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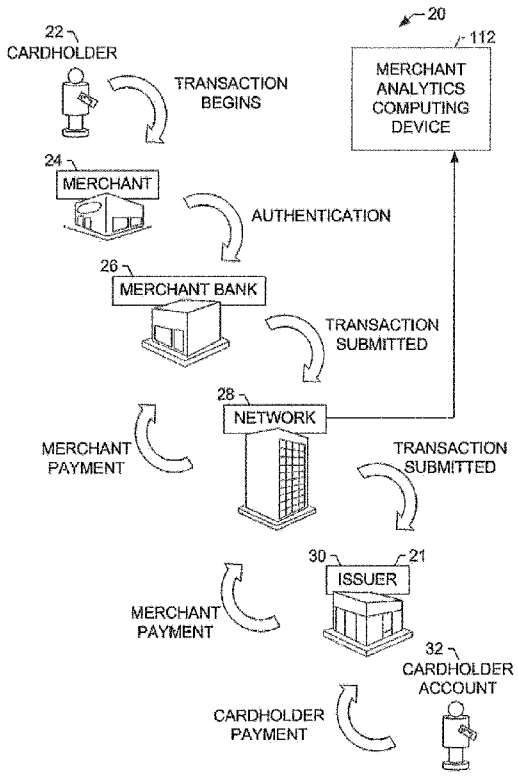
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[Continued on next page]

(54) Title: SYSTEMS AND METHODS FOR DETERMINING AN IMPACT EVENT ON A SECTOR LOCATION

FIG. 1



(57) Abstract: A method for generating and providing aggregated and analyzed merchant analytics for a sector is provided. The method includes defining a plurality of sectors and receiving transaction data for financial transactions associated with merchants and occurring within a period of time. The merchants are located in a sector. The method further includes generating aggregated merchant analytics for each sector based on the transaction data associated with all merchants located in the sector, identifying an impact event based on the aggregated data, and retrieving related content. The method further includes displaying on a user interface of the user computing device a graphical representation of the aggregated merchant analytics and the content associated with the impact event.

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SYSTEMS AND METHODS FOR DETERMINING AN IMPACT EVENT ON A SECTOR LOCATION

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims priority to U.S. Patent Application Nos. 62/162,214, filed on May 15, 2015 and 14/755,926, filed June 30, 2015, the contents of which are incorporated by reference in their entireties herein.

BACKGROUND OF THE DISCLOSURE

The field of the disclosure relates determining an impact event on a sector location, and, more specifically, to network-based methods and systems for determining an amount of an impact of an event on aggregated merchant for a sector location.

There are many parties interested in the value of a merchant, including, but not limited to, commercial real estate owners, lenders, brokers, business owners, managers, and marketing directors, as well as journalists, news organizations, economists, sociologists, and demographers. However, it is difficult to assess the value of a merchant in a manner that facilitates comparison of the merchant to other merchants in varying locations (e.g., in different areas of a city, in different states, in different countries). In particular, it may be difficult to discern which merchants demonstrate improved key business characteristics—such as growth rate, revenue stability, or consumer traffic—relative to other merchants. In some cases, it is only assumed that certain merchants are "top" earners or "top" locations. In situations where financial decisions (e.g., the distribution of marketing funds) are being made based on a relative ranking of merchants, having a more reliable metric to compare and contrast the success of one merchant compared to all other merchants may be beneficial.

Additionally, these and/or other parties may be interested in a change over time in the value of a merchant or merchants within a certain location or sector. However, it may be difficult to assess the change over time in value or other key business characteristics for specific time frames of interest. These time frames of interest may correlate to a known event (e.g., a natural disaster, layoffs in a specific location, riots, industrial accidents, and/or other events which may impact the economy within the specific location). It is further difficult to detect a change in the

value or other key business characteristics of a merchant or merchants within a certain location over time and to correlate the change in value with an unknown event which may have impacted the value or other key business characteristics. The event may have occurred within a relevant time frame encompassing the change in value. It would be beneficial to provide a party information regarding changes over time in business value or other key business characteristics which correspond to a known event such that the party can determine the impact of the event. It would further be beneficial to provide a party information that business value or other key business characteristics have changed within a certain time frame (e.g., above a certain threshold) and a correlated event which may have impacted or caused, at least in part, the change in value or other key business characteristics. It would further be beneficial to provide a party with the ability to monitor a merchant, location, and/or sector over time to track changes in value.

BRIEF DESCRIPTION OF THE DISCLSOURE

In one aspect, a method for generating and analyzing aggregated merchant analytics for a sector is provided. The method is implemented by a merchant analytics computing device including at least one processor in communication with a memory, the merchant analytics computing device in communication with a user computing device. The method includes defining a plurality of sectors of a geographic region, receiving, by the merchant analytics computing device, transaction data for financial transactions occurring within a period of time, the transaction data associated with a plurality of merchants, the plurality of merchants located in the geographic region, and identifying, for each merchant of the plurality of merchants, one sector of the plurality of sectors in which the merchant is located. The method further includes generating, by the merchant analytics computing device, aggregated merchant analytics for each sector based on the transaction data associated with all merchants of the plurality of merchants located in the sector, wherein the aggregated merchant analytics represent a ranking of each sector relative to all other sectors of the plurality of sectors. The method also includes identifying, an impact event associated with a first sector using the aggregated merchant analytics associated with the first sector, wherein the impact event is identified upon an impact trigger being satisfied. The method additionally includes retrieving content associated with the impact event from a content database and displaying, by the merchant analytics

computing device, on a user interface of the user device the aggregated merchant analytics and at least a portion of the content associated with the impact event, wherein the aggregated merchant analytics are graphically represented on a map of the defined sectors.

In another aspect, a merchant analytics computing device includes at least one processor in communication with a memory, with the merchant analytics computing device in communication with a user computing device. The processor is programmed to define a plurality of sectors of a geographic region, receive transaction data for transactions occurring within a period of time, the transaction data associated with a plurality of merchants, the plurality of merchants located in the geographic region, and identify one sector of the plurality of sectors in which each merchant of the plurality of merchants is located. The processor is further programmed to generate aggregated merchant analytics for each sector based on the transaction data associated with all merchants of the plurality of merchants located in the sector, wherein the aggregated merchant analytics represent a ranking of each sector relative to all other sectors of the plurality of sectors. The processor is also programmed to identify an impact event associated with a first sector using the aggregated merchant analytics associated with the first sector, wherein the impact event is identified upon an impact event trigger being satisfied, and retrieve content associated with the impact event from a content database. The processor is additionally programmed to cause to be displayed on a user interface of the user computing device the aggregated merchant analytics and at least a portion of the content associated with the impact event, wherein the aggregated merchant analytics are graphically represented on a map of the defined sectors.

In a further aspect, a computer-readable storage medium having computer-executable instructions embodied thereon is provided. When executed by a merchant analytics computing device including at least one processor in communication with a memory, the computer-executable instructions cause the merchant analytics computing device to define a plurality of sectors of a geographic region and receive transaction data for financial transactions occurring within a period of time, the transaction data associated with a plurality of merchants, the plurality of merchants located in the geographic region. The computer-executable instructions further cause the merchant analytics computing device to identify, for each merchant of the plurality of merchants, one sector of the plurality of sectors in which the

merchant is located, and generate aggregated merchant analytics for each sector based on the transaction data associated with all merchants of the plurality of merchants located in the sector, wherein the aggregated merchant analytics represent a ranking of each sector relative to all other sectors of the plurality of sectors. The computer-executable instructions also cause the merchant analytics computing device to identify an impact event associated with a first sector based on the aggregated merchant analytics associated with the first sector, wherein the impact event is identified upon an impact event trigger being satisfied, and retrieve content associated with the impact event from a content database. Additionally, the computer-executable instructions cause the merchant analytics computing device to display on a user interface of a user computing device the aggregated merchant analytics and the content associated with the impact event, wherein the aggregated merchant analytics are graphically represented on a map of the defined sectors.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1 – 21 show example embodiments of the methods and systems described herein.

FIG. 1 is a schematic diagram illustrating an example multi-party payment card system for enabling payment-by-card transactions and generating aggregated merchant analytics in accordance with one embodiment of the present disclosure.

FIG. 2 is an expanded block diagram of an example embodiment of a computer system used in processing payment transactions that includes a merchant analytics computing device in accordance with one example embodiment of the present disclosure.

FIG. 3 illustrates an example configuration of a server system such as the merchant analytics computing device of FIG. 2.

FIG. 4 illustrates an example configuration of a client system shown in FIG. 2.

FIG. 5 is a simplified data flow diagram for generating merchant analytics using the merchant analytics computing device of FIG. 2.

FIGS. 6-15 are example screenshots displayed on a user interface of a user computing device, including merchant analytics generated by the merchant analytics computing device of FIG. 2.

FIG. 16 is a simplified diagram of an example method for generating merchant analytics and displaying said analytics on a user interface using the merchant analytics computing device of FIG. 2.

FIG. 17 is a diagram of components of one or more example computing devices that may be used in the environment shown in FIG. 2.

FIGS. 18-20 are example screenshots displayed on a user interface of a user computing device, including merchant analytics generated by the merchant analytics computing device of FIG. 2.

FIG. 21 is an example screenshot of a monitoring report viewed on a user computing device, including merchant analytics generated by the merchant analytics computing device of FIG. 2.

Although specific features of various embodiments may be shown in some drawings and not in others, this is for convenience only. Any feature of any drawing may be referenced and/or claimed in combination with any feature of any other drawing.

DETAILED DESCRIPTION OF THE INVENTION

The systems and methods described herein facilitate the generation of aggregated merchant valuation analytics for a plurality of merchants located in an established or defined sector, and the presentation of said analytics to a user on an interactive user interface. The system described herein (i) receives transaction data associated with a plurality of merchants in a geographic region; (ii) processes the transaction data to generate aggregated merchant analytics for a plurality of sectors in the geographic region; (iii) presents said analytics to a user on an interactive user interface; and (iv) identifies a trend or occurrence of an event based on the analytics and/or monitors one or more sectors for changes in the analytics associated with the sector. The aggregated merchant analytics may be directed toward five key characteristics of a merchant or a sector including multiple merchants: growth, stability, size, traffic, and ticket size (and a composite or aggregation of those characteristics). A trend, as will be described more fully herein, may be identified or defined as an amount or percentage change of aggregated merchant analytics within a predefined location ("sector") and/or over a particular period of time.

The systems and methods described herein are implemented by a computing device that may be referred to as a "merchant analytics computing device."

The merchant analytics computing device includes a processor in communication with a memory. The merchant analytics computing device is configured to: (i) define a plurality of sectors of a geographic region; (ii) receive transaction data for transactions occurring within a period of time, the transaction data associated with a plurality of merchants, the plurality of merchants located in the geographic region; (iii) identify one sector of the plurality of sectors in which each merchant of the plurality of merchants is located; (iv) generate aggregated merchant analytics for each sector based on the transaction data associated with all merchants of the plurality of merchants located in the sector, wherein the aggregated merchant analytics represent a ranking of each sector relative to all other sectors of the plurality of sectors; (v) identify an impact event associated with a first sector using the aggregated merchant analytics associated with the first sector, wherein the impact event is identified upon an impact event trigger being satisfied; (vi) receive content associated with the impact event from a content database; and (vii) cause to be displayed on a user interface the aggregated merchant analytics and at least a portion of the received content, wherein the aggregated merchant analytics are graphically represented on a map of the defined sectors.

Sector Definition Phase

The merchant analytics computing device is configured to define a plurality of "merchant sectors," "sector locations," or "sectors" (used interchangeably herein). More specifically, the merchant analytics computing device is configured to divide up a geographic region (e.g., a country, state, city, county, etc.) into a plurality of sectors containing merchants therein (i.e., a subset of a plurality of merchants located within the geographic region). The sector may be defined by a geographic boundary containing the plurality of merchants therein. In an example embodiment, sectors are defined according to census blocks, and the geographic boundaries of a sector correspond to the geographic boundaries of the census block. In some embodiments, each sector includes at least five merchants. Accordingly, where a sector is initially defined as a census block including fewer than five merchants, the geographic boundaries of the sector are expanded or adjusted to include at least one additional census block until the sector includes at least five merchants. In some embodiments, each sector may include up to n merchants, where n is an integer greater than five.

As described above, sectors may be defined on a geographic scale as small as a census block (which may be as small as a city block). However, sectors at the census block level may be "rolled up" or aggregated into larger, block-group level sectors, which may correspond to block groups as defined by the United States Census Bureau. Block-group level sectors may be rolled up or aggregated into large sectors, such as city- or county-level sectors, which themselves may be rolled up or aggregated into state- or nation-level sectors. The (geographic) size of the sectors may depend, in an example embodiment, on a user's view of a map on an interactive user interface, the map displaying the defined sectors. For example, is a user is viewing an entire nation, the sectors may be displayed at a state level. If the user is viewing a particular county, the sectors may be displayed at a block-group or block level.

As will be described further herein, the merchant analytics computing device is configured to determine "aggregated merchant analytics" for each sector based at least in part on received transaction data for the merchants located in the sector. The merchant analytics are indicative of the financial success of the sector relative to other sectors in that geographic region. For example, the merchant analytics computing device rank or score a sector relative to other sectors in a county or in a state. In one example embodiment, the merchant analytics computing device is configured to determine and provide merchant analytics, which may include a numerical score, for a sector based on aggregated merchant analytics for individual merchants located within the sector. For example, if a sector includes five merchants, the merchant analytics computing device may process transaction data for each individual merchant to generate analytics for each particular merchant. The merchant analytics computing device may then aggregate the individual analytics to determine "aggregated merchant analytics" for the sector as a whole. A weighted average may also be used, which may give more weight to certain merchants in the sector. Alternatively, the merchant analytics computing device may determine the aggregated merchant analytics for the sector using any other aggregation or combination of the individual merchant analytics.

The merchant analytics computing device may define or establish the sectors before receiving the transaction data. For example, the merchant analytics computing device may use available public information (e.g., census data) to define sectors. The merchant analytics computing device may define sectors such that each sector includes at least five merchants located therein. In some embodiments, the

merchant analytics computing device may define the sectors using the received transaction data. For example, the merchant analytics computing device may use merchant identifiers included in the transaction data to identify a location of each merchant, and then define the sectors.

The merchant analytics computing device may store transaction data, defined sectors, and/or merchant analytics (aggregated and/or individual) in a database. Each merchant for which associated transaction data and/or scores are stored may be indexed or identified in the database by at least one sector identifier and/or by merchant industry. Accordingly, the merchant analytics computing device may be configured to not only provide analytics for sectors, but may also be configured to provide analytics for particular industries and/or for particular merchants within that industry. For example, the merchant analytics computing device may generate merchant analytics for a plurality of sectors in Charlotte, North Carolina, USA, relative to other sectors in North Carolina and may generate analytics for a particular restaurant in Charlotte relative to other restaurants in the city of Charlotte, the state of North Carolina, or the United States. Moreover, a particular merchant may be indexed by (i.e., be located in) multiple sectors. For example, a merchant at Charlotte-Douglas Airport may be included in a "block" sector (named as such because such a sector may take up an area as small as a city block, in some embodiments the smallest available sector division), a "block group" sector (representative of an area that is small but that includes at least one "block" sector, for example, a census tract), a Mecklenburg County sector, a Charlotte (city) sector, a North Carolina sector, and a United States sector.

Merchant and/or transaction data may be indexed by, assigned to, or otherwise associated with a sector based on an address or other location information included in the transaction data. For example, the transaction data may specify that a transaction is initiated at a merchant having an address within Mecklenburg County and/or within the city of Charlotte. The transaction data is then assigned, by the merchant analytics computing device receiving the transaction data, one or more sector identifiers (e.g., Mecklenburg County and/or Charlotte and/or assigned predefined numerical identifiers corresponding to the sectors). The address may be included in the transaction data or alternatively may be retrieved from a database of merchants based on a merchant identifier included in the transaction data. For example, the transaction data may include a merchant name, a merchant identification

number, an account number associated with the merchant, and/or other merchant identifier. The merchant analytics computing device may query a local or remote database using one or more merchant identifier(s) to retrieve an address, geographic area, and/or other location information associated with the merchant. For example, the database may store information about merchants in tuple form including location information and merchant identifier(s) as entries in the tuple. The plurality of tuples corresponding to a plurality of merchants may be searchable such that a match identified for one piece of information stored in the tuple (e.g., merchant identifiers(s)) will return a related piece of information stored in the same tuple in the database (e.g., merchant location information). In one embodiment, the merchant analytics computing device provides the search information (e.g., the merchant identifier) to the database along with the search query (e.g., instructions to perform the search and return related information). In an alternative embodiment, the merchant analytics computing device includes instructions for performing the search on information stored in the database (e.g., one or more search functions, algorithms, and/or other instructions for returning related information from a database based on a submitted query term(s)).

Based on the merchant location information, either included in the transaction data or determined based on the transaction data, the merchant analytics computing device may associate the transaction with a corresponding sector that encompasses the merchant location. In some embodiments, each transaction is analyzed to determine the corresponding sector based on merchant location information. In alternative embodiments, once a merchant has been assigned to a sector by the merchant analytics computing device, all transaction data associated with that merchant is automatically associated with the sector corresponding to the merchant. To associate transaction data with a sector, the merchant analytics computing device may store the transaction data and the corresponding sector (e.g., identified based on merchant location information as described above) as a tuple, with or without additional information, in a database. The merchant analytics computing device may assign a sector identifier to the transaction data and/or the merchant based on the definition of the sector(s) and whether or not the sector(s) encompass the merchant location. The database may be local to the merchant analytics computing device. The database may be located remote from the merchant analytics computing

device and accessed by the merchant analytics computing device via a network connection to a device storing the database.

The preceding description of the Sector Definition Phase may be implemented as a function, computer program, algorithm, and/or other instructions which perform the specific functions described. The function, computer program, algorithm, and/or other instructions may be stored in memory of the merchant analytics computing device as a module and executed by a processor of the merchant analytics computing device to perform the functions described herein according to algorithm(s) described.

Setup Phase

In the example embodiment, the merchant analytics computing device is configured to receive information describing a merchant in a merchant management portfolio during a configuration period referred to as a "Setup Phase." In an example embodiment, a user (e.g., a commercial real estate owner or lender, a business owner, or marketing director) may access the merchant analytics computing device (directly or via any suitable client user computing device in communication with the merchant analytics computing device) and may provide such information. The information is received by the merchant analytics computing device. Information describing or associated with particular merchants may be referred to as "merchant definitions," and may be used to identify and/or evaluate (e.g., score) each merchant. Merchant definitions include information associated with merchant locations including property identifiers, property location information, address(es), and/or other merchant location information. Merchant definitions may further include merchant classification information. In some implementations, merchant definitions may further include information relating to the real estate asset or property of which the merchant is a tenant (or owner), as described in co-owned U.S. Patent Application No. 14/564,440, the contents of which are herein incorporated by reference. For example, merchant definitions may further include pricing of a real estate asset, vacancy factors of the asset, square footage of the asset, tax information associated with the asset, and other data that may be used to adjust the analytics (e.g., valuation) of a tenant merchant and/or of a real estate asset. The user may also provide various other data associated with the user ("user data"). For example, in implementations in which the user is associated with a business (e.g., a merchant), the user may import or provide various

metrics associated with the business, including budgets, marketing data, and/or goals (e.g., increase growth, increase ticket size, increase traffic).

As used herein, "merchant management portfolio" (alternately referred to as a "portfolio") refers to a collection of merchants in different locations but managed by one entity or user, generally. In the example embodiment, a merchant management portfolio may be described by merchant definitions and/or user data and may be represented as an electronic record that may be referred to as a "merchant management portfolio record" or a "portfolio record." Accordingly, the merchant analytics computing device processes merchant definitions and any imported user data associated with a plurality of merchants to create a portfolio record.

"Property identifiers" may include known names (or any suitable unique alphanumeric identifier) of commercial real estate assets of which a merchant is a tenant, owner, etc. (e.g., "XYZ Mall"). In an example embodiment, the merchant analytics computing device uses property identifiers to designate a location for each merchant within the portfolio record. As described below, a user may accordingly view and manage individual merchants within a portfolio distinguished by identifiers including property identifiers.

"Property location information" may include any information defining the geographic location of a merchant and/or other merchant location information. In some examples, property location information may include physical addresses, geographic coordinates in latitude and longitude, elevation information (e.g., a floor or floors of a building associated with a commercial real estate asset), and any other suitable information. In some examples, property location information may include boundary information defining a physical area (or areas) containing the merchant. In an example embodiment, property location information may be used by the merchant analytics computing device to identify the merchant graphically (i.e., to provide visually mapped information showing the physical location of the merchant).

"Merchant classification information" includes information categorizing the merchant within categories that may be relevant to the monitoring of the value of the merchant. For example, merchant classification information may categorize a merchant according to a particular industry, location, or other classification, for example, "retail", "office", "warehouse", "manufacturing", "healthcare," "outdoor mall", "indoor mall" and any other suitable information.

The merchant analytics computing device may also generate a unique portfolio identifier in the Setup Phase to identify the portfolio record. Accordingly, a user device (operated by a user) may provide such a portfolio identifier at a later point in time and retrieve the portfolio record to review or monitor portfolio defined by the portfolio record. The portfolio record may be stored in a database (e.g., as a listing of or series of tuples for each merchant definition identified by the user as included in the portfolio). The portfolio may be used to track, store, present, output, and/or otherwise manipulate merchant analytics for a plurality of merchants within a single portfolio. Merchants may be assigned a portfolio identifier (e.g., number, string, and/or other piece of information) by the merchant analytics computing device in response to receiving the merchant definitions and/or identification of merchant definitions as included in the portfolio from a user. For example, the merchant analytics computing device may include a portfolio identification number as one entry of a tuple for each merchant definition included in the portfolio as identified by the user. This allows the merchant analytics computing device to retrieve information stored with and/or as a part of the merchant definition (e.g., in the tuple for each merchant) based on the portfolio identification number such that information related to all the merchants within the portfolio may be retrieved.

In at least some examples, the user data received by the merchant analytics computing device includes a plurality of investment goals associated with each merchant and/or with the portfolio. At least parties associated with the portfolio (e.g., commercial owners or lenders, marketing directors, investors, managers) may have varying financial goals for a portfolio. Because investors and lenders may vary in their underlying interests, the merchant analytics computing device may be configured to monitor merchants pursuant to such investment goals. For example, the merchant analytics computing device may be configured to identify certain merchants meeting or exceeding the investment goals and other merchants not meeting the investment goals, such that the investors may make financial decisions regarding the relative worth or success of the various merchants. In one embodiment, the merchant analytics computing device receives investment goal information for a particular merchant from a user (e.g., from a client device used by the user). The merchant analytics computing device may store the goal information in a database entry corresponding to the related merchant. For example, the goal information may be stored as an entry in a tuple which includes merchant identifier(s), merchant analytics

determined as described herein, and/or other information. The merchant analytics computing device may determine if a particular merchant has met or exceeded an investment goal by comparing the goal information stored in the tuple with the merchant analytics and/or transaction data stored in the tuple. For example, the merchant analytics computing device may take goal information of a merchant and subtract from this goal the corresponding merchant analytics stored in the tuple. If the difference is positive, then the goal has not been met or exceeded. If the difference is zero or negative then the goal has been met or exceeded, respectively. Other analytical tools or methods may be used to determine if goals are met in other embodiments. The determination of whether a goal has been met or exceeded can be output and/or displayed to a user or other location (e.g., the determination may be output as instructions to control the display of information on a user interface of a user-controlled client device in communication with the merchant analytics computing device). The user data may also include various specifications descriptive of existing merchants and/or merchant locations in the portfolio or descriptive of merchants and/or merchant locations outside of the portfolio (in the case of a commercial real estate broker looking to buy, rent, or lease a merchant location).

In one particular example, a business may own, or otherwise be associated with, multiple merchants at multiple merchant locations. A user interested in the marketing money invested in the various merchants (e.g., a marketing director or Chief Marketing Officer) may import investment goals to the merchant analytics computing device that accord with the goals of the business. For example, the user may have a marketing budget of $500 million. The investment goals may prioritize the merchants with the highest growth, such that a higher percentage of the marketing budget may be spent near those merchants. The investment goals may alternatively prioritize merchants with the highest traffic, highest ticket size, or highest stability. Accordingly, as will be described further herein, the merchant analytics computing device may use the investment goals to identify the merchant(s) with the strongest merchant analytics (e.g., highest scores) to the user.

The preceding description of the Setup Phase may be implemented as a function, computer program, algorithm, and/or other instructions which perform the specific functions described. The function, computer program, algorithm, and/or other instructions may be stored in memory of the merchant analytics computing device as

a module and executed by a processor of the merchant analytics computing device to perform the functions described herein according to algorithm(s) described.

Evaluation Phase

In an example embodiment, the merchant analytics computing device generates analytics (e.g., a score) associated with a merchant or a sector in a process that may be referred to as the "Evaluation Phase." The merchant analytics computing device is configured to generate the analytics based on received transaction data associated with the merchant or sector. As used herein, "transaction data" may include transaction amounts, merchant identifiers, account identifiers, associated time and date stamps, and data descriptive of the product(s) and/or services purchased. Merchant identifiers may include an identifier of the merchant at which the transaction was initiated and/or an identifier of the physical location (e.g., a street address, geographic coordinates, etc.) of the merchant. In the example embodiment, the merchant analytics computing device receives transaction data from a payment processor integral to or associated with a payment processing network. In some embodiments, the transaction data is anonymized and aggregated by merchant prior to receipt by the merchant analytics computing device (i.e., no personally identifiable information (PII) is received by the merchant analytics computing device). In other embodiments, the merchant analytics computing device may be configured to receive transaction data that is not yet anonymized and/or aggregated, and thus may be configured to anonymize and aggregate the transaction data. In such embodiments, any PII received by the merchant analytics computing device is received and processed in an encrypted format, or is received with the consent of the individual with which the PII is associated. In situations in which the systems discussed herein collect personal information about individuals including cardholders or merchants, or may make use of such personal information, the individuals may be provided with an opportunity to control whether such information is collected or to control whether and/or how such information is used. In addition, certain data may be processed in one or more ways before it is stored or used, so that personally identifiable information is removed.

The merchant analytics computing device may generate multiple merchant analytics for each merchant and may generate "aggregated merchant analytics" for each sector (i.e., aggregation of the merchant analytics generated for

each merchant located in the sector). For example, the "merchant analytics" may include at least one of a growth score, a stability score, a size score, a ticket size score, a traffic score, and a composite score for each sector. A "growth score" is a ranking of the growth of the sector relative to other sectors in the geographic region, wherein "growth" refers generally to sales revenue growth over a period of time. A "stability score" is a ranking of the stability of the sector, wherein "stability" refers generally to a maintenance of sales revenue within a range of sales revenues around an average. A "size score" is a ranking of the size of the sector, wherein "size" refers generally to total sales revenue. A "traffic score" is a ranking of the traffic of the sector, wherein "traffic" refers generally to a number of monthly transactions. A "ticket size score" is a ranking of the ticket size of the sector, wherein "ticket size" refers generally to a transaction amount, and may be calculated by dividing the size by the traffic (i.e., dividing sales revenue by the number of transactions). A "composite score" is a composite of the previous five scores (growth, stability, size, traffic, and ticket size), to provide an overall ranking of the sector. Where the general term "score" without a modifier is used herein, it may refer collectively to any or all of the preceding scores to describe characteristics shared by some or all of the scores. Each of these scores (collectively "analytics") may be generated for each merchant within a sector and may be subsequently aggregated to generate aggregated merchant analytics for the sector.

In the example embodiment, the score is normalized to be between 0 and 1,000. In some embodiments, a higher score indicates a "better" sector (i.e., a higher relative ranking). For example, a sector with a score of 800 may rank higher on any or all of the above-described factors than a sector with a score of 300. A "Better" sector refers to a sector that is preferred over other sectors (or is performing better) based upon the financial transactions performed at merchants located within that sector.

In the example embodiment, the merchant analytics computing device receives transaction data associated with merchants that spans a period of time. For example, the merchant analytics computing device may receive and process transaction data for a merchant or sector that spans between one month and at least four years prior to the date of receipt. Accordingly, the merchant analytics computing device may generate the analytics as functions of time. For example, a growth score would be meaningless if there were no transaction data for a past date or time period

from which to determine relative growth. In the example embodiment, the merchant analytics computing device generates analytics for each merchant and/or sector using 12 months' or one year's worth of transaction data for the merchant and/or sector. Accordingly, a growth score is representative of the growth of the sector over the past year, the stability score is representative of the stability of the sector over the past year, etc. In various alternative embodiments, various other time ranges are used for the calculation period. For example, the period of time used in determining the score may be three weeks, two weeks, a week, five days, three days, a day, or any number of hours. Transaction data may include an indication of the time at which the transaction occurred such that the time period used for calculating the score may be determined based on the resolution of the time component of the transaction data (e.g., if the time associated with the transaction in the transaction data is reported down to the day, hour, minute, second or other time interval).

In other embodiments, the merchant analytics computing device may be further configured to determine a "spot" score of any of the above-described scores, wherein a "spot" score refers generally to a score calculated for a shorter period of time, for example, three months as opposed to twelve months. The spot score may be used to determine changes in the characteristics of the merchant over a short period of time that may be masked or hidden when scoring the merchant over a year. For example, if a merchant debuted a new, highly anticipated product two months ago, a dramatic increase in sales growth over those two months may be dulled by looking at the full year's growth. As another example, if a sector (e.g., a particular city neighborhood) enacted multiple marketing campaigns over the course of a year, it may be difficult to determine which particular campaign was the most effective in increasing traffic, if the entire year's worth of transaction data is used to score the sector.

In some embodiments, the time period for determining the score and/or spot score is user definable. A user may select the time period by providing an input to the merchant analytics computing device via a client system (e.g., a user computing device) and user interface thereof, the client system in communication with the merchant analytics computing device via a network. A user may select the time resolution of the scores and/or other merchant analytics displayed on the client system user interface such that the user may view changes in the scores and/or other merchant analytics for one or more sectors across different time periods (e.g., week by week,

month by month, year by year, and/or other time periods). The time resolution may determine the time period used to determine the scores and/or other merchant analytics for each time period, or the scores and/or merchant other analytics may be determined based on a fixed time period with the selected time resolution changing the displayed information but not the determination of the scores and/or other merchant analytics. For example, the time period may be fixed at one month such that when a user selects a time resolution of one year the scores and/or merchant analytics displayed are "by year" with the scores and/or other merchant analytics averaged across the 12 months in each year. Alternative techniques may be used to transform the scores and/or other merchant analytics from time period based to time resolution based. For example, rather than averaging the time periods within the time resolution, the score and/or other merchant analytic value of the first time period within the time resolution may be used as the value for the entire time resolution (e.g., the values from the first month of the year are displayed for each year).

In one embodiment, the merchant analytics computing device may determine a growth score for a merchant using the received transaction data over a time period (e.g., a year, month, and/or other time period). The merchant analytics computing device determines the increase or decrease in the sales revenue for the merchant over that time period based on the aggregation of all of the transaction data associated with the merchant (e.g., by taking the difference of the sales revenue for the time period and the prior time period). Additionally or alternatively, the growth for a merchant may be calculated by fitting total sales revenue (e.g., per time period) to a regression line and tracking resulting slopes. Additionally or alternatively, quarterly sales revenue (i.e., 3-months' worth of sales revenue data) may be calculated and compared to the corresponding quarter of the previous year. For example, the merchant analytics computing device may take the difference between the quarterly sales revenue for a quarter of one year and the quarterly sales revenue for the same quarter of a prior year. As the growth score is a relative ranking, the merchant analytics computing device may compare a determined growth of each merchant prior to providing the numerical growth score for each merchant. For example, the merchant analytics computing device may sort each raw growth calculation (e.g., the difference in revenue between time periods) for each merchant and/or sector by size of the difference. Based on the ranking of each raw growth, the merchant analytics computing device may assign normalized growth scores to each

merchant and/or sector. The merchant analytics computing device may then use the growth scores of all of the merchants in a sector to determine an aggregated growth score for the sector (e.g., an average or weighted average of the merchant growth scores for the merchants within the sector). Alternatively, the merchant analytics computing device may use the determined growth of each merchant in a sector to determine an aggregated growth score for the sector and may subsequently compare sectors. The merchant analytics computing device may then provide the (numerical) growth score for the sector.

In one embodiment, the merchant analytics computing device may determine a stability score for a merchant using the received transaction data over a time period (e.g., a year, month, and/or other time period). The stability of a merchant is a metric or analytic of the volatility of the merchant's cash flow. The merchant analytics computing device may determine an average sales revenue for the merchant over set time intervals within the time period or may receive an average sales revenue for the merchant, per time interval or over the time period. The average sales revenue for the merchant may be an "expected" average sales revenue or other value received from a user associated with the merchant or may be retrieved from a database. The merchant analytics computing device may then determine a value range around that average (e.g., one standard deviation, a certain percentage or fraction of the average, or any other suitable range) which indicates stable sales revenue. Using aggregated transaction data, the merchant analytics computing device identifies whether the merchant had sales revenue within that range during each time interval in the time period or over the time period as a whole. Falling outside of the range indicates less stable sales revenue and lowers the ranking of the merchant in terms of stability (e.g., an increasing number of time intervals during the time period in which the value falls outside the range results in a decreased stability ranking). For example, the merchant analytics computing device may use monthly transaction data to determine, at each month, whether the merchant had sales revenue within the predetermined range. Alternatively, the merchant analytics computing device may use transaction data from any other interval (e.g., each week, every two weeks, over the year, etc.) to determine the stability of the sales revenue of the merchant.

Because the stability score is a relative ranking, the merchant analytics computing device may compare a determined stability of each merchant prior to providing the numerical stability score for each merchant. The merchant analytics

computing device may then use the stability scores of all of the merchants in a sector to determine an aggregated stability score for the sector (e.g., an average or weighted average of the merchant stability scores for the merchants within the sector). Alternatively, the merchant analytics computing device may use the determined stability of each merchant in a sector to determine an aggregated stability score for the sector and may subsequently compare sectors. The merchant analytics computing device may then provide the (numerical) stability score for the sector.

In one embodiment, the merchant analytics computing device may determine a size score for a merchant using the received transaction data associated with the merchant over a time period (e.g., a year, month, and/or other time period). The size metric or analytic may be considered a proxy analytic for how large a particular merchant or business is. The merchant analytics computing device may aggregate the total sales revenue for the merchant for each month or other time interval in the time period, or over the whole time period. As the size score is a relative ranking, the merchant analytics computing device may compare a determined size of each merchant prior to providing the numerical size score for each merchant. The merchant analytics computing device may then use the size scores of all of the merchants in a sector to determine an aggregated size score for the sector (e.g., an average or weighted average of the merchant size scores for the merchants within the sector). Alternatively, the merchant analytics computing device may use the determined size of each merchant in a sector to determine an aggregated size score for the sector and may subsequently compare sectors. The merchant analytics computing device may then provide the (numerical) size score for the sector.

In one embodiment, the merchant analytics computing device may determine the traffic score for a merchant using the received transaction data over a period of time (e.g., a year, month, and/or other time period). The merchant analytics computing device may identify a number of transactions completed at the merchant for the entire time period to determine the traffic for the merchant, or may identify the number of transactions for each of a set time interval in the time period (e.g., each month in the year). Additionally or alternatively, other data may be used to determine the traffic at a merchant, including mobile device signal data, as described in co-owned U.S. Patent Application No. 14/708,020, the contents of which are hereby incorporated by reference. As the traffic score is a relative ranking, the merchant analytics computing device may compare a determined traffic of each merchant prior

to providing the numerical traffic score for each merchant. The merchant analytics computing device may then use the traffic scores of all of the merchants in a sector to determine an aggregated traffic score for the sector (e.g., an average or weighted average of the merchant traffic scores for the merchants within the sector). Alternatively, the merchant analytics computing device may use the determined traffic of each merchant in a sector to determine an aggregated traffic score for the sector and may subsequently compare sectors. The merchant analytics computing device may then provide the (numerical) traffic score for the sector.

In one embodiment, the merchant analytics computing device may determine a ticket size score for a merchant using the received transaction data over a time period (e.g., a year, month, and/or other time period) and/or using the determined size and traffic for the merchant. The ticket size (also referred to herein as an "average ticket size") enables improved visibility into the types of merchant in a sector. A low average ticket size, for example, around $5, may indicate a sector includes restaurants or coffee shops. A higher average ticket size, for example, around $2,000, may indicate a sector includes jewelry stores, electronics merchants, or furniture stores. The merchant analytics computing device may calculate the ticket size for the merchant by dividing a sales revenue of the merchant by a number of transactions (e.g., for the time period). Alternatively, the merchant analytics computing device may calculate the ticket size by dividing a size of the merchant, as determined above, by a traffic of the merchant, as determined above. As the ticket size score is a relative ranking, the merchant analytics computing device may compare a determined ticket size of each merchant prior to providing the numerical ticket size score for each merchant. The merchant analytics computing device may then use the ticket size scores of all of the merchants in a sector to determine an aggregated ticket size score for the sector (e.g., an average or weighted average of the merchant ticket size scores for the merchants within the sector). Alternatively, the merchant analytics computing device may use the determined ticket size of each merchant in a sector to determine an aggregated ticket size score for the sector and may subsequently compare sectors. The merchant analytics computing device may then provide the (numerical) ticket size score for the sector.

In one embodiment, the merchant analytics computing device may determine a composite score for a merchant based on the growth, stability, size, traffic, and/or ticket size score for the merchant. The composite score may be for a

time period. The merchant analytics computing device may determine a composite score for a sector, which may be an average of all five scores, may be a weighted average of all five scores, or may be any other combination or aggregation of the five scores for the merchants within the sector (e.g., an average or weighted average of the merchant composite scores for the merchants within the sector) or of the five scores for the sector itself. Alternatively, the composite score for a sector may be an average, weighted average, or any other aggregation of the composite scores of the merchants in the sector. The composite score is intended to be an "at-a-glance" ranking of the relative success of the sector, taken as a function of the five identified characteristics that may reflect the success of a business.

In some embodiments, the merchant analytics computing device may be configured to generate and store merchant analytics for a merchant and/or a sector over multiple periods of time. For example, the merchant analytics computing device may initially generate a score based on transaction data having timestamps from June 1, 2013 – June 1, 2014 and may store that score as Score 1. The merchant analytics computing device may then generate a score based on transaction data having timestamps from July 1, 2013 – July 1, 2014, and may store that score as Score 2. The merchant analytics computing device may store *N* scores (or any other analytics) for a merchant and/or a sector, wherein *N* is an integer greater than one. Accordingly, the merchant analytics computing device may store a time series of scores (or any other analytics) for a merchant and/or a sector, which collects all *N* scores for the merchant and/or the sector sequentially (i.e., in order of time, from oldest to newest). In some embodiments, the time period for which sequential scores and/or analytics are stored is one month. In various other embodiments, various other time periods are used (e.g., one week, one year, and/or other time periods). The scores for multiple periods of times may be stored by the merchant analytics computing device in the database as "score data". For example, the scores for multiple periods of time may be stored as a tuple including a merchant identifier and/or a sector identifier as one entry and each score in the series of scores corresponding to multiple time periods stored as additional individual entries. For example, the sector identifier may be one entry, Score 1 may be a second entry, Score 2 may be a third entry, and so on for *N* scores. Information relating to the time period(s) and/or duration of each time period may be stored as further entries. In an alternative example, the series of scores and corresponding time periods may be stored as a one or more matrices corresponding to

one or more merchants and/or sectors. As described in greater detail herein with reference to the Trend Identification Phase and User Interface, the merchant analytics computing device may use score data (e.g., time series of scores) stored for a plurality of time periods to identify trends in the scores, compare scores corresponding to different time periods, and/or cause a user computing device to display information related to the identification of trends in the scores and/or comparisons of scores at varying times.

In one embodiment, the merchant analytics computing device may update a portfolio record with any or all of the analytics for a merchant and/or any or all aggregated merchant analytics for a sector in which the merchant is located. The merchant analytics computing device may be configured to determine analytics for the portfolio as a whole, using the generated analytics for each merchant in the portfolio and/or each corresponding sector. The merchant analytics computing device may be further configured to sort the merchants in a portfolio based on the investment goals for the portfolio. For example, if an investment goal identifies growth as a priority, the merchant analytics computing device may sort the merchant records in the portfolio record according to highest growth score. If there are no investment goals or if there are conflicting investment goals, the merchant analytics computing device may sort the merchant records in the portfolio according to highest composite score.

The preceding description of the Evaluation Phase may be implemented as a function, computer program, algorithm, and/or other instructions which perform the specific functions described. The function, computer program, algorithm, and/or other instructions may be stored in memory of the merchant analytics computing device as a module and executed by a processor of the merchant analytics computing device to perform the functions described herein according to algorithm(s) described.

Optimization Phase

The system is also configured to facilitate optimization of portfolios in an "Optimization Phase." In one example, the system is configured to sort the merchant records in the portfolio according to the investment goals of a user. As described briefly above, some users may be responsible for or otherwise interested in a distribution of a marketing budget according to the investment goals, in some cases

prioritizing growth or traffic or stability, as desired. If the user (a CMO, in this example, for illustrative purposes only) has a specific, predetermined budget and predetermined investment goals, the system may enable the CMO to distribute the budget based on the evaluation of all of the merchants in the CMO's portfolio. If, for example, the CMO chose to prioritize growth in his/her investment goals for his/her associated business, the system may sort the merchant location records in the portfolio from highest growth score to lowest growth score and may present the results as a list. In some implementations, the CMO may import more specific investment goals to the system. For example, the CMO may indicate that 15% of his/her budget is to be spent on the top 5% of merchants in the portfolio with the highest growth. The next 15% is to be spent on the 10% of merchants with the next-highest growth. The next 10% is to be spent on the 10% of the merchants with the next-highest growth, and so on and so forth. The system may use these specific investment goals and output an optimized portfolio record that divides the merchant records into the desired percentiles.

In another example, the system is configured to provide recommendations for new locations for merchants using existing merchant records in a portfolio. In this example, a user (a real estate broker, for illustrative purposes only) may have received an offer from a merchant to rent (or lease) a merchant location (e.g., a property or a portion of a property). The merchant may have a particular sector in mind, or may have indicated in the offer that he/she desires a merchant location having certain specifications (e.g., a merchant location in a high-traffic sector). The real estate broker may import the specifications into the system, which may output an optimized portfolio to the real estate broker including sector records of sectors including available merchant locations having the specifications. Alternatively, the real estate broker may use the system to locate and/or suggest a sector other than the particular sector identified in the offer, by illustrating (using a user interface provided by the system) higher performance (e.g., higher traffic or higher growth) in a different sector. In another related example, the real estate broker may have an existing client complaining of poor performance at his/her merchant location. The real estate broker may illustrate (using the user interface provided by the system) slowing growth or traffic trends in the client's current sector, and may suggest relocation to a sector with higher recent performance.

The preceding description of the Optimization Phase may be implemented as a function, computer program, algorithm, and/or other instructions

which perform the specific functions described. The function, computer program, algorithm, and/or other instructions may be stored in memory of the merchant analytics computing device as a module and executed by a processor of the merchant analytics computing device to perform the functions described herein according to algorithm(s) described.

Trend Identification Phase

In some embodiments, the merchant analytics computing device is configured to identify trends and/or other events, including short-term changes in scores (collectively referred to herein as "impact events"), using score data for merchants and/or sectors. Such impact events may occur as a result of real-world events occurring in effected sectors. For example, certain sector scores may trend downwards as a result of emigration from a region due to poor economic opportunity. As another example, certain sector scores may drop dramatically due to a natural disaster or a "man-made disaster" such a riot or a terrorist attack. In at least some cases, it may be difficult to determine which particular real-world event, if any, has precipitated the impact event on the sector scores. Accordingly, the merchant analytics computing device is configured to identify these impact events in the Trend Identification Phase and determine a potential real-world event that may correlate to the particular impact event in the Trend Analysis Phase, as described below.

The merchant analytics computing device uses a series of scores and/or transaction data corresponding to a plurality of time periods to identify impact events. In one embodiment, an impact event is identified when an impact event trigger (or "trigger," used interchangeably herein) is satisfied. Upon an identification of an impact event, the merchant analytics computing device may notify a user of the identified impact event. This notification may occur through a user computing device and associated user interface, on which the merchant analytics computing device displays a notification and/or other information. The notification may be a report that is delivered to the user by the merchant analytics computing device. For example, the merchant analytics computing device may cause the report to be presented in the user interface of the user computing device and/or cause an e-mail to be sent to an address of the user which includes the report. One embodiment of the report is discussed in greater detail herein with reference to FIG. 21.

The merchant analytics computing device analyzes the score and/or transaction data over time in order to identify trends. The trigger for a trend may include, for example, a threshold amount (e.g., percentage, fraction, or absolute numerical) change in the score(s) of a sector or a plurality of sectors within a particular interval of time (e.g., a week, a month, two months, six months, a year, or any other time period(s)), or a particular number of time periods over which such a change in score(s) occurs. For example, the merchant analytics computing device may identify a trend of an increasing score over multiple periods. This increase trend may be identified by taking the difference of the score for a time period and the preceding time period. If the difference is positive, an increase between time periods has been identified. The merchant analytics computing device may track score increases between periods and determine the number of consecutive time periods in which the score has increased (e.g., using a counter value stored in the database and linked to the type of score and merchant and/or sector). If the determined number of consecutive time periods is greater than a predetermined trigger number (e.g., 0, 1, 5, 10, etc.), the trigger may be satisfied, and the merchant analytics computing device may identify a trend of increasing scores. The predetermined number of periods may be specified by a user in some embodiments. The merchant analytics computing device may identify the trend by setting a value or flag stored in the database associated with the type of score, merchant, time periods included in the trend, and/or sector. The flag indicates that an event has been identified. Similarly, the merchant analytics computing device may identify a trend of a decreasing score. For example, if the difference between the score for a time period and the preceding time period is negative, a decrease is identified. If a decrease is identified for consecutive time periods greater than the predetermined number of time periods a decreasing score trend is identified.

Additional trends may be identified by the merchant analytics computing device. For example, the merchant analytics computing device may identify a plateau in score values over a plurality of time periods. The merchant analytics computing device may take the difference between score values for consecutive time periods. If the difference falls within a predetermined range, a plateau period may be identified. The merchant analytics computing device may track the number of consecutive plateau periods (e.g., using a counter value), and if the number of consecutive plateau periods is greater than a predetermined trigger number (e.g., 0, 1, 5, 10, etc.), the merchant analytics computing device determines that a

plateau trend trigger has been satisfied and identifies the impact event (i.e., the plateau trend). The merchant analytics computing device may identify the trend by setting a flag stored in the database associated with the type of score, merchant, time periods included in the trend, and/or sector. The flag indicates that an event has been identified.

Still further trends may be identified by the merchant analytics computing device. For example, the merchant analytics computing device may identify an upturn in scores. The merchant analytics computing device may determine a slope of a score across multiple time periods. For example, the merchant analytics computing device may take the difference between a score value for one time period and the score value for the preceding time period and divide by the difference between the time periods. In an alternative embodiment, the merchant analytics computing device may plot the score values and corresponding time periods for a plurality of time periods and use one or more curve fitting algorithms (e.g., least squares, ordinary least squares, Gaussian function, Gauss-Newton, and/or other algorithms) and/or derivative algorithms and/or other numerical derivations (e.g., Newton's difference quotient, Simpson's method, Trapezium rule, and/or other algorithms) to determine the derivative of the score values over time. The merchant analytics computing device may determine that within a predetermined number of time periods (e.g., 3, 5, 8, 10, etc.), the slope or derivative changes from negative to positive, which may satisfy an impact event trigger. In that case, the merchant analytics computing device may identify the time periods as including or representing an upturn trend (e.g., set a flag for that time period and/or scores in the database, wherein he flag indicates that an impact event trigger has been satisfied). In further embodiments, additional criteria may be required to trigger the identification of an upturn trend. For example, following the change in slope or derivative from negative to positive, the merchant analytics computing device may determine that the score continues to increase for a predetermined number of periods (e.g., by taking the difference between consecutive periods). Alternatively or additionally, the merchant analytics computing device may determine that the score increases at a rate (e.g., slope or derivative) above a predetermined value, wherein the predetermined value may be the impact event trigger. Alternatively or additionally, the merchant analytics computing device may determine if similar criteria are met for the time periods prior to the change in slope (e.g., determine that at least a predetermined number of periods,

before the change to positive slope or derivative, have a negative slope or derivative and/or that the periods before the change to positive slope or derivative have an absolute slope or derivative above a predetermined value). Similarly, the merchant analytics computing device may identify a trend of a downturn in a score using similar techniques to identify the slope or derivative changes from positive to negative and/or that other criteria are satisfied.

The merchant analytics computing device identifies other impact events in some embodiments. Impact events may include changes in a score and/or transaction data which occur over a shorter number of time periods in contrast to trends, although this is not required in all cases. For example, the merchant analytics computing device may identify as an event a large change in a score value over a predetermined number of periods. The merchant analytics computing device may take the difference between the score value in a first period and the score value in a second earlier period (e.g., the first period prior, the third period prior, and/or other prior period). If the absolute value of the difference in the score values is above a predetermined value, an impact event trigger may be satisfied, and the merchant analytics computing device may set a value or flag stored in the database associated with the type of score, merchant, time periods included in the event analysis, first time period, the prior time period, and/or sector. The flag indicates that an event has been identified.

In some alternative embodiments, other techniques are used to determine that a change in a score has occurred to identify the change as an event. For example, the merchant analytics computing device may determine the percentage change of a score value in a first period and the score value in a second earlier period (e.g., the first period prior, the third period prior, and/or other prior period). If the absolute value of the percentage change is above a predetermined value, an impact event trigger may be satisfied, and the merchant analytics computing device may set a value or flag stored in the database associated with the type of score, merchant, time periods included in the event analysis, first time period, the prior time period, and/or sector. The flag indicates that an event has been identified. In an additional alternative embodiment, the merchant analytics computing device may determine a slope of a score value across a first period and a second earlier period (e.g., the first period prior, the third period prior, and/or other prior period). If the absolute value of the slope is

above a predetermined trigger value, the merchant analytics computing device may identify an event.

Additional impact events may be identified by the merchant analytics computing device. For example, the merchant analytics computing device may identify as an impact event an inflection point in a curve fitted to score values for a plurality of time periods. The merchant analytics computing device may determine the derivative of the curve fitted to the score values for a predetermined number of time periods. The merchant analytics computing device may determine the point at which the derivative value crosses zero (e.g., the derivative value for a first time period is positive and the derivative value for an adjacent time period is negative). The two time periods or one time period thereof may be identified as corresponding to an impact event. The merchant analytics computing device may set a value or flag stored in the database associated with the type of score, merchant, time periods included in the event analysis, first time period, the adjacent time period, and/or sector. The flag indicates that an event has been identified. In further exemplary embodiments, the merchant analytics computing device may identify local and/or global maximum and/or minimum trigger scores for a predetermined set of time periods (e.g., 2, 5, 10, all time periods for which score data is available, a range of time periods specified by a user, etc.). The corresponding time periods, type of score, merchant, and/or sector may be flagged as related to or including an impact event. The merchant analytics computing device may use one or more of the techniques described herein (e.g., use of derivatives, value ranking, changes in slope, etc.) and/or other techniques to identify the local and/or global maximum and/or minimum score values.

The above discussed trends and other impact events are exemplary only. The merchant analytics computing device may identify further impact event using a variety of statistical and/or other analytical techniques. In some embodiments, a user and/or operator of the merchant analytics computing device may specify additional impact event triggers and/or other criteria which the merchant analytics computing device then uses to analyze the scores and/or transaction data. For example, a user and/or operator of the merchant analytics computing device may supply the merchant analytics computing device with further instructions for impact event identification using an Application Program Interface (API) of the merchant analytics computing device.

Identified impact events may be communicated to a user by the merchant analytics computing device. For example, the merchant analytics computing device may provide (e.g., via network communication) instructions to a user client device or system which causes a user interface displayed by the client device or system to display an indication of the identified impact event(s).

The preceding description of the Trend Identification Phase may be implemented as a function, computer program, algorithm, and/or other instructions which perform the specific functions described. The function, computer program, algorithm, and/or other instructions may be stored in memory of the merchant analytics computing device as a module and executed by a processor of the merchant analytics computing device to perform the functions described herein according to algorithm(s) described.

Trend Analysis Phase

In some embodiments, the merchant analytics computing device analyzes identified impact events. The merchant analytics computing device may access additional information (e.g., news stories, social media communications, census information, and/or other content) as part of the analysis of an identified impact event to determine a real-world event that may have precipitated, caused, effected, or otherwise affected a corresponding impact event. The additional information (e.g., content) may be correlated with the impact event, merchant, time period(s) associated with the impact event, sector, and/or other information related to the impact event. The additional information may be stored in a database communicatively coupled to the merchant analytics computing device. This information may be presented to a user as information related to the impact event. Advantageously, the information may be useful to the user in identifying a possible cause of the impact event and/or a real-world impact of the impact event.

In some embodiments, the additional information is stored in one or more databases local to the merchant analytics computing device. In further embodiments, some or all of the additional information may be stored in one or more databases remote from the merchant analytics computing device, which the merchant analytics computing device accesses (e.g., via a network connection to the remote source). In still further embodiments, some or all of the additional information is stored, managed, curated, collected by, and/or accessed through a third party (e.g., a

subscription service). For example, the merchant analytics computing device may communicate search criteria (e.g., based on information related to the identified impact event) to a computer system of the third party, which returns additional information identified through a search of the additional information. In a further embodiment, the merchant analytics computing device searches (e.g., web crawls) one or more sources (e.g., sources available through the Internet) using search criteria corresponding to the identified impact event.

In one embodiment, the additional information content includes metadata, keyword tags, is resource description framework formatted, and/or includes other content identifiers. Content identifiers may be included in the content before being stored in the one or more databases. For example, a webpage may include metadata tagging keywords and/or other information included in the webpage. As an additional example, social media posts may be tagged with hashtags when posted. The database may be populated with content which already includes these content identifiers. This allows for searching of the content included in the database using the search criteria identified by the merchant analytics computing device. For example, the content may be searched according to any keywords or similar metadata associated with an impact event, such as (i) a period of time associated with the impact event, (ii) a merchant, sector, or region identifier associated with the impact event, and/or (iii) any other associated keywords or metadata. The content may be retrieved or received using any one or more of a variety of techniques. For example, the content may be solicited in exchange for supplying the content provider with automatically tagged content, the content may be received from a content provider voluntarily through a submission, the content may be retrieved using a web crawler or other algorithm or program, and/or the content may otherwise be obtained.

In some embodiments, the obtained content is processed prior to being made available for searching. For example, the received content (e.g., unstructured text) may be analyzed using natural language processing techniques (e.g., analysis based on statistical module, probabilistic decision making, assigning real-valued weights to input features, statistical inference algorithms, and/or other natural language processing techniques and/or tools). The content which has been analyzed using natural language processing may be formatted according to a resource description framework to identify one or more of entities, relationships, facts, events, topics, and/or other information included in the content. The resource description

framework formatted content may be stored in a database and made available for searching based on the search criteria identified by the merchant analytics computing device as corresponding to an identified impact event (e.g., merchant identifier(s), sector identifier(s), region identifier(s), one or more date ranges based on time period(s) corresponding to the identified impact event, and/or other search terms and/or parameters). In some embodiments, the processing is carried out by the merchant analytics computing device. In other embodiments, the processing may be carried out by a third party who makes the processed content available to the merchant analytics computing device for searching (e.g., provides a copy of the processed content to the merchant analytics computing device and/or receives search criteria from the merchant analytics computing device and returns search results and the corresponding content).

The content identified through the search may be stored in a database by the merchant analytics computing device such that the identified content is associated with the identified impact event that formed the basis for the search criteria. For example, the merchant analytics computing device may store the identified content and/or links to the identified content as entries in a tuple including an identifier of the impact event, an identifier of the corresponding sector, an identity of a corresponding merchant, and/or other information. The merchant analytics computing device may use stored content to provide content related to an identified impact event to a user when the user provides an input to the merchant analytics computing device requesting the content. For example, a user, via a client system (e.g., a user computing device) and user interface, may click on a notification provided by the merchant analytics computing device indicating that an impact event has been identified for a sector. The client system then sends the input to the merchant analytics computing device. Upon receiving the input, the merchant analytics computing device retrieves from the database content which is related to the identified impact event based on the identifier of the impact event and/or other information. For example, the mention of any of "Charlotte-Douglas Airport," "CLT," "Mecklenburg County," "Charlotte," and "North Carolina" prior to, during, or after a time period flagged as an impact event may be correlated to or associated with an impact event for a sector including Charlotte-Douglas Airport. The merchant analytics computing device may then transmit the content, links to the content, instructions, and/or other information to the client system which causes the client system to display the content

and/or related information via the user interface. Display of content related to an identified impact event is discussed in greater detail with reference to the User Interface.

In some embodiments, the merchant analytics computing device displays a subset of the retrieved content corresponding to the impact event. The merchant analytics computing device may determine the subset of the retrieved content to display which corresponds to a real-world event which may be the cause or result from the impact event. The determination may be based on a relevance analysis and/or other analysis. For example, the merchant analytics computing device may select content as corresponding to a real-world event based on the number of views of the content, a sentiment analysis of the retrieved content, number of links to or from the content, etc.). In one embodiment, the subset of content is selected based on the number, frequency, location (e.g., body, summary, title, etc.), and/or other characteristic of keywords identified in the content as corresponding to the search criteria. In a further embodiment, social media content may be identified as corresponding to the real-word event and/or selected for display based on the number of up-votes, likes, and/or other positive feedback from users of a social media platform associated with the content. In some embodiments, content is identified as corresponding to the real-word event and/or selected for display (e.g., inclusion in the subset) based on an identification of particular entities, relationships, facts, events, and/or topics included in the resource description framework of a piece of content. For example, a piece of content may be resource description framework formatted based on natural language processing to identify one or more of entities, relationships, facts, events, and/or topics. The merchant analytics computing device may compare the identified entities, relationships, facts, events, and/or topics of the resource description framework to a set of predefined and/or user specifiable words (e.g., string entries) of particular interest. For example, the comparison set may include words or terms corresponding to real-world events such as "earthquake," "fire," "riot," "job cuts," "new jobs," and/or other terms or phrases. Based on the presence, frequency, placement, etc. of terms of the comparison set in the retrieved content, the retrieved content may be selected for inclusion in the subset or not selected.

In one embodiment, merchant analytics displays at least a portion of the content subset to a user (e.g., via a user interface on a client system). In some embodiments, the merchant analytics computing device identifies a real-world event

as corresponding to the impact event and displays the real world event itself rather than and/or in addition to content corresponding to the impact event. For example, the merchant analytics computing device may determine that a natural disaster occurred using the techniques described herein (e.g., identifying a high frequency of the word earthquake in retrieved content). The merchant analytics computing device may display to the user an indication that a natural disaster likely occurred and is or may be related to the impact event. Content may additionally be displayed.

The preceding description of the Trend Analysis Phase may be implemented as a function, computer program, algorithm, and/or other instructions which perform the specific functions described. The function, computer program, algorithm, and/or other instructions may be stored in memory of the merchant analytics computing device as a module and executed by a processor of the merchant analytics computing device to perform the functions described herein according to algorithm(s) described.

Monitoring Phase

In some embodiments, the merchant analytics computing device monitors one or more merchant(s) and/or sector(s). The merchant analytics computing device may monitor specific merchant(s) and/or sector(s) upon receiving an input from a user computing device (e.g., running a user interface generated based on information supplied by the merchant analytics computing device) identifying a merchant and/or sector for monitoring. For example, a user computing device may send instructions to the merchant analytics computing device to monitor a specific merchant, sector, region (e.g., a geographic area including one or more sector(s)), and/or regions. The instructions may be based on input received from a user via a user interface implemented on the client device according to instructions and/or information received by the user computing device from the merchant analytics computing device.

In one embodiment, a user may specify a region(s) and/or sector(s) for the merchant analytics computing device to monitor using a drag and drop component of the user interface. A user may drag an icon (e.g., of a pin) to a specific point on a map displayed sectors (e.g., shaded, patterned, and/or colored to correspond to sector score values). The user may, in some embodiments, further specify one or more (e.g., three) levels or radii from the point for monitoring. The levels may correspond to an

immediate area, nearby area, and relative area for monitoring. Reporting of monitoring results to the user may be broken down based on the area to which the reported information (e.g., scores, changes in scores, trends, events, and/or other information) corresponds. The user computing device transmits instructions based on the user input to the merchant analytics computing device.

The merchant analytics computing device flags (e.g., by setting a flag value in a database entry) the sector(s) and/or merchant(s) selected for monitoring by the user and indicated in the instructions received from the user computing device. The flag value may be set based on what level of monitoring was selected by the user for the merchant(s) and/or sector(s) (e.g., flag value 1 for immediate area, flag value 2 for nearby area, flag value 3 for relative area). For sector(s) and/or merchant(s) which have been flagged for monitoring, the merchant analytics computing device stores scores, identified impact events, transaction data, and/or other information in the database. Alternatively, this information may already be automatically stored in the database, and the flag causes the merchant analytics computing device to periodically retrieve the information for reporting to the user (e.g., via the user computing device and the user interface, by e-mail, etc.).

In some embodiments, the merchant analytics computing device only monitors sectors which are completely encompassed by at least one of the levels of monitoring selected by the user. In alternative embodiments, the merchant analytics computing device monitors any sector which is partially included in at least one of levels of monitoring selected by the user.

In some embodiments, the merchant analytics computing device periodically reports the results of the monitoring to the user. Included in the report may be information related to the sector(s) and/or merchant(s) over time. For example, a report may include a table of scores and corresponding time periods spanning a length of time from when monitoring began to the present. In some embodiments, scores for a predetermined number of time periods (e.g., 1, 2, etc.) prior to the start of monitoring are also included in the report. The report may indicate a nature of the impact event, for example, if scores have increased or decreased between consecutive periods, a percentage change in scores, the type of score, and/or other information. In some embodiments, the report further includes graphical representations of the impact event over the time period reflected in the report (e.g., the start of monitoring to the month, day, etc. in which the report was presented to the

user). All six scores or a subset of the six scores discussed herein may be included in the report. The report may identify or organize (e.g., under headings, tabs, etc.) whether a score, sector, and/or merchant in the report corresponds with the immediate monitoring area, nearby monitoring area, and/or relative monitoring area. For example, a monitoring composite score may be generated for each monitoring area by aggregating, averaging, or otherwise processing the scores for each sector within each monitoring area. This may be done for all of the six types of scores described herein. The monitoring composite scores for each region and related information discussed herein (e.g., the composite monitoring score for each time period, the percentage changes in the composite monitoring scores between time periods, graphs of the composite monitoring scores etc.) may be included in the report and broken down (e.g., placed under headings) by monitoring area.

Impact events that are identified for the time period(s) included in the monitoring report may be included in the monitoring report. The impact events may be listed in the report (e.g., at the beginning or end). The impact events may be indicated by icons placed on the graphs of the composite monitoring scores. In some embodiments, the monitoring report may include buttons which correspond to an identified impact event that, when selected by a user, cause the display of information (e.g., news articles) that the merchant analytics computing device has determined may correspond to the identified impact event. For example, the impact event may be identified as pertaining to one of the sectors included in the monitoring areas and corresponding information (e.g., news stories) retrieved for that impact event as described herein. The impact event(s) and/or corresponding information for the sectors included in the monitoring areas may be aggregated for inclusion in the monitoring report. Alternatively, the merchant analytics computing device may aggregate score information for the sectors in the monitoring areas and identify impact events for the aggregated scores for the monitoring areas using the same techniques described herein for individual sectors. Similarly, the identified impact events for each monitoring area may be analyzed using similar techniques to those described herein for individual sectors.

The content of the monitoring report may be generated using the techniques described herein and/or one or more other data analytics, data processing techniques, data visualization techniques, statistical techniques, and/or other data manipulation techniques. For example, scores for consecutive periods may be

processed to determine the percentage change in the score from a first time period to a second time period, and curve fitting algorithms may be applied to scores for multiple time periods to generate the graphs included in the monitoring report. Other algorithms, programs, functions, and/or techniques may be used to generate the statistical and/or other information included in the monitoring report.

The merchant analytics computing device may periodically report the monitoring results by providing a user with the monitoring report described herein. For example, the merchant analytics computing device may e-mail the monitoring report to an e-mail address associated with the user at the end of a predetermined or user defined period (e.g., weekly, monthly, yearly, etc.). In some embodiments, the monitoring report is presented to the user via a user computing device and user interface. The merchant analytics computing device provides instructions and/or information to the user computing device for the display of the monitoring report. For example, the merchant analytics computing device may cause the user interface of the user computing device to periodically (e.g., weekly, monthly, yearly, etc.) display an alert and link to the monitoring report, display the monitoring report in a pop-up window, pane, or other location in the user interface, and/or otherwise make the monitoring report available to the user via the user interface.

In some embodiments, the monitoring report is accessible on demand by a user. For example, a user may provide an input to the merchant analytics computing device via the user computing device that caused the merchant analytics computing device to e-mail the monitoring report to an e-mail address associated with the user or otherwise provided by the user. In one embodiment, the user interface implemented on the user computing device includes a button, tab, or other element that allows the user to cause the monitoring report to be displayed on demand.

The preceding description of the Monitoring Phase may be implemented as a function, computer program, algorithm, and/or other instructions which perform the specific functions described. The function, computer program, algorithm, and/or other instructions may be stored in memory of the merchant analytics computing device as a module and executed by a processor of the merchant analytics computing device to perform the functions described herein according to algorithm(s) described.

User Interface

The merchant analytics computing device is further configured to facilitate the display of an interactive graphical user interface (UI). The UI may be displayed on a user computing device of a user. The UI is configured such that the user may easily view aggregated merchant analytics for a sector and/or for a particular industry, for example, as a graphical representation displayed on a map. The UI is populated with data that is updated following the end of a time period for which merchant scores and/or merchant analytics are determined. For example, the UI may be populated with data that is updated on a monthly basis, however, in other embodiments, the UI may be populated with data updated at any other interval (e.g., weekly, daily, etc.). In some embodiments, a user of the UI may determine at what interval the UI is populated with updated data. For example, the merchant analytics computing device may use time periods of one week for determining merchant and/or sector scores and/or analytics. A user of the UI may provide an input which the merchant analytics computing device receives via a network and from the user computing device providing the UI which causes the merchant analytics computing device to update the information provided to the user computing device for generating the UI at different intervals, for example one month. The merchant analytics computing device may determine merchant and/or sector scores and/or analytics weekly with the UI of the client system displaying updated information based on and/or including the merchant and/or sector scores and/or analytics every month.

In the example embodiment, the user may search by location to find a geographic region (e.g., state, city, zip code, zip+4, county, neighborhood, and/or other geographic region) in which the user is interested. The UI displays the geographic location divided into defined sectors. In some embodiments, the UI enables a user to "zoom in" and "zoom out" on the view. Zooming in may provide a view of the sectors at a more granular level. Zooming out may provide a view of sectors aggregated into larger geographic regions, for example, by city, county, or state. In the example embodiment, displayed sectors are colored or shaded according to the strength of generated merchant analytics, wherein a darker or more saturated color or shade indicates stronger analytics (e.g., more successful sectors). Accordingly, the user may easily discern sectors with stronger analytics, with only a single glance. In other embodiments, lighter colors may indicate stronger analytics. In still other embodiments, the sectors may not be colored or shaded at all.

As will be described further herein, the UI may provide to user an option to view sectors according to different metrics (e.g., according to the various scores described above included within the merchant analytics). The UI may also allow the user to switch between a "street map" view, in which the divisions of defined sectors are overlaid upon a traditional street map, and a "satellite view", in which the defined sectors are overlaid upon satellite imagery of the geographic region. Accordingly, depending on the view, users may be able to more easily understand the delineations between sectors and the geographical advantages that may serve certain sectors over others. In addition, as will be described further herein, the UI may provide other tools to the user for navigation of the merchant analytics and for a "deeper dive" into the granularity of the analytics.

Through the monitoring of commercial real estate portfolios, the systems and methods are further configured to facilitate (a) integration of transaction data into the generation of merchant analytics by linking transaction data received from interchange networks (or payment networks) to such analytics, (b) improvement of the visualization of sector value or success, relative to other sectors and over time, and (c) optimization of investment by using objective evaluations of relative success of certain sectors and/or merchants over others.

The technical effects of the systems and methods described herein can be achieved by performing at least one of the following steps: (i) defining a plurality of sectors of a geographic region; (ii) receiving transaction data for transactions occurring within a period of time, the transaction data associated with a plurality of merchants, the plurality of merchants located in the geographic region; (iii) identifying one sector of the plurality of sectors in which each merchant of the plurality of merchants is located; (iv) generating aggregated merchant analytics for each sector based on the transaction data associated with all merchants of the plurality of merchants located in the sector, wherein the aggregated merchant analytics represent a ranking of each sector relative to all other sectors of the plurality of sectors; (v) identifying an impact event associated with a first sector using the aggregated merchant analytics associated with the first sector, wherein the impact event is identified upon an impact event trigger being satisfied; (vi) retrieving content associated with the impact event from a content database; and (vii) displaying, by the merchant analytics computing device, on a user interface of the user computing device the aggregated merchant analytics and at least a portion of the content

associated with the impact event, wherein the aggregated merchant analytics are graphically represented on a map of the defined sectors.

The following detailed description of the embodiments of the disclosure refers to the accompanying drawings. The same reference numbers in different drawings may identify the same or similar elements. Also, the following detailed description does not limit the claims.

Described herein are computer systems such as merchant analytics computing devices and user computer systems. As described herein, all such computer systems include a processor and a memory. However, any processor in a computer device referred to herein may also refer to one or more processors wherein the processor may be in one computing device or a plurality of computing devices acting in parallel. Additionally, any memory in a computer device referred to herein may also refer to one or more memories wherein the memories may be in one computing device or a plurality of computing devices acting in parallel.

As used herein, a processor may include any programmable system including systems using micro-controllers, reduced instruction set circuits (RISC), application specific integrated circuits (ASICs), logic circuits, and any other circuit or processor capable of executing the functions described herein. The above examples are example only, and are thus not intended to limit in any way the definition and/or meaning of the term "processor."

As used herein, the term "database" may refer to either a body of data, a relational database management system (RDBMS), or to both. As used herein, a database may include any collection of data including hierarchical databases, relational databases, flat file databases, object-relational databases, object oriented databases, and any other structured collection of records or data that is stored in a computer system. The above examples are example only, and thus are not intended to limit in any way the definition and/or meaning of the term database. Examples of RDBMS's include, but are not limited to including, Oracle® Database, MySQL, IBM® DB2, Microsoft® SQL Server, Sybase®, and PostgreSQL. However, any database may be used that enables the systems and methods described herein. (Oracle is a registered trademark of Oracle Corporation, Redwood Shores, California; IBM is a registered trademark of International Business Machines Corporation, Armonk, New York; Microsoft is a registered trademark of Microsoft Corporation, Redmond, Washington; and Sybase is a registered trademark of Sybase, Dublin, California.)

In one embodiment, a computer program is provided, and the program is embodied on a computer readable medium. In an example embodiment, the system is executed on a single computer system, without requiring a connection to a sever computer. In a further embodiment, the system is being run in a Windows® environment (Windows is a registered trademark of Microsoft Corporation, Redmond, Washington). In yet another embodiment, the system is run on a mainframe environment and a UNIX® server environment (UNIX is a registered trademark of X/Open Company Limited located in Reading, Berkshire, United Kingdom). The application is flexible and designed to run in various different environments without compromising any major functionality. In some embodiments, the system includes multiple components distributed among a plurality of computing devices. One or more components may be in the form of computer-executable instructions embodied in a computer-readable medium.

As used herein, an element or step recited in the singular and proceeded with the word "a" or "an" should be understood as not excluding plural elements or steps, unless such exclusion is explicitly recited. Furthermore, references to "example embodiment" or "one embodiment" of the present disclosure are not intended to be interpreted as excluding the existence of additional embodiments that also incorporate the recited features.

As used herein, the terms "software" and "firmware" are interchangeable, and include any computer program stored in memory for execution by a processor, including RAM memory, ROM memory, EPROM memory, EEPROM memory, and non-volatile RAM (NVRAM) memory. The above memory types are example only, and are thus not limiting as to the types of memory usable for storage of a computer program.

As used herein, the terms "transaction card," "financial transaction card," and "payment card" refer to any suitable transaction card, such as a credit card, a debit card, a prepaid card, a charge card, a membership card, a promotional card, a frequent flyer card, an identification card, a prepaid card, a gift card, and/or any other device that may hold payment account information, such as mobile phones, Smartphones, personal digital assistants (PDAs), key fobs, and/or computers. Each type of transactions card can be used as a method of payment for performing a transaction. In addition, consumer card account behavior can include but is not limited to purchases, management activities (e.g., balance checking), bill payments,

achievement of targets (meeting account balance goals, paying bills on time), and/or product registrations (e.g., mobile application downloads).

The systems and processes are not limited to the specific embodiments described herein. In addition, components of each system and each process can be practiced independent and separate from other components and processes described herein. Each component and process also can be used in combination with other assembly packages and processes.

The following detailed description illustrates embodiments of the disclosure by way of example and not by way of limitation. It is contemplated that the disclosure has general application to the generation and communication (e.g., display) of sole and/or aggregate merchant and/or sector valuation analytics, scores, and/or other analytics.

FIG. 1 is a schematic diagram illustrating an example multi-party payment card system 20 for enabling payment-by-card transactions and communicating aggregated merchant analytics for a sector, in accordance with one embodiment of the present disclosure. FIG. 1 depicts a flow of data in a typical financial transaction through system 20, which includes a merchant analysis computing device 112. Components of system 20 provide merchant analysis computing device 112 with transaction data, which merchant analysis computing device 112 processes to generate merchant analytics and provide the analytics on a user interface.

Embodiments described herein may relate to a transaction card system, such as a credit card payment system using the MasterCard® interchange network. The MasterCard® interchange network is a set of proprietary communications standards promulgated by MasterCard International Incorporated® for the exchange of financial transaction data and the settlement of funds between financial institutions that are members of MasterCard International Incorporated®. (MasterCard is a registered trademark of MasterCard International Incorporated located in Purchase, New York).

In a typical transaction card system, a financial institution called the "issuer" issues a transaction card, such as a credit card, to a consumer or cardholder 22, who uses the transaction card to tender payment for a purchase from a merchant 24. Cardholder 22 may purchase goods and services ("products") at merchant 24. Cardholder 22 may make such purchases using virtual forms of the transaction card

and, more specifically, by providing data related to the transaction card (e.g., the transaction card number, expiration date, associated postal code, and security code) to initiate transactions. To accept payment with the transaction card or virtual forms of the transaction card, merchant 24 must normally establish an account with a financial institution that is part of the financial payment system. This financial institution is usually called the "merchant bank," the "acquiring bank," or the "acquirer." When cardholder 22 tenders payment for a purchase with a transaction card or virtual transaction card, merchant 24 requests authorization from a merchant bank 26 for the amount of the purchase. The request may be performed over the telephone or electronically, but is usually performed through the use of a point-of-sale terminal, which reads cardholder's 22 account information from a magnetic stripe, a chip, or embossed characters on the transaction card and communicates electronically with the transaction processing computers of merchant bank 26. Merchant 24 receives cardholder's 22 account information as provided by cardholder 22. Alternatively, merchant bank 26 may authorize a third party to perform transaction processing on its behalf. In this case, the point-of-sale terminal will be configured to communicate with the third party. Such a third party is usually called a "merchant processor," an "acquiring processor," or a "third party processor."

Using an interchange network 28, computers of merchant bank 26 or merchant processor will communicate with computers of an issuer bank 30 to determine whether cardholder's 22 account 32 is in good standing and whether the purchase is covered by cardholder's 22 available credit line. Based on these determinations, the request for authorization will be declined or accepted. If the request is accepted, an authorization code is issued to merchant 24.

When a request for authorization is accepted, the available credit line of cardholder's 22 account 32 is decreased. Normally, a charge for a payment card transaction is not posted immediately to cardholder's 22 account 32 because bankcard associations, such as MasterCard International Incorporated®, have promulgated rules that do not allow merchant 24 to charge, or "capture," a transaction until products are shipped or services are delivered. However, with respect to at least some debit card transactions, a charge may be posted at the time of the transaction. When merchant 24 ships or delivers the products or services, merchant 24 captures the transaction by, for example, appropriate data entry procedures on the point-of-sale terminal. This may include bundling of approved transactions daily for standard retail purchases. If

cardholder 22 cancels a transaction before it is captured, a "void" is generated. If cardholder 22 returns products after the transaction has been captured, a "credit" is generated. Interchange network 28 and/or issuer bank 30 stores the transaction card information and/or transaction information such as a type of merchant, amount of purchase, date of purchase, and/or other information in a database 120 (shown in FIG. 2).

After a purchase has been made, a clearing process occurs to transfer additional transaction data related to the purchase among the parties to the transaction, such as merchant bank 26, interchange network 28, and issuer bank 30. More specifically, during and/or after the clearing process, additional data, such as a time of purchase, a merchant name, a type of merchant, purchase information, cardholder account information, a type of transaction, information regarding the purchased item and/or service, and/or other suitable information, is associated with a transaction and transmitted between parties to the transaction as transaction data, and may be stored by any of the parties to the transaction. In the example embodiment, transaction data including such additional transaction data may also be provided to systems including merchant analytics computing device 112. In the example embodiment, interchange network 28 provides such transaction data (including merchant data associated with merchant tenants of each commercial real estate asset of each portfolio record) and additional transaction data. In alternative embodiments, any party may provide such data to merchant analytics computing device 112.

After a transaction is authorized and cleared, the transaction is settled among merchant 24, merchant bank 26, and issuer bank 30. Settlement refers to the transfer of financial data or funds among merchant's 24 account, merchant bank 26, and issuer bank 30 related to the transaction. Usually, transactions are captured and accumulated into a "batch," which is settled as a group. More specifically, a transaction is typically settled between issuer bank 30 and interchange network 28, and then between interchange network 28 and merchant bank 26, and then between merchant bank 26 and merchant 24.

As described below in more detail, merchant analytics computing device 112 may be used to generate and communicate aggregated merchant analytics. Although the systems described herein are not intended to be limited to facilitate such applications, the systems are described as such for exemplary purposes.

FIG. 2 is an expanded block diagram of an example embodiment of a computer system 100 used in processing payment transactions that includes merchant analytics computing device 112 in accordance with one example embodiment of the present disclosure. In the example embodiment, system 100 is used for generating merchant analytics and displaying said analytics on a user interface, as described herein.

More specifically, in the example embodiment, system 100 includes a merchant analytics computing device 112, and a plurality of client sub-systems, also referred to as client systems 114, connected to merchant analytics computing device 112. In one embodiment, client systems 114 are computers including a web browser, such that merchant analytics computing device 112 is accessible to client systems 114 using the Internet and/or using network 115. Client systems 114 are interconnected to the Internet through many interfaces including a network 115, such as a local area network (LAN) or a wide area network (WAN), dial-in-connections, cable modems, special high-speed Integrated Services Digital Network (ISDN) lines, and RDT networks. Client systems 114 may include systems associated with cardholders 22 (shown in FIG. 1) as well as external systems used to store data. Merchant analytics computing device 112 is also in communication with payment network 28 using network 115. Further, client systems 114 may additionally communicate with payment network 28 using network 115. Client systems 114 could be any device capable of interconnecting to the Internet including a web-based phone, PDA, or other web-based connectable equipment.

A database server 116 is connected to database 120, which contains information on a variety of matters, as described below in greater detail. In one embodiment, centralized database 120 is stored on merchant analytics computing device 112 and can be accessed by potential users at one of client systems 114 by logging onto merchant analytics computing device 112 through one of client systems 114. In an alternative embodiment, database 120 is stored remotely from merchant analytics computing device 112 and may be non-centralized. Database 120 may be a database configured to store information used by merchant analytics computing device 112 including, for example, transaction data, defined sectors, merchant definitions, user data, portfolio records, merchant scores, and sector scores.

Database 120 may include a single database having separated sections or partitions, or may include multiple databases, each being separate from each other.

Database 120 may store transaction data generated over the processing network including data relating to merchants, consumers, account holders, prospective customers, issuers, acquirers, and/or purchases made. Database 120 may also store account data including at least one of a cardholder name, a cardholder address, an account number, other account identifiers, and transaction information. Database 120 may also store merchant information including a merchant identifier that identifies each merchant registered to use the network, and instructions for settling transactions including merchant bank account information. Database 120 may also store purchase data associated with items being purchased by a cardholder from a merchant, and authorization request data.

In the example embodiment, one of client systems 114 may be associated with one of acquirer bank 26 (shown in FIG. 1) and issuer bank 30 (also shown in FIG. 1). For example, one of client systems 114 may be a POS device. Client systems 114 may additionally or alternatively be associated with a user (e.g., a commercial real estate owner or lender, a marketing director, a consumer, or any other end user). In the example embodiment, one of client systems 114 includes a user interface 118. For example, user interface 118 may include a graphical user interface with interactive functionality, such that aggregated merchant analytics, transmitted from merchant analytics computing device 112 to client system 114, may be shown in a graphical format. A user of client system 114 may interact with user interface 118 to view, explore, and otherwise interact with the merchant analytics. Merchant analytics computing device 112 may be associated with interchange network 28 and/or may process transaction data.

FIG. 3 illustrates an example configuration of a server system 301 such as merchant analytics computing device 112 (shown in Figs 2 and 3) used to generate merchant analytics and present said analytics on an interactive user interface, in accordance with one example embodiment of the present disclosure. Server system 301 may also include, but is not limited to, database server 116. In the example embodiment, server system 301 determines and analyzes characteristics of devices used in payment transactions, as described below.

Server system 301 includes a processor 305 for executing instructions. Instructions may be stored in a memory area 310, for example. Processor 305 may include one or more processing units (e.g., in a multi-core configuration) for executing instructions. The instructions may be executed within a variety of different

operating systems on the server system 301, such as UNIX, LINUX, Microsoft Windows®, etc. It should also be appreciated that upon initiation of a computer-based method, various instructions may be executed during initialization. Some operations may be required in order to perform one or more processes described herein, while other operations may be more general and/or specific to a particular programming language (e.g., C, C#, C++, Java, or other suitable programming languages, etc.).

Processor 305 is operatively coupled to a communication interface 315 such that server system 301 is capable of communicating with a remote device such as a user system or another server system 301. For example, communication interface 315 may receive requests (e.g., requests to display merchant analytics and/or provide an interactive user interface) from a client system 114 via the Internet, as illustrated in FIG. 2.

Processor 305 may also be operatively coupled to a storage device 134. Storage device 134 is any computer-operated hardware suitable for storing and/or retrieving data. In some embodiments, storage device 134 is integrated in server system 301. For example, server system 301 may include one or more hard disk drives as storage device 134. In other embodiments, storage device 134 is external to server system 301 and may be accessed by a plurality of server systems 301. For example, storage device 134 may include multiple storage units such as hard disks or solid state disks in a redundant array of inexpensive disks (RAID) configuration. Storage device 134 may include a storage area network (SAN) and/or a network attached storage (NAS) system.

In some embodiments, processor 305 is operatively coupled to storage device 134 via a storage interface 320. Storage interface 320 is any component capable of providing processor 305 with access to storage device 134. Storage interface 320 may include, for example, an Advanced Technology Attachment (ATA) adapter, a Serial ATA (SATA) adapter, a Small Computer System Interface (SCSI) adapter, a RAID controller, a SAN adapter, a network adapter, and/or any component providing processor 305 with access to storage device 134.

Memory area 310 may include, but are not limited to, random access memory (RAM) such as dynamic RAM (DRAM) or static RAM (SRAM), read-only memory (ROM), erasable programmable read-only memory (EPROM), electrically erasable programmable read-only memory (EEPROM), and non-volatile RAM

(NVRAM). The above memory types are exemplary only, and are thus not limiting as to the types of memory usable for storage of a computer program.

FIG. 4 illustrates an example configuration of a client computing device 402. Client computing device 402 may include, but is not limited to, client systems ("client computing devices") 114. Client computing device 402 includes a processor 404 for executing instructions. In some embodiments, executable instructions are stored in a memory area 406. Processor 404 may include one or more processing units (e.g., in a multi-core configuration). Memory area 406 is any device allowing information such as executable instructions and/or other data to be stored and retrieved. Memory area 406 may include one or more computer-readable media.

Client computing device 402 also includes at least one media output component 408 for presenting information to a user 400 (e.g., a cardholder 22). Media output component 408 is any component capable of conveying information to user 400. In some embodiments, media output component 408 includes an output adapter such as a video adapter and/or an audio adapter. An output adapter is operatively coupled to processor 404 and operatively couplable to an output device such as a display device (e.g., a liquid crystal display (LCD), organic light emitting diode (OLED) display, cathode ray tube (CRT), or "electronic ink" display) or an audio output device (e.g., a speaker or headphones).

In some embodiments, client computing device 402 includes an input device 410 for receiving input from user 400. Input device 410 may include, for example, a keyboard, a pointing device, a mouse, a stylus, a touch sensitive panel (e.g., a touch pad or a touch screen), a camera, a gyroscope, an accelerometer, a position detector, and/or an audio input device. A single component such as a touch screen may function as both an output device of media output component 408 and input device 410.

Client computing device 402 may also include a communication interface 412, which is communicatively couplable to a remote device such as server system 302 or a web server operated by a merchant. Communication interface 412 may include, for example, a wired or wireless network adapter or a wireless data transceiver for use with a mobile phone network (e.g., Global System for Mobile communications (GSM), 3G, 4G or Bluetooth) or other mobile data network (e.g., Worldwide Interoperability for Microwave Access (WIMAX)).

Stored in memory area 406 are, for example, computer-readable instructions for providing a user interface to user 400 via media output component 408 and, optionally, receiving and processing input from input device 410. A user interface may include, among other possibilities, a web browser and client application. Web browsers enable users 400 to display and interact with media and other information typically embedded on a web page or a website from a web server associated with a merchant. A client application allows users 400 to interact with a server application associated with, for example, a merchant. The user interface, via one or both of a web browser and a client application, facilitates display of generated merchant analytics by merchant analytics computing device 112. The user may interact with the user interface to view and explore the merchant analytics, for example, by selecting a sector of interest using input device 410 and viewing analytics associated with that sector.

FIG. 5 is a simplified data flow diagram for generating aggregated merchant analytics for a sector, and providing the analytics for display on a user interface using merchant analytics computing device 112. As described herein, merchant analytics computing device 112 receives merchant definitions 510 and user data 512 (such as investment goals) from a user device 502 (such as a commercial lender, a commercial owner, or a marketing director). Merchant analytics computing device 112 defines a plurality of merchant records 552 based on merchant definitions 510 in the Setup Phase as identified above and herein. Merchant analytics computing device 112 further defines merchant management portfolio record 550 based on such merchant definitions 510.

Merchant analytics computing device 112 also receives transaction data 540 associated with a plurality of merchants being analyzed. Transaction data 540 may be received from interchange network 28. Other information including census data or other public information 542 data may be received from external systems such as external server 504. In some embodiments, additional or alternative data may be received from an external server 504. This data may be publicly available, provided by a private service, accessible as part of a subscription to a database or other information source, and/or otherwise be accessible. For example, data regarding aggregated or individual news items (e.g., titles, content, authors, subjects, keywords, metadata, and/or other information related to published news articles, news articles available through internet distribution, social networking news

feeds, posts, or other shared information, and/or other content) may be received. The data may be raw content, keyword tagged content, tagged content, resource description framework formatted content, and/or other data. In some embodiments, merchant analytics computing device 112 provides external server 504 with search criteria which the external server 504 uses to search through content stored on or accessible to external server 504. For example, the search criteria provided may be or include one or more of a time period, a date range(s), merchant identification information, information identifying a sector, and/or other information. External server 504 may return search results and/or the content identified by the search results to merchant analytics computing device 112. The source of the data described herein may be a subscription service or may be a plurality of primary sources (e.g., merchant analytics computing device 112 may perform a web crawling function which returns data which is further processed to identify the data described herein). The received data may be stored in a database, correlated with stored merchant definitions (e.g., stored in the same database with or otherwise linked to merchant definitions with a particular news item linked to a particular merchant definition on the basis that the merchant definition is found in the news or other information item), correlated with a defined sector (stored in the same database with or otherwise linked to sector definitions with a particular news item linked to a particular sector on the basis that the sector or information identifying the sector is found within the news or other information item), correlated with information stored in the database based on search criteria provided to external server 504, and/or correlated with other information used in displaying or determining merchant and/or sector scores and/or analytics. Merchant analytics computing device 112 may process, correlate, and/or display the received news items or other information items as further described herein with reference to the Trend Analysis Phase and the User Interface.

In one exemplary embodiment, external server 504 may include a database of content (e.g., news stories, social media communications, census information, web pages, and/or other information) which external server 504 retrieves and/or receives. External server 504 and/or another computing device may read unstructured text and/or other text included in the content using natural language processing to identify and tag entities, relationships, facts, events, topics, and/or other parts of the content. External server 504 may then store the content as resource description framework formatted content based on the tagged content.

External server 504 may provide access to the resource description framework formatted content to merchant analytics computing device 112. In one embodiment, merchant analytics computing device 112 maintains a database of the resource description framework formatted content received from external server 504 and uses the search criteria to identify particular pieces of content which are related and/or relevant to the search criteria and the identified impact event on which the search criteria is based. Merchant analytics computing device 112 may identify a trend or event associated with a particular sector and time period. The merchant analytics computing device 112 may then use location of the sector and/or identifying information of the sector and the date range of the time period as search criteria. For example, merchant analytics computing device 112 may identify a trend or event that is associated with Mecklenburg County sector and within the time period of October 2012. Merchant analytics computing device 112 searches the database of resource description framework formatted content for the term "Mecklenburg County" and for content which was created or tagged as falling within October, 2012. Any search algorithm or search technique may be used. The search results and/or associated content may be stored in a database entry linked to or otherwise related to the identified trend and/or event. The content and/or a portion thereof may be displayed to a user as described in reference to the Trend Analysis Phase and User Interface. For example, the content and/or a portion thereof may be caused to be displayed on or reported to a user client system 114 by merchant analytics computing device 112.

In an alternative embodiment, external server 504 maintains a database of resource description framework formatted content. Merchant analytics computing device 112 transmits search criteria to the external server (e.g., via a network connection). Merchant analytics computing device 112 may transmit further instructions and/or other information with the search criteria which cause external server 504 to perform a search on the resource description framework formatted content stored in the database when received. External server 504 may use any search algorithm or search technique. External server 504 may transmit the search results and/or identified content to merchant analytics computing device 112. The content and/or a portion thereof may be displayed to a user as described in reference to the Trend Analysis Phase and User Interface. For example, the content and/or a portion thereof may be caused to be displayed on or reported to a user client system 114 by merchant analytics computing device 112.

Merchant analytics computing device 112 includes a plurality of modules 560, 570, and 580 that facilitate generation and display of merchant analytics. Specifically, merchant analytics computing device 112 includes sector definition module 560 configured to define sectors and identify merchants located in each sector, as specified in the Sector Definition Phase. Sector definition module 560 may update merchant records 552 to reflect the sector in which each associated merchant is located. Merchant analytics computing device 112 also includes merchant analysis module 570 configured to generate analytics for each merchant record 552 (or for each sector in which a merchant is located) in merchant management portfolio record 550, as specified in the Evaluation Phase. Merchant analytics computing device 112 also includes optimization module 580 configured to perform optimization tasks for merchant management portfolio record 550 as specified in Optimization Phase.

In some embodiments, merchant analytics computing device 112 may include further modules which facilitate the generation and display of analysis of merchant analytics. Specifically, merchant analytics computing device 112 may include a trend identification module configured to identify impact events based on scores and/or transaction data for merchant(s) and/or sector(s), as specified in the Trend Identification Phase. Merchant analytics computing device 112 may include a trend analysis module configured to analyze identified trends and/or events by retrieving information based on search criteria generated from the identified trend and/or event, as specified in the Trend Analysis Phase. Merchant analytics computing device 112 may include a monitoring module configured to monitor scores and/or transaction data for a merchant and/or sector, as specified in the Monitoring Phase.

Merchant analytics computing device 112 is also configured to provide outputs 590 as described herein. Specifically, outputs 590 may include merchant scores and/or analytics for each merchant for which there is an associated merchant record 552, as well as aggregated merchant scores and/or analytics for each sector. Outputs 590 may also include an optimized portfolio record 550, which may be sorted to identify and emphasize merchants that align with investment goals. Outputs 590 may also include any and all formatted output for display on a user interface of a user computing device (e.g., client system 114, as shown in FIG. 2). Outputs 590 may further include instructions generated by merchant analytics computing device 112 which, when received, cause user device 502 to display a UI (e.g., as displayed and

described with reference to FIGS. 6-15 herein) based on and/or displaying merchant scores and/or analytics for each merchant for which there is an associated merchant record 552, aggregated merchant scores and/or analytics for each sector, an optimized portfolio record 550 which may be sorted to identify and emphasize merchants that align with investment goals, and/or other information as described herein.

FIGS. 6-15 are example screenshots displayed on a user interface (e.g., user interface 118, shown in FIG. 2) of a user computing device (e.g., client system 114, also shown in FIG. 2). The example screenshots include data generated by merchant analytics computing device 112 (shown in FIG. 2) such as merchant analytics, as described herein. Merchant analytics computing device 112 communicates the merchant analytics to the user device for display on interactive user interface 118.

More specifically, FIG. 6 depicts a U.S.-level screenshot 600 showing a "zoomed out" view 602 of the United States of America. In view 602, the sectors are defined and displayed at a state-wide level. The screenshot 600 also includes several tools that enable a user to navigate the user interface and to examine the data generated and transmitted by merchant analytics computing device 112. For example, the screenshot 600 depicts a location search bar 608, which enables the user to search for a geographic region of interest. The screenshot 600 also includes a view navigation module 610. The view navigation module 610 includes a "view type" selectable icon 612, which enables the user to toggle between a "street map" view (as shown in view 602) and a "satellite" view (as shown in FIG. 15). The view navigation module 610 also includes "zoom out" 614 and "zoom in" 616 selectable icons. The view navigation module 610 further includes a merchant number indicator 618, which indicates the number of merchants encompassed by the current view (3,446,677 in view 602).

The screenshot 600 further includes a metric information module 620. The metric information module 620 allows the user to select between available merchant analytics metrics (e.g., Composite, Growth, Stability, Size, Traffic, and Ticket Size scores) using a drop-down menu 622. In the example embodiment, the metric information module 620 further includes a score scale 626, which provides an explanation to the user of the color-coding of the sectors. The sectors displayed in view 602 are shown "painted" with colors and/or shades corresponding to the score scale 626, which visually indicates the relative score (for the selected metric 624) for

each sector. When a user chooses a different metric using drop-down menu 622, the user interface will "re-paint" (i.e., re-color or re-shade) the displayed sectors (and, in some cases, the score scale 626) to reflect a range of numerical scores according to the selected metric 624. In the example embodiment, a darker color indicates a higher score. In view 602, the selected metric 624 is "Size." Accordingly, the merchant analytics provided on the user interface are size scores for selected sectors.

The screenshot 600 also depicts a "smart chart" 640, which provides the user with a score 642 for a selected sector 604, as well as additional information. In view 602, North Carolina is the selected sector 604, as indicated by the sector indicator 644 of the smart chart 640. The smart chart 640 includes, in view 602, a size score 642 for North Carolina (500 in view 602). As view 602 depicts sectors at a state level, the size score 642 for North Carolina is relative to all other states. The smart chart 640 also includes a trend graph 646, which is a visual representation of the size score trends for the selected sector 604 (North Carolina) over time. The smart chart 640 also includes its own merchant number indicator 648, which indicates the number of merchants included in the selected sector 604 (North Carolina). State and County ranking indicators 650, 652 in the current view 602, are blank, as they are not applicable to a state-level sector. State and County ranking indicators 650, 652 will be described further herein with respect to FIGS. 7 and 8. The smart chart 640 also includes an industry chart 654 (a pie chart in the illustrated embodiment), which indicates the percentage of merchant locations in the selected sector 604 associated with various industries.

FIG. 7 depicts a screenshot 700 showing a state-level view 702 (zoomed-in relative to view 602, shown in FIG. 6). View 702 depicts the state of North Carolina divided into county-level sectors. Notably, the merchant number indicator 718 in the view navigation module 710 has changed (relative to the merchant number indicator 618 in FIG. 6), depicting 93,490 merchants encompassed by view 702. The score scale 726 has also changed (relative to score scale 626 in FIG. 6), such that the colors or shades indicate different ranges of scores.

In view 702, Mecklenburg County is the selected sector 704. Accordingly, the information in the smart chart 740 has changed to reflect the data representing Mecklenburg County. For example, the size score 742 is 552, the merchant number indicator 748 reflects a much smaller number of merchants encompassed, and the industry chart 754 has also been updated. The state ranking

indicator 750 is now populated. The state ranking indicator 750 denotes the percentile of the selected sector 704 relative to all other sectors in the state. In view 702, the state ranking indicator 750 reads 96%, denoting that Mecklenburg County is in the 96th percentile of counties in the state, according to the selected metric 724 of "size."

FIG. 8 depicts a screenshot 800 showing a view 802 that is zoomed-in relative to view 602 and view 702 (shown in FIGS. 6 and 7, respectively). View 802 depicts a portion of Mecklenburg County at block-group-level sectors. In view 802, "Block Group 1" is the selected sector 804. Block Group 1 includes, in this example, Charlotte-Douglas Airport (CLT). Once again, the merchant number indicator 818 has decreased, and the information in the smart chart 840 has changed. The size score 842 (now 767), trend graph 846, merchant number indicator 848, state ranking indicator 850, and industry chart 854 reflect data representative of Block Group 1. Moreover, the county ranking indicator 852 is now populated. The county ranking indicator 852 denotes the percentile of the selected sector 804 relative to all sectors in the county. In view 802, the county ranking indicator 852 reads 99%, denoting that Block Group 1 is in the 99th percentile of block-group-level sectors in the county, according to the selected metric 824 of "size."

FIG. 9 depicts a screenshot 900 showing a view 902 that is the same in geographical scale as view 802 (shown in FIG. 8). However, view 902 has substantially changed in terms of the shading of the sectors. The metric information module 920 shows the selected metric 924 is the merchant analytic of "Growth," thus the sectors have been "re-painted" or "re-shaded" to reflect the growth scores of the visible sectors. The smart chart 940 for selected sector 904 Block Group 1 shows that the growth score 942 for Block Group 1 is 456, and the state and county ranking indicators 950, 952 have substantially decreased (relative to state and county ranking indicators 850, 852 shown in FIG. 8). As Block Group 1 includes CLT, it follows that the growth score 942 would be lower than the size score 842 (shown in FIG. 8). Though airports may have very high sales revenue (size) due to the sheer number of people passing through every day, their growth may be low, as the number of people travelling (and therefore the amount of money spent at airports) may not substantially increase from year to year.

FIG. 10 depicts a screenshot 1000 showing a view 1002 that is the same in geographical scale as views 802 and 902 (shown in FIGS. 8 and 9, respectively). However, again, view 1002 shows different shading of sectors than in

FIGS. 8 or 9. View 1002 reflects the selected metric 1024, the merchant analytic of "Stability." The selected sector 1004 Block Group 1 has a high stability score 1042 of 719, and also ranks highly relative to sectors in the state and county. Again, considering that Block Group 1 includes CLT, it stands to reason that sales revenue may be relatively stable, as the amount of people travelling (and therefore the amount of money spent at airports) may not substantially fluctuate from year to year.

FIG. 11 depicts a screenshot 1100 showing a view 1102 that is the same in geographical scale as views 802, 902, and 1002 (shown in FIGS. 8, 9, and 10, respectively). View 1102 reflects the selected metric 1124, the merchant analytic of "Traffic." The selected sector 1104 Block Group 1 has a very high traffic score 1142 of 801, and again ranks very highly relative to sectors in the state and county. Considering the number of people travelling through airports (such as CLT) each day, and hence each years, it follows that the transaction traffic may be very high, compared to other sectors in the same geographic region.

FIG. 12 depicts a screenshot 1200 showing a view 1202 that is the same in geographical scale as views 802, 902, 1002, and 1102 (shown in FIGS. 8, 9, 10, and 11, respectively). View 1202 reflects the selected metric 1224, the merchant analytic of "Ticket Size." Selected sector 1204 Block Group 1 has a very low ticket size score 1242 of 340 and ranks low relative to sectors in the state and county, despite Block Group 1 having a high numerical size score 842 (shown in FIG. 8) and a high numerical traffic score 1142 (shown in FIG. 11). Many transactions initiated in an airport (such as CLT) may be purchases of food and beverages by travelers, which may have relatively small ticket sizes (as opposed to, say, a jewelry store).

FIG. 13 depicts a screenshot 1300 showing a view 1302 that is the same in geographic scale as views 802, 902, 1002, 1102, and 1202 (shown in FIGS. 8, 9, 10, 11, and 12, respectively). View 1302 reflects the selected metric 1324, the merchant analytic of "Composite" (e.g., aggregated score). As described above, the composite score for a sector may be an average, weighted average, or some other aggregation of the other five scores for that sector. The selected sector 1304 Block Group 1 has a fairly high composite score 1342 of 669, which may be expected, considering three of the five previous scores were high for Block Group 1.

FIG. 14 depicts a screenshot 1400 showing a view 1402 that is same in geographical scale as views 802, 902, 1002, 1102, 1202, and 1302 (shown in FIGS. 8, 9, 10, 11, 12, and 13, respectively). Moreover, the selected metric 1424, as in view

1302, is "Composite." However, it should be noted that the time-selection slider 1430 has been moved from February 2015 (as was selected in all previous views) to December 2012. The time-selection slider 1430 acts as a virtual "time machine," allowing a user to see how the score for a sector has developed (i.e., increased or decreased) over time by dragging the slider 1430 from one point to another. In the example embodiment, the time-selection slider 1430 includes an interval indicator 1432, which denotes the number of months' worth of transaction data used to determine the scores shown in that particular view. The interval indicator 1432 in view 1402 reads "12," indicating that 12-months' worth of data is included in the determined scores shown. In view 1402, one can see that the merchant number indicators of merchants 1418, 1448 have decreased, both in the view navigation module 1410 and in the smart chart 1440 for the selected sector 1404 (Block Group 1). This immediately informs the user that, from December 2012 to February 2015, the geographic area has experienced some manner of growth, as more merchant locations were present in February 2015 than December 2012, in the same geographic view. The composite score 1442 for Block Group 1 has also changed, indicating that the composite score 1342, 1442 for Block Group 1 decreased from December 2012 to February 2015. This may indicate that the selected sector 1404 is not performing as well relative to itself in December 2012, or may indicate that other sectors are performing better, relative to the selected sector 1404 (or some combination of the two scenarios). In some embodiments, some sectors may "disappear," the further back in time the user goes on the user interface by moving slider 1430 "back in time," as at that selected month (or other point in time), there was not twelve-months' worth (or any other minimum amount) of data yet for enough merchant locations to define or establish a sector at that geographic location.

FIG. 15 depicts a screenshot 1500 showing a view 1502 that is zoomed-in relative to views 802-1402 (shown in FIGS. 8-14). In view 1502, the user has toggled a "satellite" view by selecting "view type" icon 1512. Accordingly, the sectors are displayed overlaid upon satellite imagery of the geographic region. In some cases, such a view may help a user understand and visualize the boundaries of and between defined sectors. In addition, the defined sectors are at the block level. The selected sector 1504 is denoted as "Block 1001," which was included in the "Block Group 1" (block-group level) sector shown in FIGS. 8-14. Accordingly, the number of merchants included in the selected sector 1504 is reduced (relative to the

number of merchants in, for example, selected sector 1404 shown in FIG. 14), as shown in the merchant number indicator 1548, and the various analytics (e.g., Composite score 1542, in this example) are determined using data for the merchants in just that block sector.

FIG. 16 is a simplified diagram of an example method 1600 for generating merchant analytics for a sector and providing the analytics on a user interface using merchant analytics computing device 112 (shown in FIG. 2). Specifically, merchant analytics computing device 112 is defines 1602 a plurality of sectors of a geographic region. Additionally, merchant analytics computing device 112 receives 1604 transaction data (e.g., transaction data 540, shown in FIG. 5) for a period of time. The transaction data may be associated with a plurality of merchants, and the plurality of merchants may be located in the geographic region. Additionally, merchant analytics computing device 112 identifies 1606 one sector of the plurality of sectors in which each merchant of the plurality of merchants is located. Additionally, merchant analytics computing device 112 generates 1608 aggregated merchant analytics (e.g., as output 590, also shown in FIG. 5) for each sector based on the transaction data associated with all merchants of the plurality of merchants located in the sector. The aggregated merchant analytics may represent a ranking of each sector relative to all other sectors of the plurality of sectors. Merchant analytics computing device 112 identifies 1610 an impact event associated with a first sector using the aggregated merchant analytics associated with the first sector. Merchant analytics computing device 112 may identify the impact event by determining if an impact event trigger is satisfied based on the aggregated merchant analytics (e.g., determining if a change in merchant analytics from one time period to a next is above a predetermined threshold). Merchant analytics computing device 112 retrieves 1612 content associated with the impact event from a content database. For example, merchant analytics device 112 may provide search criteria (e.g., a sector identifier and time period) to a database and retrieve content matching the search criteria. In some embodiments, merchant analytics computing device 112 may further determine which content of the retrieved content corresponds to a real-world event which may be the cause or result from the impact event. For example, merchant analytics computing device 112 may select content as corresponding to a real-world event based on the number of views of the content, a sentiment analysis of the retrieved content, number of links to or from the content, etc.). Additionally, merchant analytics computing

device 112 displays 1614 on a user interface (e.g., user interface 118, shown in FIG. 2) the aggregated merchant analytics and the content associated with the impact event. The aggregated merchant analytics may be graphically represented on a map of the defined sectors. "Display," as used in reference to merchant analytics computing device 112, may refer to any method in which merchant analytics computing device 112 facilitates or causes display of the merchant analytics on the user computing device.

FIG. 17 is a diagram of components of one or more example computing devices that may be used in the environment shown in FIG. 2. FIG. 17 further shows a configuration of databases including at least database 120 (shown in FIG. 2). Database 120 may store information such as, for example, transaction data 1702, public information 1704, and user data 1706. Database 120 is coupled to several separate components within merchant analytics computing device 112, which perform specific tasks.

Merchant analytics computing device 112 includes a defining component 1710 for defining a plurality of sectors of a geographic region. Additionally, merchant analytics computing device 112 includes a receiving component 1720 for receiving transaction data for transactions occurring within a period of time. The transaction data is associated with a plurality of merchants, and the plurality of merchants are located in the geographic region. Additionally, merchant analytics computing device 112 includes an identifying component 1730 for identifying one sector of the plurality of sectors in which each merchant of the plurality of merchants is located. Additionally, merchant analytics computing device 112 includes a generating component 1740 for generating aggregated merchant analytics for each sector based on the transaction data associated with all merchants of the plurality of merchants located in the sector. The aggregated merchant analytics represent a ranking of each sector relative to all other sectors of the plurality of sectors. Aggregating component 1740 and/or another component may further identify impact events based on the aggregated merchant analytics and/or transaction data. Merchant analytics computing device 112 includes a retrieving component 1750 for retrieving content associated with an identified impact event. Additionally, merchant analytics computing device 112 includes a causing component 1760 (alternatively referred to as a "display component") for causing to be displayed on a user interface the aggregated merchant analytics and/or content associated with an identified impact

event. The aggregated merchant analytics are graphically represented on a map of the defined sectors.

In some implementations, generating component 1740 (or any other component of merchant analytics computing device 112) may be further configured to calculate a growth of each sector using received transaction data for a subset of the plurality of merchants located in each corresponding sector. The growth represents a difference in total sales revenue in each sector from a beginning of the period of time to an end of the period of time. Generating component 1740 may be further configured to determine a relative ranking for each sector by comparing the growth of each sector of the plurality of sectors and generate the growth score for each sector based on the relative ranking.

In some implementations, generating component 1740 (or any other component of merchant analytics computing device 112) may be further configured to calculate a stability of each sector using received transaction data for a subset of the plurality of merchants located in each corresponding sector. The stability represents maintenance of total sales revenue within a range of values around an average value of the total sales revenue in each sector during the period of time. Generating component 1740 may be further configured to determine a relative ranking for each sector by comparing the stability of each sector of the plurality of sectors, and generate the stability score for each sector based on the relative ranking.

In some implementations, generating component 1740 (or any other component of merchant analytics computing device 112) may be further configured to calculate a size of each sector using received transaction data for a subset of the plurality of merchants located in each corresponding sector. The size represents a total sales revenue in each sector during the period of time. Generating component 1740 may be further configured to determine a relative ranking for each sector by comparing the size of each sector of the plurality of sectors, and generate the size score for each sector based on the relative ranking.

In some implementations, generating component 1740 (or any other component of merchant analytics computing device 112) may be further configured to calculate a traffic of each sector using received transaction data for a subset of the plurality of merchants located in each corresponding sector. The traffic represents a number of transactions initiated in each sector during the period of time. Generating component 1740 may be further configured to determine a relative ranking for each

sector by comparing the traffic of each sector of the plurality of sectors, and generate the traffic score for each sector based on the relative ranking.

In some implementations, generating component 1740 (or any other component of merchant analytics computing device 112) may be further configured to calculate an average ticket size for each sector using received transaction data for a subset of the plurality of merchants located in each corresponding sector. The average ticket size represents an average transaction amount in each sector during the period of time, and the average ticket size may be calculated by dividing a total sales revenue for a sector by a number of transactions initiated in the sector during the period of time. Generating component 1740 may be further configured to determine a relative ranking for each sector by comparing the average ticket size of each sector of the plurality of sectors, and generate the ticket size score for each sector based on the relative ranking.

In some implementations, generating component 1740 (or any other component of merchant analytics computing device 112) may be further configured to generate a growth score for each sector. The growth score represents a first relative ranking of the plurality of sectors based on a difference in total sales revenue in each sector from a beginning of the period of time to an end of the period of time. Generating component 1740 may also be configured to generate a stability score for each sector. The stability score represents a second relative ranking of the plurality of sectors based on a maintenance of a total sales revenue within a range of values around an average value of the total sales revenue in each sector during the period of time. Generating component 1740 may be further configured to generate a size score for each sector. The size score represents a third relative ranking of the plurality of sectors based on the total sales revenue in each sector during the period of time. Generating component 1740 may also be configured to generate a traffic score each sector. The traffic score represents a fourth relative ranking of the plurality of sectors based on a number of transactions initiated in each sector during the period of time. Generating component 1740 may further be configured to generate a ticket size score for each sector. The ticket size score represents a fifth relative ranking of the plurality of sectors based on an average transaction amount in each sector during the period of time. Generating component 1740 may still further be configured to generate the composite score for each sector. The composite score represents a sixth relative

ranking of the plurality of sectors based on an aggregation of the growth score, the stability score, the size score, the traffic score, and the ticket size score of each sector.

In some implementations, generating component 1740 may be configured to generate a merchant record for each merchant of the plurality of merchants. Receiving component 1720 may be configured to receive an investment goal associated with the plurality of merchants. Identifying component 1730 may be configured to sort the plurality of merchant records according to the investment goal and the merchant analytics for each sector in which each merchant of the plurality of merchants is located. Causing or displaying component 1750 may be configured to present the sorted merchant records in an optimized merchant management portfolio.

In some implementations, generating component 1740 may be configured to identify an impact event based on the aggregated merchant analytics. Generating component 1740 may determine if a relationship between aggregated merchant analytics corresponding to a plurality of time periods for a sector satisfies an impact event trigger. For example, generating component 1740 may take the difference between one or more aggregated merchant analytics of a sector for consecutive time periods and determine if the absolute value of the difference is equal to and/or greater than a predetermined impact trigger value.

In some embodiments, retrieving component 1750 and/or another component may be configured to determine a subset of the retrieved content to display which corresponds to a real-world event based on a relevance analysis of the retrieved content associated with the impact event. For example, retrieving component 1750 and/or another component may select content as corresponding to a real-world event based on the number of views of the content, a sentiment analysis of the retrieved content, number of links to or from the content, etc.).

Referring now to FIG. 18, view 1800 is an example embodiment of the UI showing information related to identified impacts events. As described herein with reference to the Trend Identification Phase and the Trend Analysis Phase, the merchant analytics computing device may identify trends and/or events based on the transaction data and/or retrieve information related to the identified impact event. The merchant analytics computing device may cause the client system to provide this information in the UI. For example, the UI may include an alert icon 1860 corresponding to an identified impact event. Alert icon(s) 1860 are placed on time-selection slider 1830 corresponding to the time period for which the impact event was

identified. Alert icons 1860 are placed on time-selection slider 1830 for each identified impact event for the currently selected sector 1804. In alternative embodiments, alert icons 1860 are placed on time-selection slider 1830 for identified impact events corresponding to each sector displayed.

In some embodiments, the UI includes alert icons 1862. Alert icons 1862 are displayed on visible sectors prior to a sector being selected by a user for viewing. In alternative embodiments, alert icons 1862 remain visible on non-selected sectors and/or become visible if a user deselects a sector. Alert icons 1862 are placed on a sector to indicate that at least one impact event has been identified for that sector during the time period encompassed by time-selection slider 1830. In alternative embodiments, alert icons 1862 correspond to impact events identified for a predetermined time period before and/or after interval indicator 1832 which indicates the current time period for which data is displayed. For example, if interval indicator 1832 indicates that data is being shown for one-month intervals, alert icons 1862 may be displayed on sectors for which an impact event has been identified within the current month, previous month, and/or following month.

In some embodiments, the UI includes smart chart 1840 displaying information about selected sector 1804. The smart chart may include a graph of a score over time. The type of score displayed by the graph is indicated as composite score 1842. Other information (e.g., merchant number indicator 1848) may also be included. Alert icons 1864 may be included on the graph of the score over time included in smart chart 1840.

In some embodiments, alert icons 1860, 1862, 1864 are displayed for impact events identified based on the currently selected metric 1424 (e.g., composite score). Impact events identified based on other scores are not displayed. Changing selected metric 1824 may change the alter icons 1860, 1862, 1864 displayed. In alternative embodiments, an identification of an impact event based on other scores may be displayed in the UI. For example, alert icons 1862, 1864 may only correspond to impact events identified based on the selected metric 1824. Alert icon 1860 may correspond to an identified impact event identified based on any score.

In some embodiments, the UI includes analysis window 1866. Analysis window 1866 includes additional information determined by the merchant analytics computing device to correspond to the identified impact event as described in the Trend Analysis Phase. In some embodiments, the UI displays analysis window

1866 when a user clicks on, hovers over, and/or otherwise selects an alert icon 1860, 1862, 1864. The information included in analysis window 1866 corresponds with the identified impact event to which the alert icon 1860, 1862, 1864 corresponds. When a user clicks on, hovers over, and/or otherwise selects a different alert icon 1860, 1862, 1864, analysis window 1866 is updated to display the additional information determined by the merchant analytics computing device to correspond to that identified impact event. In some embodiments, analysis window 1866 is a separate window which appears on top of other elements of the UI (e.g., the map of sectors). Analysis window 1866 may be repositioned and/or resized. Analysis window 1866 may be exited by clicking on an X icon, selecting the alert icon 1860, 1862, 1864 selected to open the analysis window 1866, and/or by clicking outside analysis window 1866. In some embodiments, analysis window 1866 is docked to a specific area of the UI (e.g., a left side, right side, top, bottom, etc.). In further embodiments, analysis window 1866 is positioned near the alert icon 1860 corresponding to the identified impact event for which information is displayed in analysis window 1866. In still further embodiments, analysis window 1866 and/or alert icon 1860, 1862, 1864 may be color coded or otherwise indicate that analysis window 1866 corresponds with a particular alert icon 1860, 1862, 1864.

In some embodiments, analysis window 1866 includes date 1868 which corresponds to the time period in which the impact event was identified. The additional information displayed in analysis window 1866 may include one or more of published news articles, news articles available through internet distribution, social networking news feeds, posts, or other shared information, and/or other content. The content may be organized by type and positioned under headings 1878 which identify the type of content. For example, news articles may be located under a news heading 1878 and social media posts organized under a social media heading 1878. Each content item may have title 1870, date 1872, and/or preview 1874. In some embodiments, clicking on or otherwise selecting title 1870, date 1872, and/or preview 1874 causes the user interface to display or link to the associated content. In some embodiments, words, tags, and/or other parts of title 1870, date 1872, and/or preview 1874 which matched the search criteria used to determine the content is related to the identified impact event are highlighted, bolded, and/or otherwise identified. In some embodiments, preview 1874 includes at least one word, tag, or other part of the content which was identified as matching search criteria. For example, preview 1874

may include a business or location 1876 which is identified with the sector. In some embodiments, analysis window 1866 includes graph 1880 which includes an indicator of the identified impact event and score data corresponding to the time period or time periods surrounding the identified trend and/or event. Graph 1880 may include score information over a shorter time period than other graphs included in the UI which may provide increased resolution regarding score data surrounding the identified impact event. In some embodiments, analysis window 1866 includes comparison button 1882. Comparison button 1882, when selected by a user, causes the UI to display a comparison view 1900 which displays information from two time periods.

FIG. 19 is an example comparison view 1900 of the UI. Comparison view 1900 includes view 1910 of a first time period showing sectors "painted" with colors and/or shades corresponding to the score scale, which visually indicates the relative score (for the selected metric 1924) for each sector. Comparison view 1900 also includes view 1911 of a second time period showing sectors "painted" with colors and/or shades corresponding to the score scale, which visually indicates the relative score (for the selected metric 1924) for each sector. View 1910 shows a view of the sectors prior to an identified impact event, and view 1911 shows a view of the sectors after the identified impact event. Smart charts 1940, 1941 may be included for a selected sector with each smart chart 1940, 1941 displaying information for the corresponding time period (e.g., December 2012 and February 2015). In some embodiments, time periods for which information is displayed in views 1910 and 1911 may be adjusted using the time-selection slider corresponding to each view 1910, 1911. In some embodiments, selecting a sector in either view 1910, 1911 causes the other view to update to the selected sector as well. When comparison view 1900 is first displayed, the selected sector may be, by default, the sector which was selected when comparison button 1882 was selected by the user.

In some embodiments, comparison view 1900 includes timeline 1962. Timeline 1962 may indicate the time corresponding to the identified trend and/or event using icon 1968. Timeline 1962 may further indicate the time corresponding to views 1910, 1911. For example, icon 1964 on timeline 1962 corresponds to view 1910 and illustrates to a user the time period for which the data is displayed in view 1910 relative to the identified impact event, signified with icon 1968, and the time period for which the data is displayed in view 1911, signified with icon 1966. In some embodiments, dragging icon 1964, 1966 causes the data displayed in view 1910, 1911

to change to data corresponding to the time period to which icon 1964, 1966 is repositioned.

In some embodiments, comparison view 1900 includes analysis pane 1960. Analysis pane 1960 may include the same information displayed in analysis window 1866. Analysis pane 1960 may include more detailed information in comparison to analysis window 1866. For example, analysis pane 1960 may include previews 1976 which include more content. Analysis pane 1960 may include content for a greater number of time periods accessible using scroll bar 1978. Analysis pane 1960 may include more content entries for each time period organized by date headings 1970, content type headings 1972, and content titles 1974. In some embodiments, selecting date heading 1970 causes analysis pane 1960 to display content only for that time period.

In some embodiments, comparison view 1900 includes back button 1980. Selecting back button 1980 causes the UI to exit comparison view 1900. Upon exiting comparison view 1900, the UI may display any one of the views described herein. For example, upon exiting comparison view 1900 the UI may display view 1800.

Referring now to FIG. 20, view 2000 is an example screenshot displayed on the UI. In some embodiments, the UI may include pin icon 2060. Pin icon 2060 allows a user to select a sector and/or monitoring area(s) for the merchant analytics computing device to monitor as described in the Monitoring Phase. In some embodiments, pin icon 2060 is dragged to a sector and/or area which the user wants to monitor. While pin icon 2060 is dragged, it is displayed on the UI. For example, while being dragged, pin icon 2060 is shown in dashed lines 2062 or otherwise indicated that pin icon 2060 has not been placed. When pin icon 2060 is placed in a sector and/or area, pin icon 2060 may be displayed by a placed pin icon 2064 (e.g., in sector 2040). In some embodiments, monitoring areas are displayed around placed pin icon 2064. The monitoring areas may be placed at predefined radii from placed pin icon 2064. For example, an immediate area monitoring area 2066, nearby area monitoring area 2068, and relative area monitoring area 2070 may be displayed around placed pin icon 2064. In some embodiments, immediate area monitoring area 2066 is defined as having a 10 mile radius centered on placed pin icon 2064, nearby area monitoring area 2068 is defined as having a 20 mile radius centered on placed pin icon 2064, and relative area monitoring area 2070 is defined as having a 30 mile radius centered on

placed pin icon 2064. In other embodiments, other predetermined radii are used for the monitoring areas.

In some embodiments, the monitoring areas may be defined by the user of the UI. For example, when pin icon 2060 is placed to identify a sector and/or area to monitor, a user may be prompted with fields to enter the radii for one or more monitoring areas centered on the placed pin icon 2064. In one embodiment, a user may drag the circles defining the monitoring areas in order to resize the monitoring areas as desired. Sectors completely within the monitoring areas are monitored by the merchant analytics computing device. In an alternative embodiment, sectors at least partially within a monitoring area are monitored by the merchant analytics computing device.

In some embodiments, the UI includes monitoring dashboard 2072. Monitoring dashboard 2072 includes a list of placed pin icons 2064 and corresponding monitoring. Each placed pin icon 2064 has a corresponding monitoring area identifier 2074 in monitoring dashboard 2072. In some embodiments, when a user places a pin icon 2060, monitoring dashboard 2072 is displayed and cursor 2076 is activated to allow for a user to edit the monitoring area identifier 2074 for the pin icon 2060 which was placed. A user may change the monitoring area identifier 2074. Monitoring dashboard 2072 may include a date 2078 corresponding to when monitoring began (e.g., the date the user placed the pin icon 2060 and/or the date for which corresponding data was displayed when the user placed pin icon 2060). Monitoring may be stopped and a placed pin icon 2064 removed when a user selects X icon 2080 associated with a monitoring area identifier 2074. In some embodiments, when a user selects monitoring area identifier 2074, a monitoring report is displayed in the UI.

FIG. 21 displays an example monitoring report 2100 generated by merchant analytics computing device 112 (shown in FIG. 2). In some embodiments, monitoring report 2100 is displayed by the UI upon receiving a corresponding input from the user. For example, a user may select monitoring area identifier 2074 which causes the display of monitoring report 2100 (e.g., in a separate window of the UI). In other embodiments, monitoring report 2100 is periodically provided to the user as described in the Monitoring Phase.

The content of monitoring report 2100 is generated as described in the Monitoring Phase. In some embodiments, monitoring report 2100 includes title 2102

which identifies the monitoring area, merchant, and/or sector to which the information in monitoring report 2100 pertains. Monitoring report 2100 includes period identifiers 2104 for which corresponding score data 2106 and/or transaction data is displayed. In one embodiment, period identifiers 2104 head columns with score data 2106 being row entries in each column. In some embodiments, monitoring report 2100 includes score data 2106 for a plurality of score types (e.g., composite, growth, stability, size, ticket, traffic, and/or other scores). Each score type may form a separate row. In some embodiments, graphs 2112 correspond to each score type for which score data 2106 is displayed. Graphs 2112 may span the same time periods identified by time period identifiers 2104. In other embodiments, the information included within monitoring report 2100 may be organized differently.

In some embodiments, score data 2106 is displayed with an arrow 2108 which indicates if the score for a particular time period has increased (e.g., an upward oriented arrow) or decreased (e.g., a downward oriented arrow). The arrow may be color coded (e.g., green for increase, red for decrease). In some embodiments, percentage change 2110 is displayed with score data 2106 indicating the percentage change in the score for a time period as compared to the previous time period. In some embodiments, percentage change 2110 is an absolute value. In an alternative embodiment, percentage change 2110 includes a sign. In some embodiments, percentage change 2100 is rounded to the nearest whole number. In an alternative embodiment, percentage change 2100 includes a predetermined number of decimal places. For example, a decimal percentage change 2116 may include a single decimal place. In a further alternative embodiment, percentage change 2110 may be reported using an inequality if less than a predetermined amount. For example, an inequality percentage change 2118 may indicate that the score has changed less than one percent from the prior time period. In a further alternative embodiment, straight lines 2122 may indicate that there was no change or that the percentage change was under a predetermined amount (e.g., less than one percent). In some embodiments, the percentage change 2110 is only displayed if a score for a prior time period is also displayed in monitoring report 2100. In an alternative embodiment, a first reported score 2120 includes a percentage change from a score in a prior month even if the prior month score is not included in monitoring report 2100.

In some embodiments, monitoring report 2100 includes related content icons 2114. Related content icons 2114 may correspond to each period identifier 2104

included in monitoring report 2100. When a user selects related content icon 2114, the UI may display or link the user to a list of related content to the monitoring area for the time period. The related content may be identified and/or provided as described in the Trend Analysis Phase. In some embodiments, monitoring report 2100 further includes identification of identified trends and/or events within the reported time periods. For example, an icon may be included on graph 2112, next to score data 2106, and/or period identifier 2104. Impact events may be identified as described in the Trend Identification Phase.

This written description describes storing information as tuples. It should be understood that this is an exemplary embodiment. Tuples may include string entries, numerical entries, file location entries, files storing a plurality of information, pages, and/or other entries. In alternative embodiments, other database storage techniques may be used in place of, or in combination with, the use of tuples. For example, information may be stored in a database using a B+ tree structure, unordered structure, ordered structure, heap files structure, hash buckets structure, and/or other structure. Information may be stored such that entries of information are linked by any type of relationship corresponding to entries in the same tuple as described herein.

As used herein, the term "non-transitory computer-readable media" is intended to be representative of any tangible computer-based device implemented in any method or technology for short-term and long-term storage of information, such as, computer-readable instructions, data structures, program modules and sub-modules, or other data in any device. Therefore, the methods described herein may be encoded as executable instructions embodied in a tangible, non-transitory, computer readable medium, including, without limitation, a storage device and/or a memory device. Such instructions, when executed by a processor, cause the processor to perform at least a portion of the methods described herein. Moreover, as used herein, the term "non-transitory computer-readable media" includes all tangible, computer-readable media, including, without limitation, non-transitory computer storage devices, including, without limitation, volatile and nonvolatile media, and removable and non-removable media such as a firmware, physical and virtual storage, CD-ROMs, DVDs, and any other digital source such as a network or the Internet, as well as yet to be developed digital means, with the sole exception being a transitory, propagating signal.

In addition, although various elements of the merchant analytics computing device are described herein as including general processing and memory devices, it should be understood that the merchant analytics computing device is a specialized computer configured to perform the steps described herein for generating and displaying aggregated merchant analytics for a sector, as well as identifying an impact event using the aggregated merchant analytics.

This written description uses examples to disclose the disclosure, including the best mode, and also to enable any person skilled in the art to practice the embodiments, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the disclosure is defined by the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they have structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal languages of the claims.

WHAT IS CLAIMED IS:

1. A method for identifying an impact event using aggregated merchant analytics for a sector, said method implemented by a merchant analytics computing device including at least one processor in communication with a memory, the merchant analytics computing device in communication with a user computing device, said method comprising:

defining a plurality of sectors of a geographic region;

receiving, by the merchant analytics computing device, transaction data for financial transactions occurring within a period of time, the transaction data associated with a plurality of merchants, the plurality of merchants located in the geographic region;

identifying, for each merchant of the plurality of merchants, one sector of the plurality of sectors in which the merchant is located;

generating, by the merchant analytics computing device, aggregated merchant analytics for each sector based on the transaction data associated with all merchants of the plurality of merchants located in the sector, wherein the aggregated merchant analytics represent a ranking of each sector relative to all other sectors of the plurality of sectors;

identifying an impact event associated with a first sector using the aggregated merchant analytics associated with the first sector, wherein the impact event is identified upon an impact event trigger being satisfied;

retrieving content associated with the impact event from a content database;

displaying, by the merchant analytics computing device, on a user interface of the user computing device the aggregated merchant analytics and at least a portion of the content associated with the impact event, wherein the aggregated merchant analytics are graphically represented on a map of the defined sectors.

2 The method of Claim 1, further comprising:

determining a subset of the retrieved content to display which corresponds to a real-world event based on a relevance analysis of the retrieved content associated with the impact event.

3. The method of Claim 1, wherein retrieving the content associated with the impact event further comprises:

generating search criteria associated with the impact event, the search criteria including at least one of: a sector identifier of the sector associated with the impact event, a merchant identifier associated with the impact event, and a time period associated with the impact event; and

applying the search criteria to a plurality of data feeds in the database.

4. The method of Claim 3, wherein the plurality of data feeds includes text-based content that has been analyzed using natural language processing techniques, and indexed according to at least one of an associated entity, relationship, fact, event, or topic.

5. The method of Claim 3, wherein applying the search criteria further comprises transmitting, by the merchant analytics computing device, the search criteria to a third-party system associated with the database.

6. The method of Claim 1, wherein the graphical user interface includes a time-selection slider that allows a user of the user computing device to adjust the period of time for which the aggregated merchant analytics are graphically represented, said method further comprising:

displaying an alert icon on the time-selection slider to correspond to a time period associated with the impact event; and

receiving user input associated with a user interaction with the alert icon prior to said displaying the content associated with the impact event.

7 The method of Claim 1, wherein identifying the impact event further comprises identifying a trend in the aggregated merchant analytics for the first sector, wherein the impact event trigger includes a time period threshold associated with the trend.

8. The method of Claim 1, wherein identifying the impact event further comprises identifying a percentage change in the aggregated merchant analytics

for the first sector within a time period, wherein the impact event trigger includes a threshold percentage change and a threshold time period.

9. The method of Claim 1, further comprising:

receiving, by the merchant analytics computing device, a user input corresponding to a user selection of the first sector to monitor; and

monitoring the first sector identified by the user input for the impact event, wherein said monitoring comprises:

storing the generated aggregated merchant analytics for the first sector for a plurality of time periods; and

monitoring the stored aggregated merchant analytics for a satisfaction of the impact event trigger.

10. The method of Claim 1, further comprising:

determining that the impact trigger is satisfied by comparing a relationship between aggregated merchant analytics corresponding to a plurality of time periods for a sector to an impact trigger value.

11. A merchant analytics computing device comprising at least one processor in communication with a memory, said merchant analytics computing device in communication with a user computing device, said at least one processor programmed to:

define a plurality of sectors of a geographic region;

receive transaction data for transactions occurring within a period of time, the transaction data associated with a plurality of merchants, the plurality of merchants located in the geographic region;

identify one sector of the plurality of sectors in which each merchant of the plurality of merchants is located;

generate aggregated merchant analytics for each sector based on the transaction data associated with all merchants of the plurality of merchants located in the sector, wherein the aggregated merchant analytics represent a ranking of each sector relative to all other sectors of the plurality of sectors;

identify an impact event associated with a first sector using the aggregated merchant analytics associated with the first sector, wherein the impact event is identified upon an impact event trigger being satisfied;

retrieve content associated with the impact event from a content database;

cause to be displayed on a user interface of the user computing device the aggregated merchant analytics and at least a portion of the content associated with the impact event, wherein the aggregated merchant analytics are graphically represented on a map of the defined sectors.

12. The merchant analytics computing device of claim 11, wherein said at least one processor is further programmed to:

determine a subset of the retrieved content to display which corresponds to a real-world event based on a relevance analysis of the retrieved content associated with the impact event.

13. The merchant analytics computing device of claim 11, wherein said at least one processor is further programmed to:

generate search criteria associated with the impact event, the search criteria including at least one of: a sector identifier of the sector associated with the impact event, a merchant identifier associated with the impact event, and a time period associated with the impact event; and

apply the search criteria to a plurality of data feeds in the database.

14. The merchant analytics computing device of claim 13, wherein the plurality of data feeds includes text-based content that has been analyzed using natural language processing techniques, and indexed according to at least one of an associated entity, relationship, fact, event, or topic.

15. The merchant analytics computing device of claim 11, wherein said at least one processor is further programmed to:

display an alert icon on the time-selection slider to correspond to a time period associated with the impact event; and

receive user input associated with a user interaction with the alert icon prior to said displaying the content associated with the impact event.

16. The merchant analytics computing device of claim 11, wherein said at least one processor is further programmed to:

identify the impact event by identifying a trend in the aggregated merchant analytics for the first sector, wherein the impact event trigger includes a time period threshold associated with the trend.

17. The merchant analytics computing device of claim 11, wherein said at least one processor is further programmed to:

identify the impact event by identifying a percentage change in the aggregated merchant analytics for the first sector within a time period, wherein the impact event trigger includes a threshold percentage change and a threshold time period.

18. The merchant analytics computing device of claim 11, wherein said at least one processor is further programmed to:

receive, by the merchant analytics computing device, a user input corresponding to a user selection of the first sector to monitor; and

store the generated aggregated merchant analytics for the first sector for a plurality of time periods; and

monitor the stored aggregated merchant analytics for a satisfaction of the impact event trigger.

19. The merchant analytics computing device of claim 11, wherein said at least one processor is further programmed to:

determine that the impact trigger is satisfied by comparing a relationship between aggregated merchant analytics corresponding to a plurality of time periods for a sector to an impact trigger value.

20. A computer-readable storage medium having computer-executable instructions embodied thereon, wherein when executed by a merchant analytics computing device including at least one processor in communication with a

memory, the computer-executable instructions cause the merchant analytics computing device to:

define a plurality of sectors of a geographic region;

receive transaction data for financial transactions occurring within a period of time, the transaction data associated with a plurality of merchants, the plurality of merchants located in the geographic region;

identify, for each merchant of the plurality of merchants, one sector of the plurality of sectors in which the merchant is located;

generate aggregated merchant analytics for each sector based on the transaction data associated with all merchants of the plurality of merchants located in the sector, wherein the aggregated merchant analytics represent a ranking of each sector relative to all other sectors of the plurality of sectors;

identify an impact event associated with a first sector based on the aggregated merchant analytics associated with the first sector, wherein the impact event is identified upon an impact event trigger being satisfied;

retrieve content associated with the impact event from a content database; and

display on a user interface of a user computing device the aggregated merchant analytics and the content associated with the impact event, wherein the aggregated merchant analytics are graphically represented on a map of the defined sectors.

FIG. 1

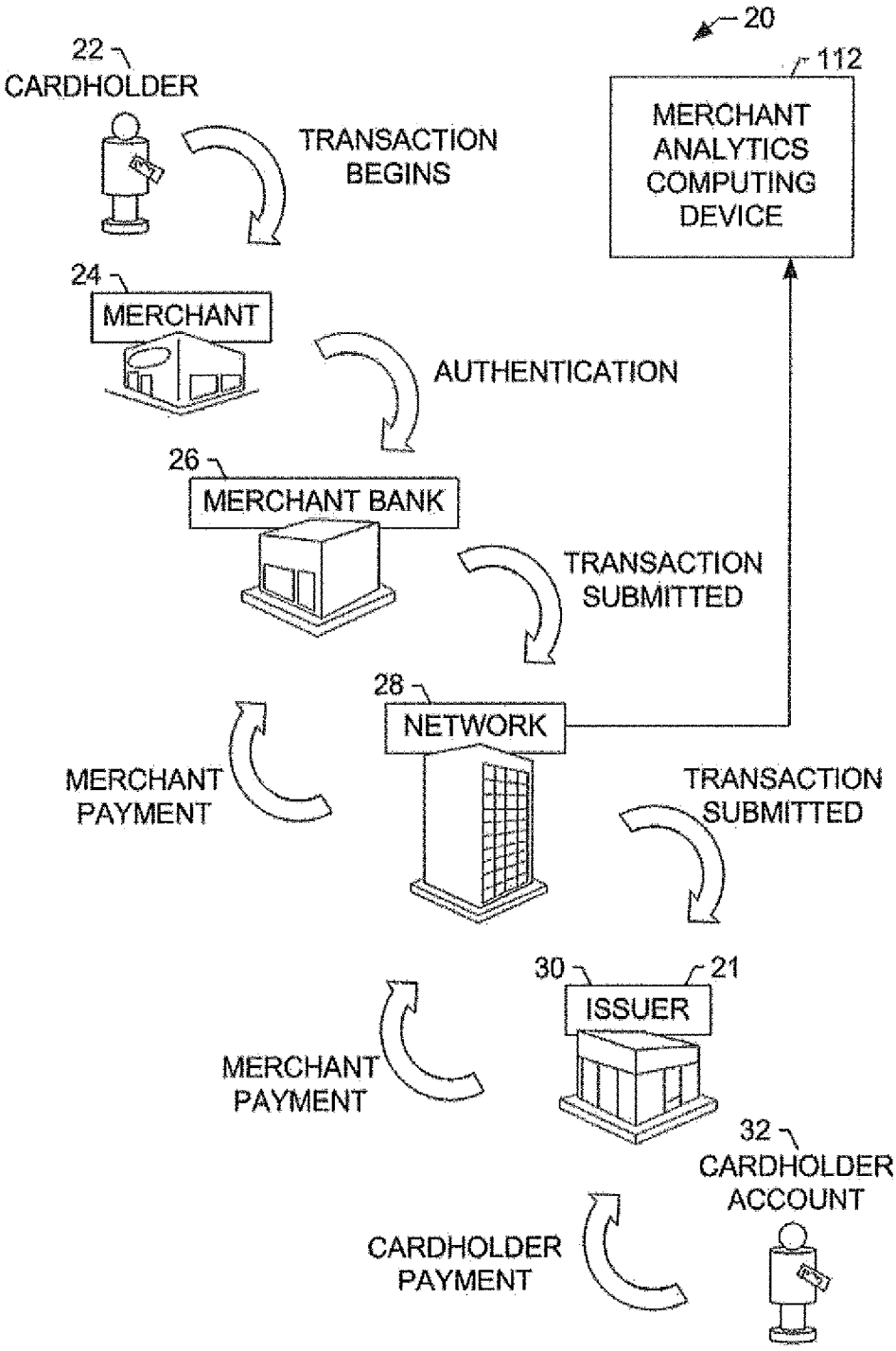
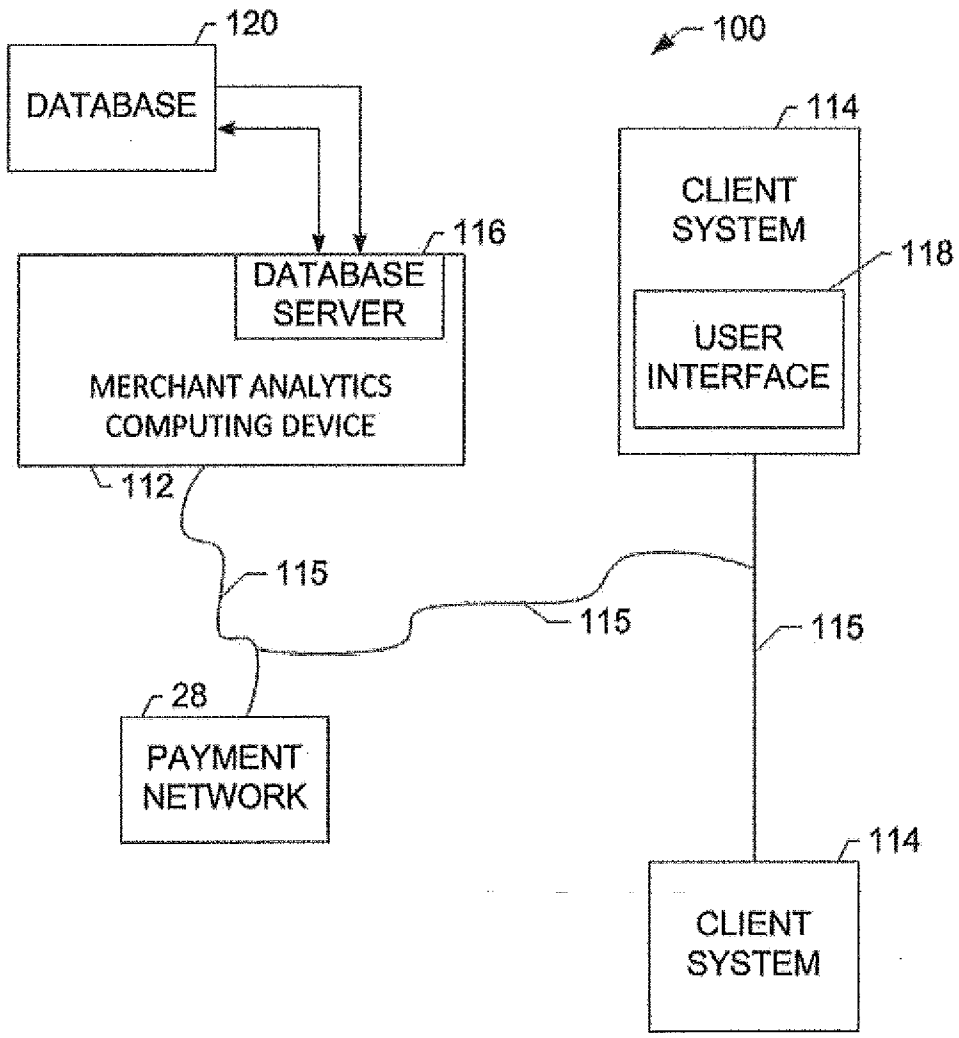

20
22
CARDHOLDER
112
MERCHANT ANALYTICS COMPUTING DEVICE
TRANSACTION BEGINS
24
MERCHANT
AUTHENTICATION
26
MERCHANT BANK
TRANSACTION SUBMITTED
28
NETWORK
MERCHANT PAYMENT
TRANSACTION SUBMITTED
30
21
ISSUER
MERCHANT PAYMENT
32
CARDHOLDER ACCOUNT
CARDHOLDER PAYMENT

FIG. 2


120
DATABASE
100
114
CLIENT SYSTEM
116
DATABASE SERVER
118
USER INTERFACE
MERCHANT ANALYTICS COMPUTING DEVICE
112
115
115
115
28
PAYMENT NETWORK
114
CLIENT SYSTEM

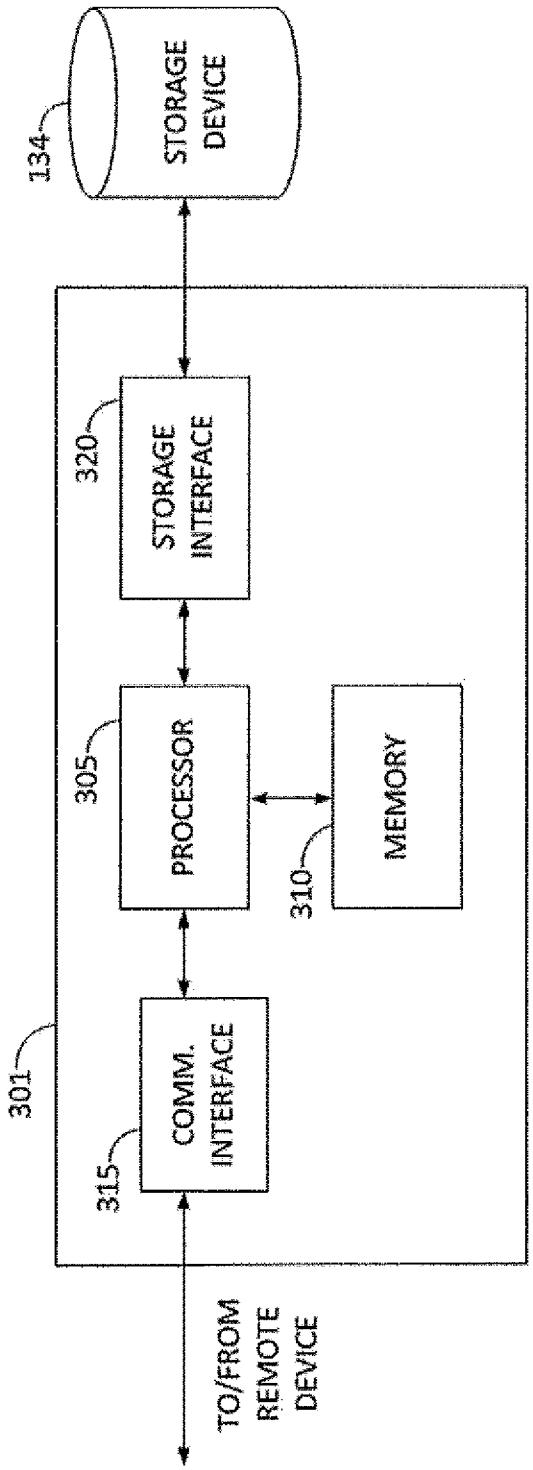

134
STORAGE DEVICE
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STORAGE INTERFACE
305
PROCESSOR
310
MEMORY
301
315
COMM. INTERFACE
TO/FROM REMOTE DEVICE

FIG. 3

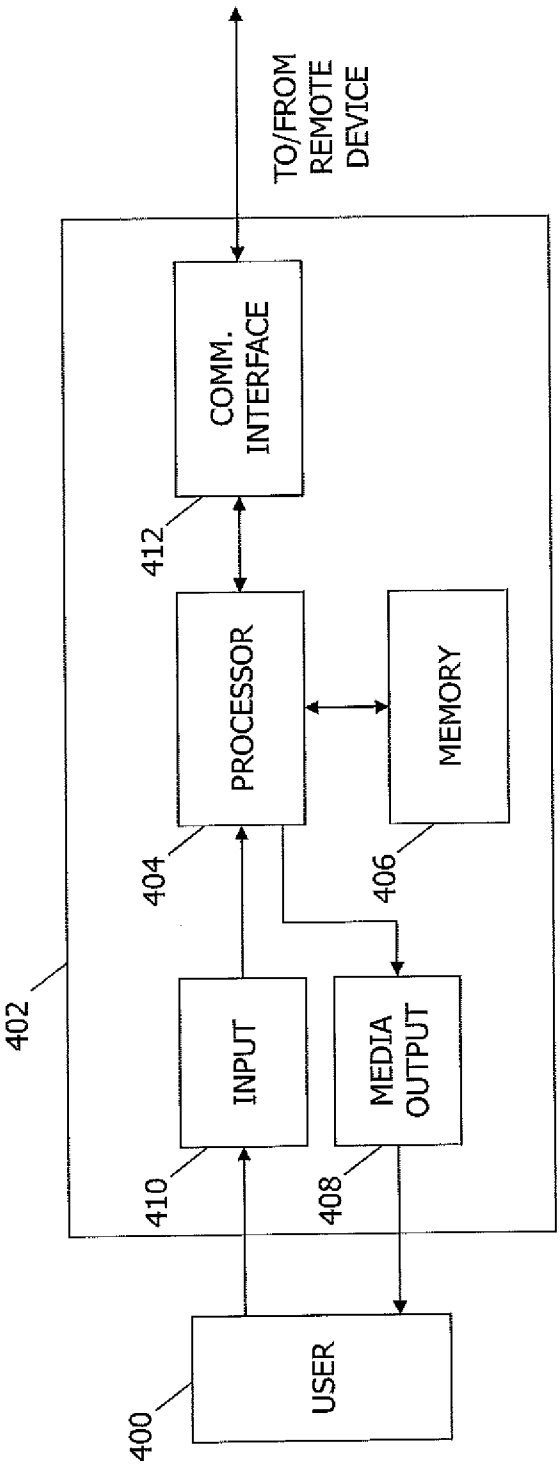

TO/FROM REMOTE DEVICE
COMM. INTERFACE
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PROCESSOR
MEMORY
404
406
402
INPUT
MEDIA OUTPUT
410
408
USER
400

FIG.4

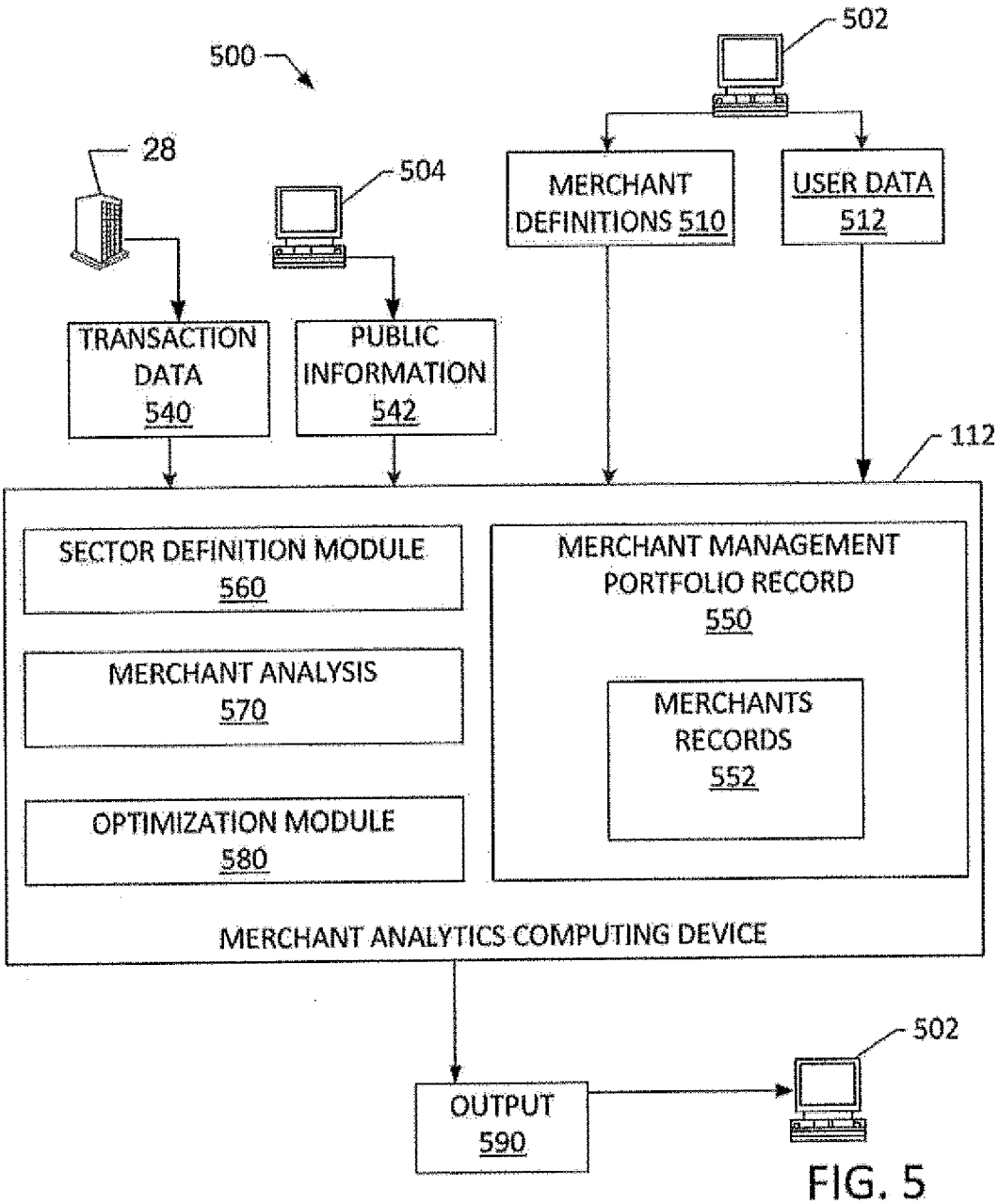

500
502
28
504
MERCHANT DEFINITIONS 510
USER DATA 512
TRANSACTION DATA 540
PUBLIC INFORMATION 542
112
SECTOR DEFINITION MODULE 560
MERCHANT MANAGEMENT PORTFOLIO RECORD 550
MERCHANT ANALYSIS 570
MERCHANTS RECORDS 552
OPTIMIZATION MODULE 580
MERCHANT ANALYTICS COMPUTING DEVICE
OUTPUT 590
502

FIG. 5

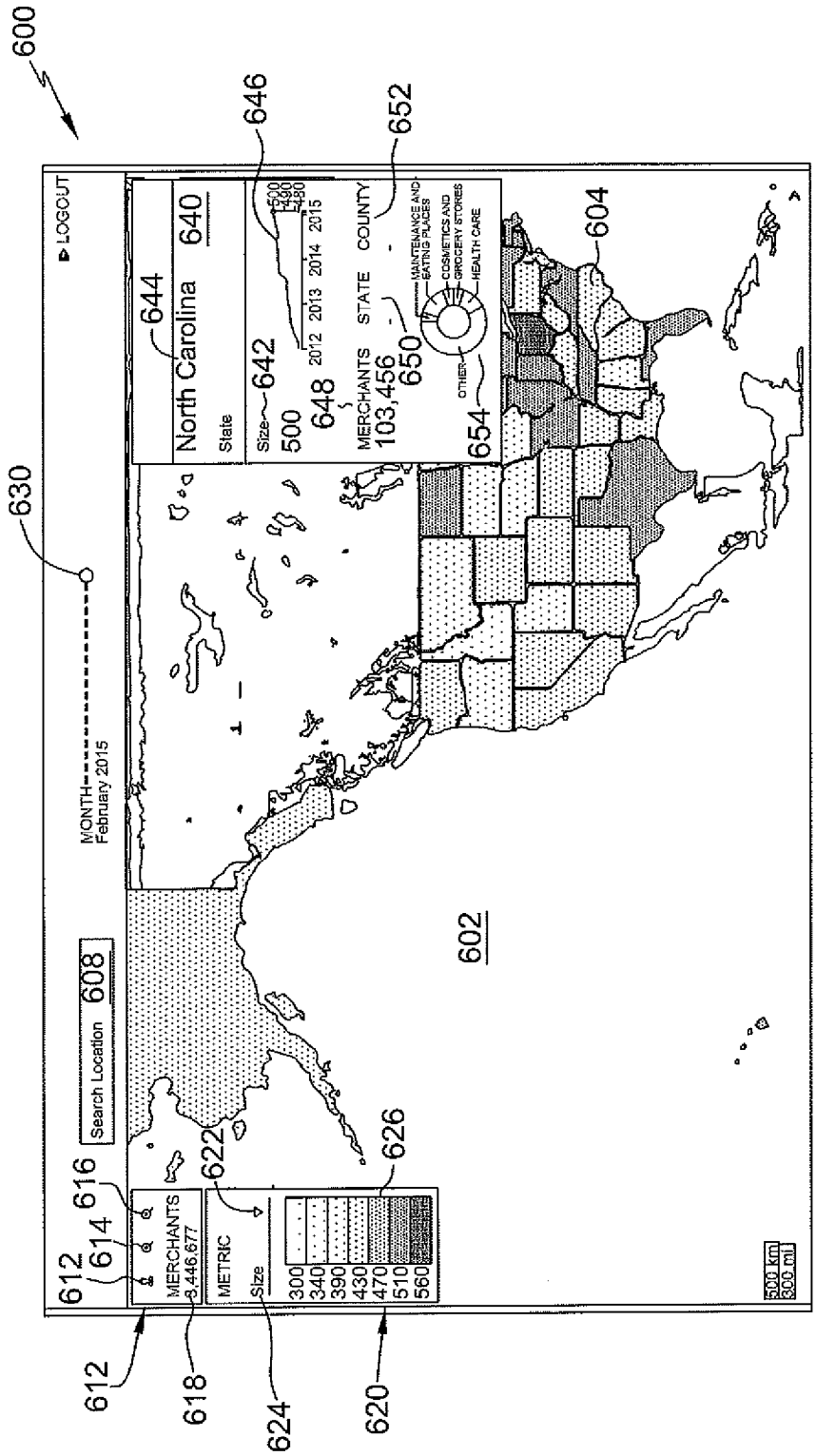

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Size
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103,456
650
STATE
COUNTY
652
MAINTENANCE AND EATING PLACES
COSMETICS AND GROCERY STORES
HEALTH CARE
OTHER
654
604
612
614
616
MERCHANTS
8,446,677
METRIC
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300
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510
560
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300 mi
612
618
624
620

FIG. 6

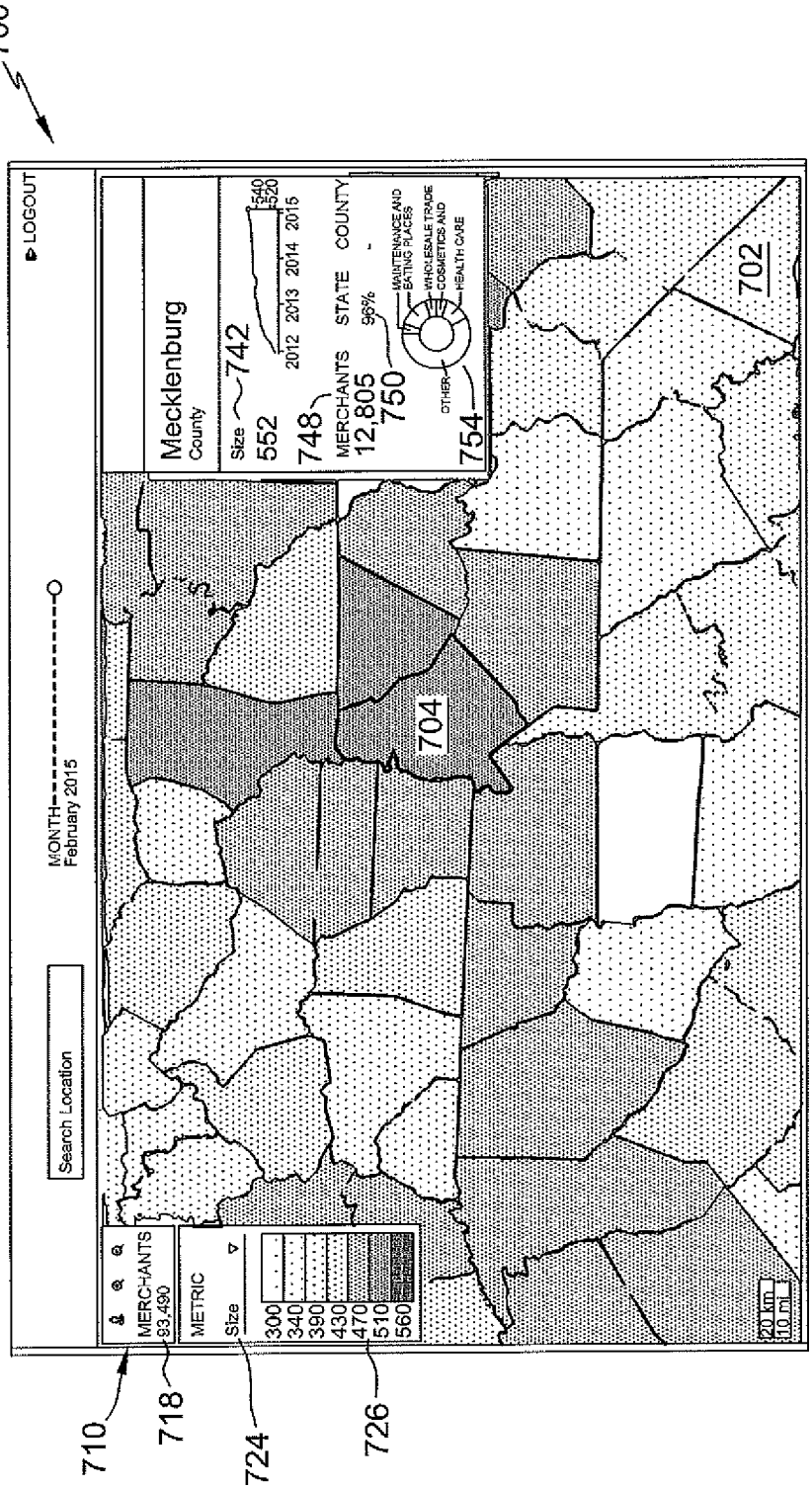

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County
Size
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520
748
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750
STATE
98%
COUNTY
-
MAINTENANCE AND EATING PLACES
WHOLESALE TRADE
COSMETICS AND
HEALTH CARE
OTHER
754
704
702
MERCHANTS
83,490
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300
340
390
430
470
510
560
20 km
10 mi
710
718
724
726

FIG. 7

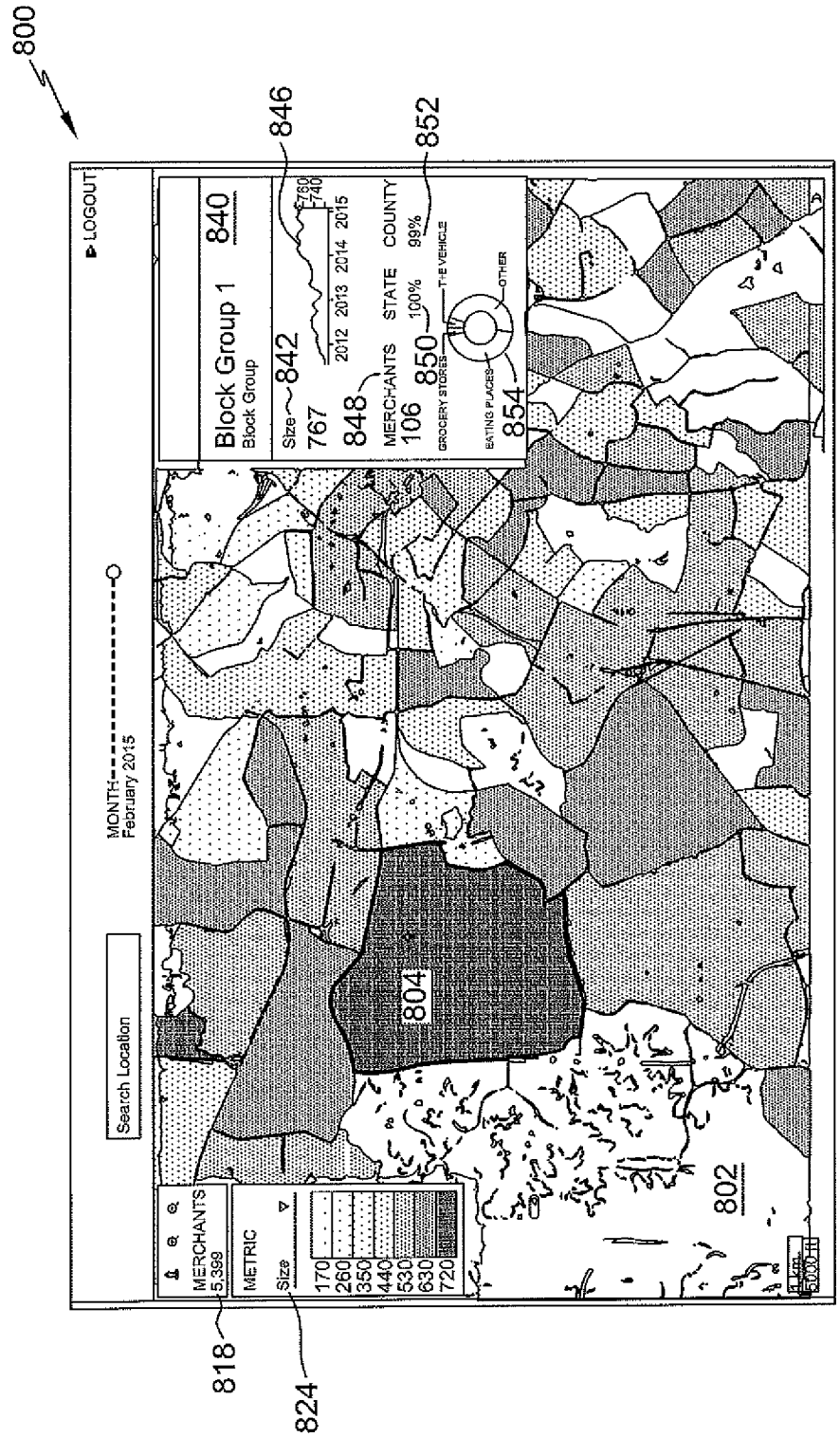

800
LOGOUT
MONTH
February 2015
Search Location
Block Group 1
Block Group
840
Size
842
767
2012 2013 2014 2015
846
848
MERCHANTS
106
STATE
100%
850
COUNTY
99%
852
GROCERY STORES
EATING PLACES
OTHER
854
804
802
MERCHANTS
5,399
METRIC
Size
170
260
350
440
530
630
720
818
824

FIG. 8

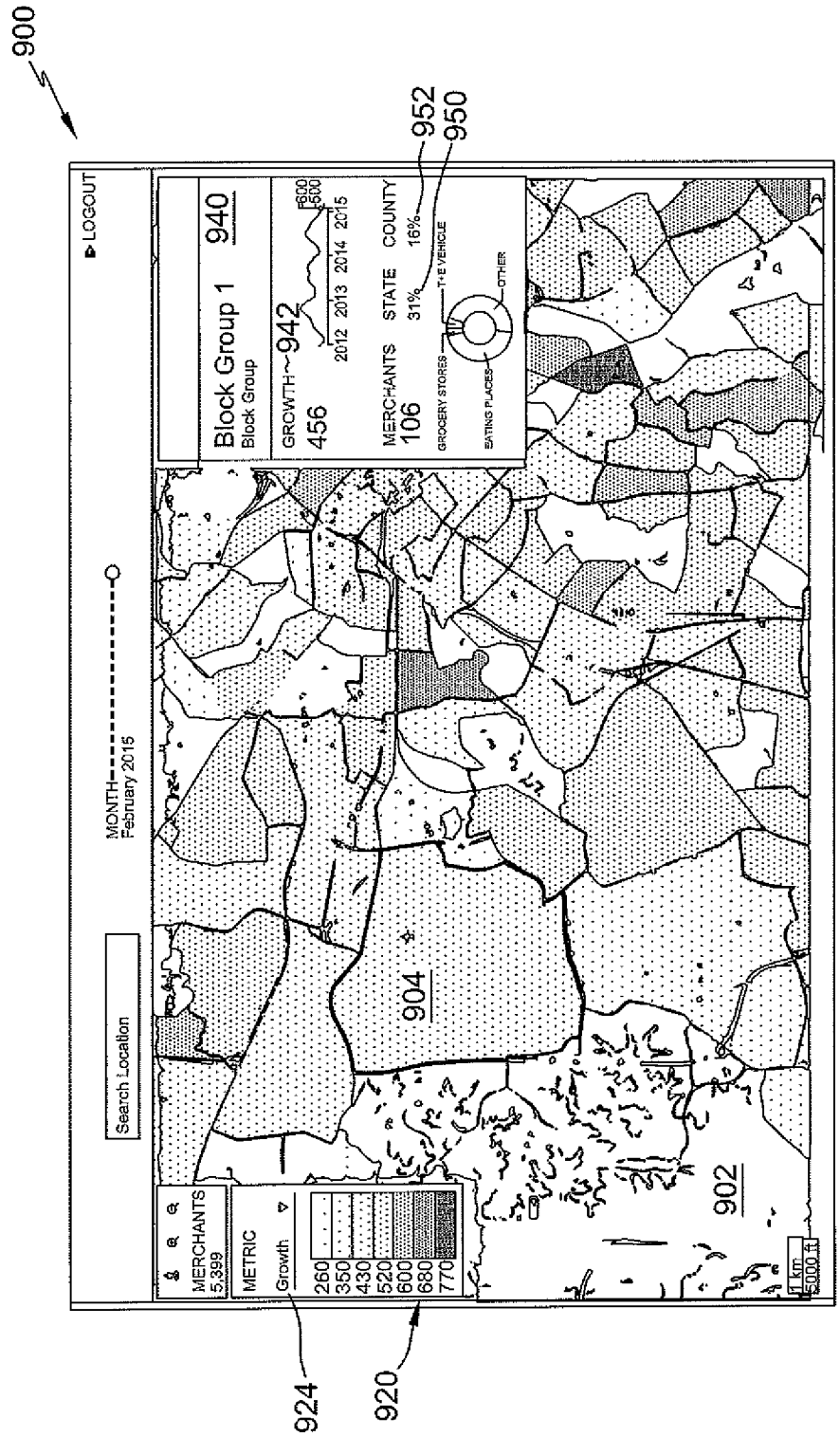

900
LOGOUT
MONTH
February 2015
Search Location
Block Group 1
Block Group
940
GROWTH
942
456
2012 2013 2014 2015
MERCHANTS
106
STATE
31%
COUNTY
16%
GROCERY STORES
EATING PLACES
T-E VEHICLE
OTHER
952
950
MERCHANTS
5,399
METRIC
Growth
260
350
430
520
600
680
770
904
902
1 km
5000 ft
924
920

FIG. 9

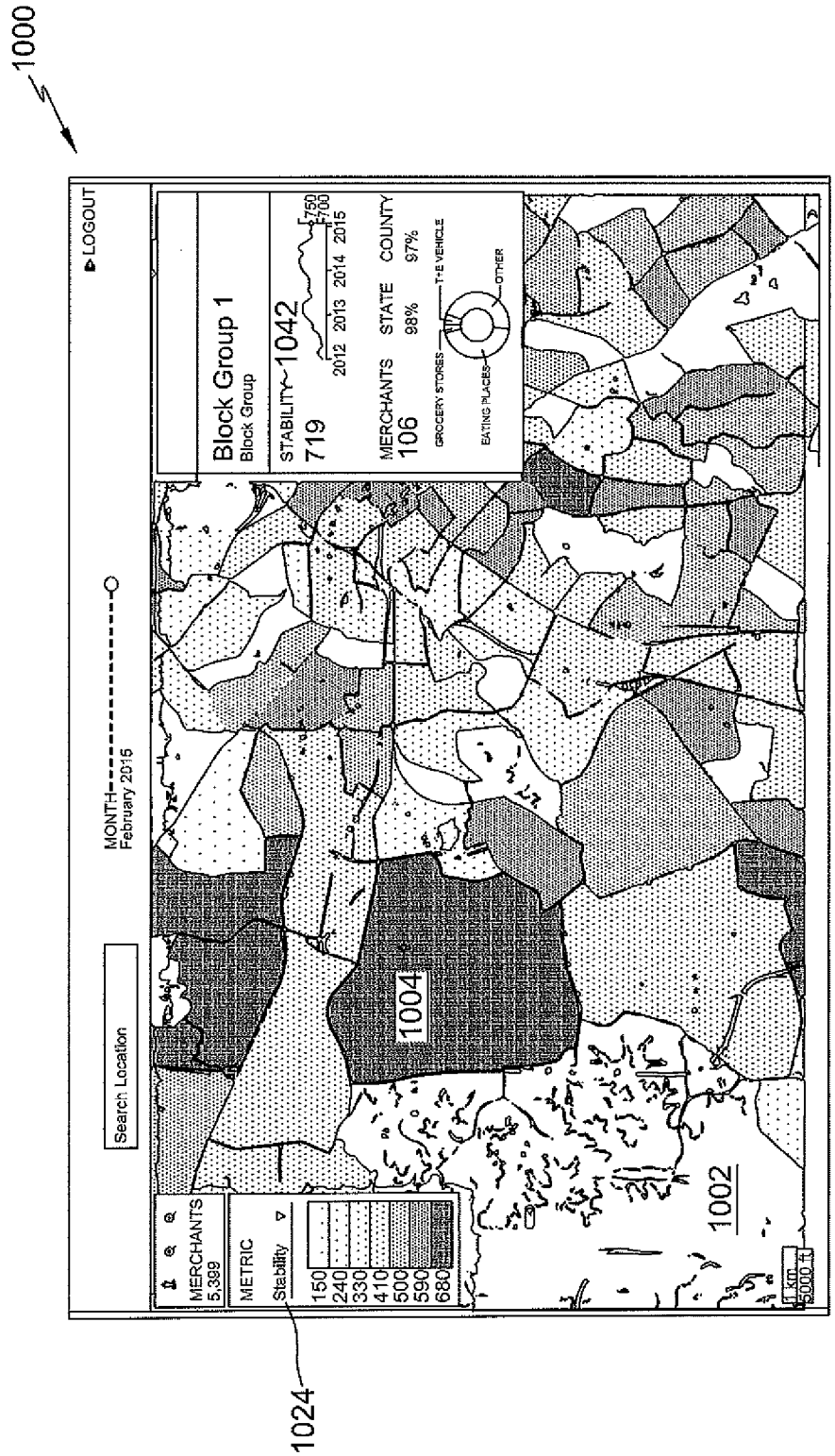

1000
LOGOUT
MONTH
February 2015
Search Location
MERCHANTS
5,399
METRIC
Stability
150
240
330
410
500
590
680
Block Group 1
Block Group
STABILITY
719
1042
2012 2013 2014 2015
MERCHANTS
106
STATE
98%
COUNTY
97%
GROCERY STORES
T+E VEHICLE
EATING PLACES
OTHER
1004
1002
1024

FIG. 10

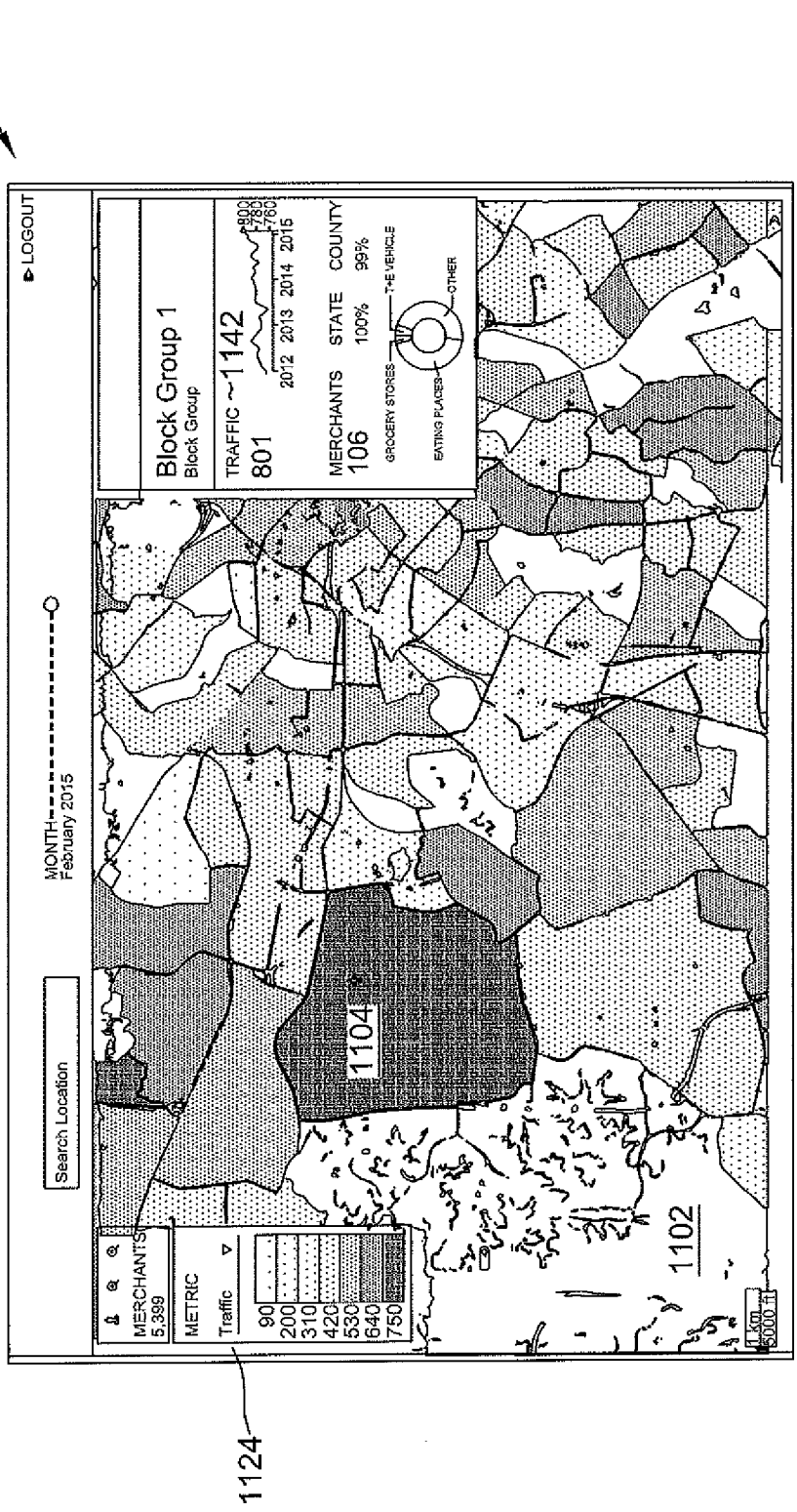

1100
LOGOUT
MONTH
February 2015
Search Location
Block Group 1
Block Group
TRAFFIC
1142
801
2012 2013 2014 2015
MERCHANTS
106
STATE
100%
COUNTY
99%
GROCERY STORES
THE VEHICLE
EATING PLACES
OTHER
1104
1102
MERCHANTS
5,399
METRIC
Traffic
90
200
310
420
530
640
750
1124

FIG. 11

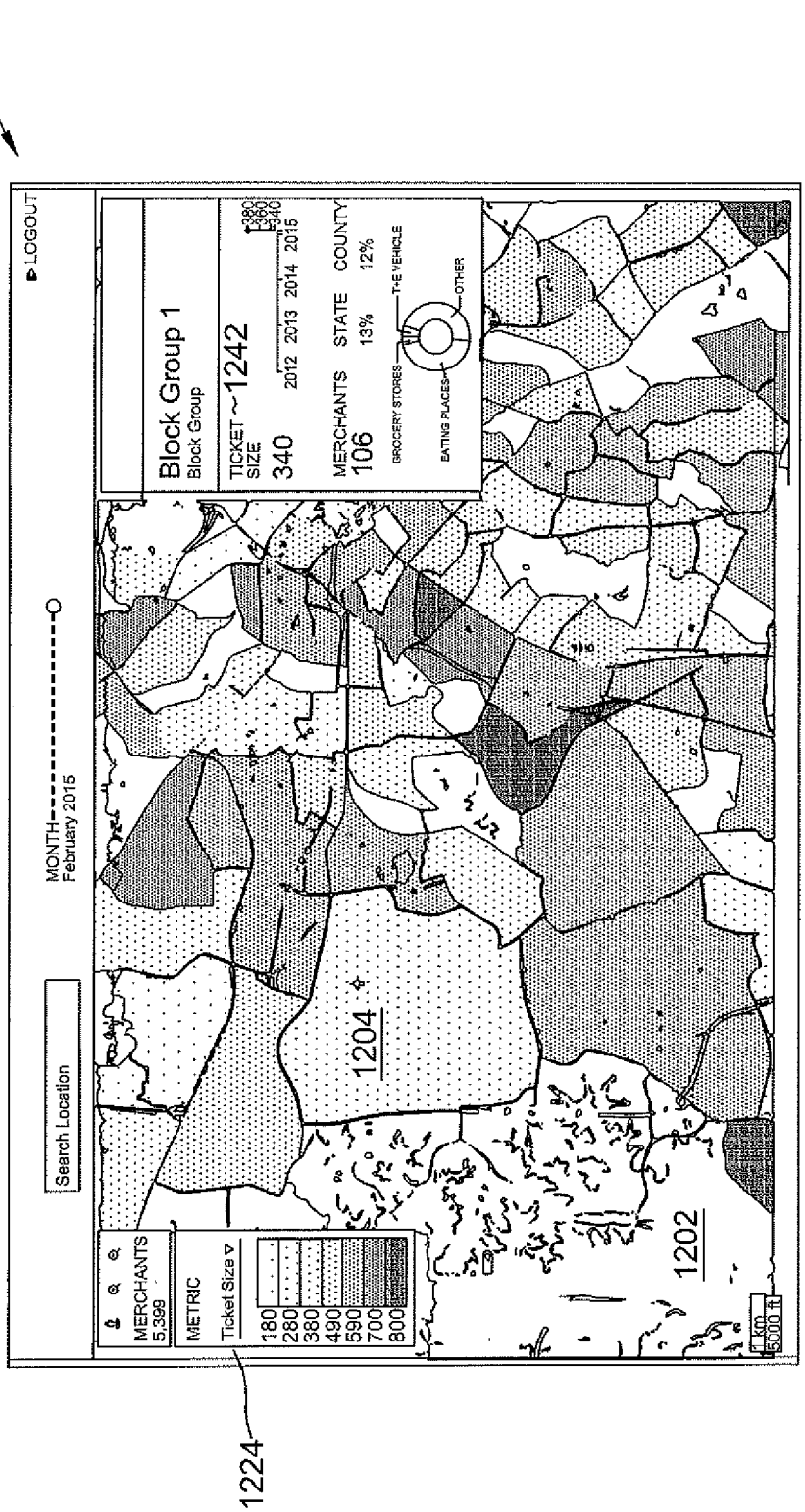

1200
LOGOUT
MONTH
February 2015
Search Location
MERCHANTS
5,399
METRIC
Ticket Size
180
280
380
490
590
700
800
Block Group 1
Block Group
TICKET SIZE
340
2012 2013 2014 2015
MERCHANTS
106
STATE
13%
COUNTY
12%
GROCERY STORES
TAKE VEHICLE
EATING PLACES
OTHER
1204
1202
1224

FIG. 12

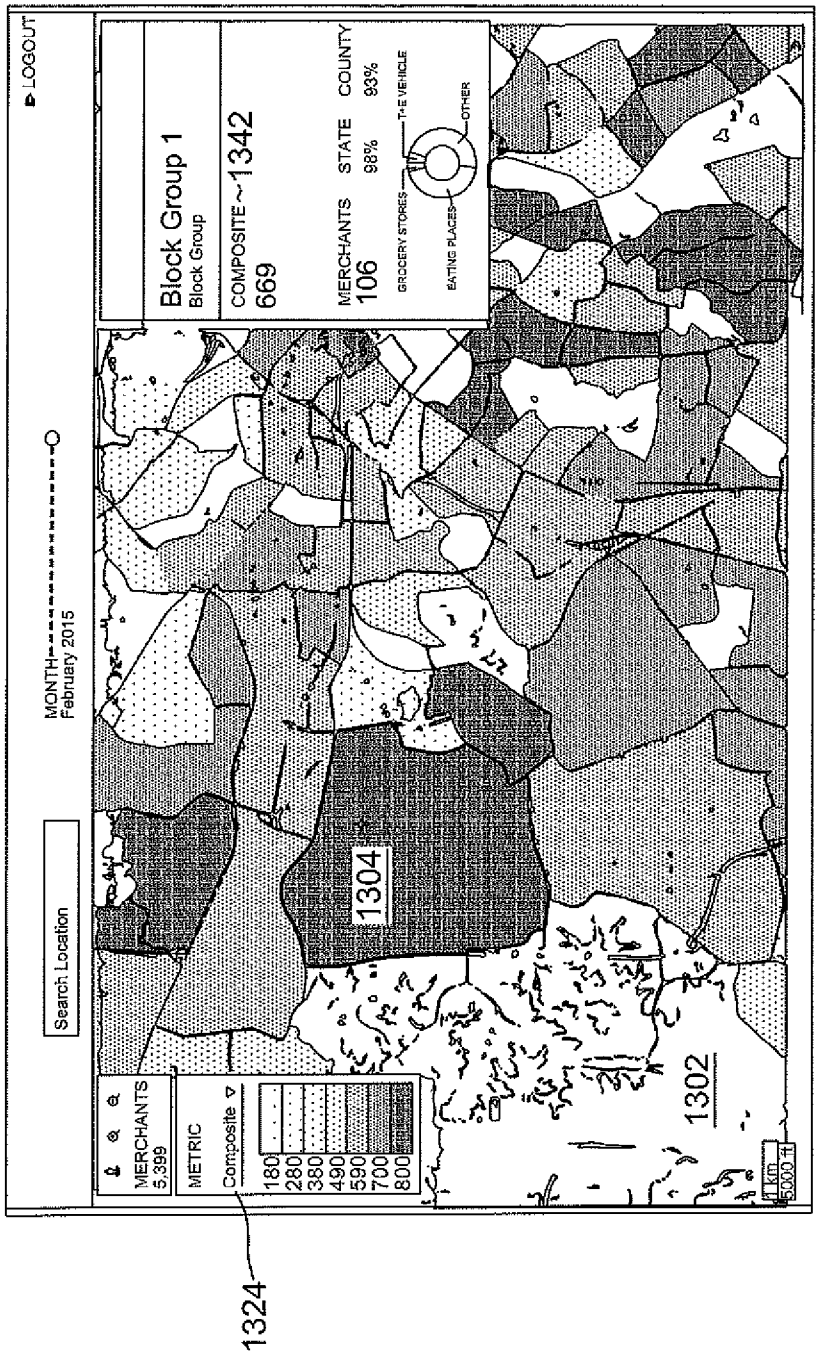

1300
LOGOUT
MONTH
February 2015
Search Location
MERCHANTS
5,399
METRIC
Composite
180
280
380
490
590
700
800
1304
Block Group 1
Block Group
COMPOSITE
669
1342
MERCHANTS
106
STATE
98%
COUNTY
93%
GROCERY STORES
TIRE VEHICLE
EATING PLACES
OTHER
1302
1 km
5000 ft
1324

FIG. 13

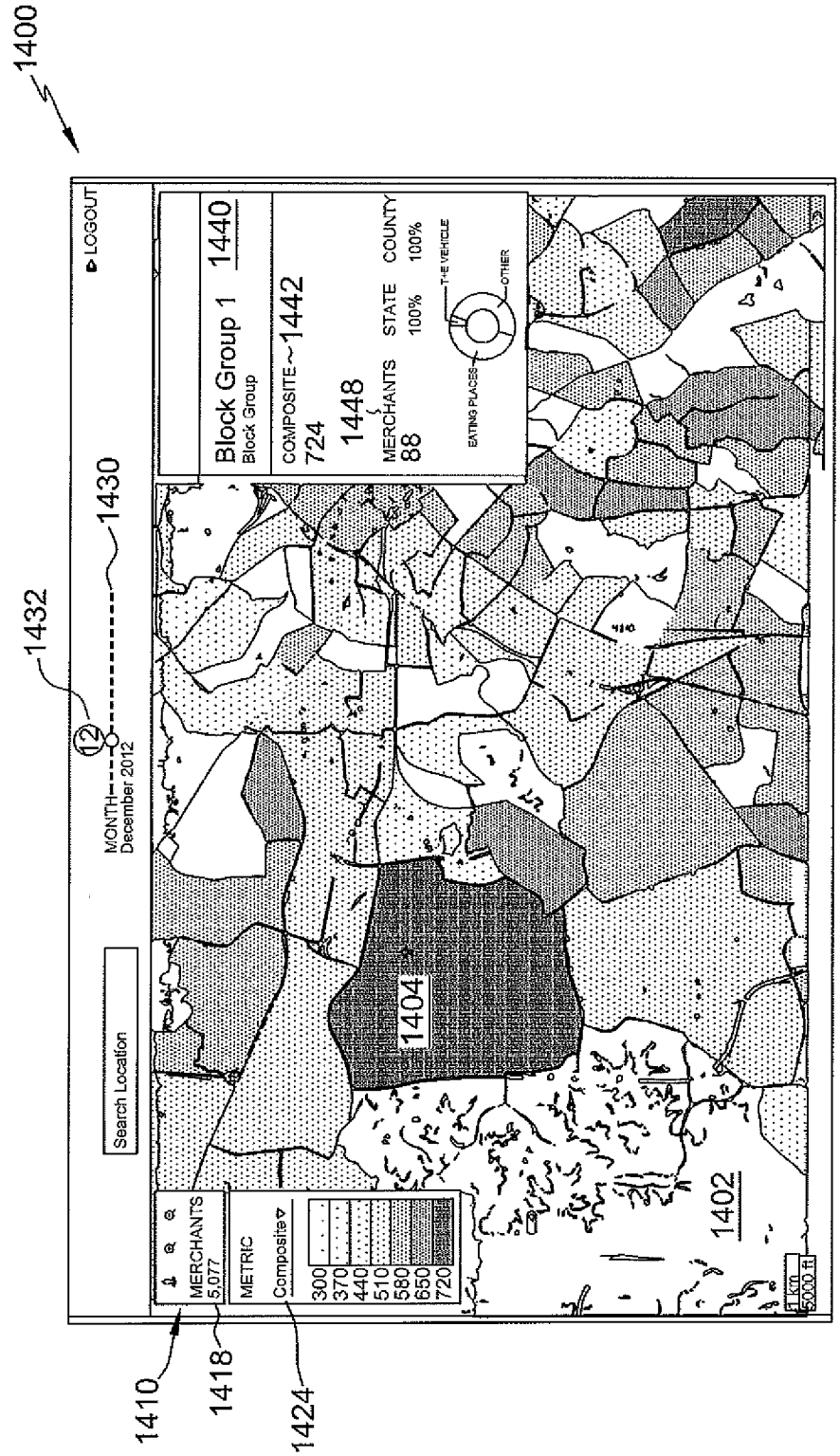

1400
LOGOUT
1430
1432
MONTH
December 2012
Search Location
Block Group 1
1440
Block Group
COMPOSITE
1442
724
1448
MERCHANTS
88
STATE
100%
COUNTY
100%
THE VEHICLE
EATING PLACES
OTHER
1404
1402
MERCHANTS
5,077
METRIC
Composite
300
370
440
510
580
650
720
1 km
5000 ft
1410
1418
1424

FIG. 14

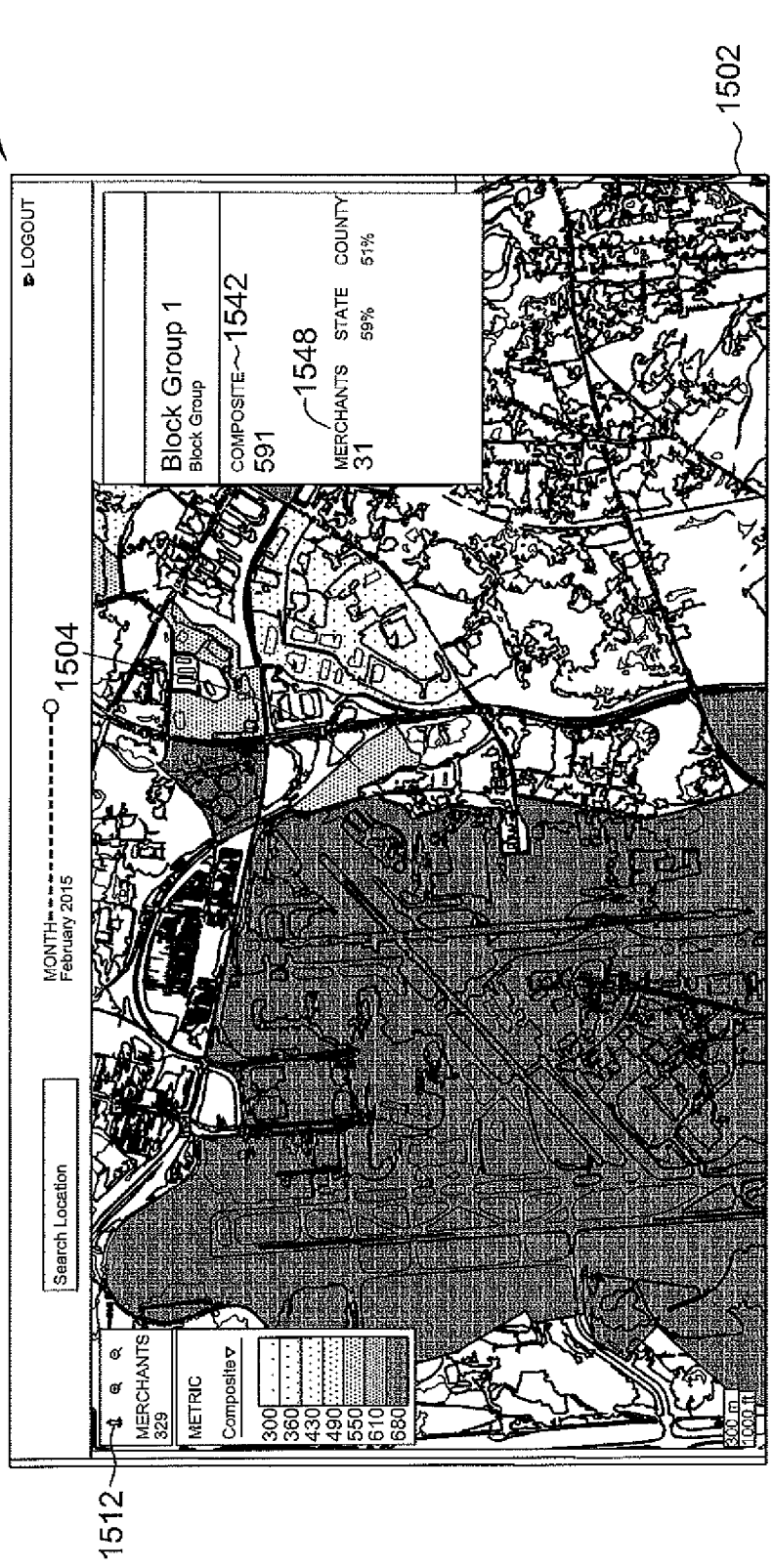

1500
1502
LOGOUT
1504
MONTH
February 2015
Search Location
Block Group 1
Block Group
COMPOSITE
1542
591
1548
MERCHANTS
31
STATE
59%
COUNTY
51%
MERCHANTS
329
METRIC
Composite
300
360
430
490
550
610
680
1512

FIG. 15

FIG. 16

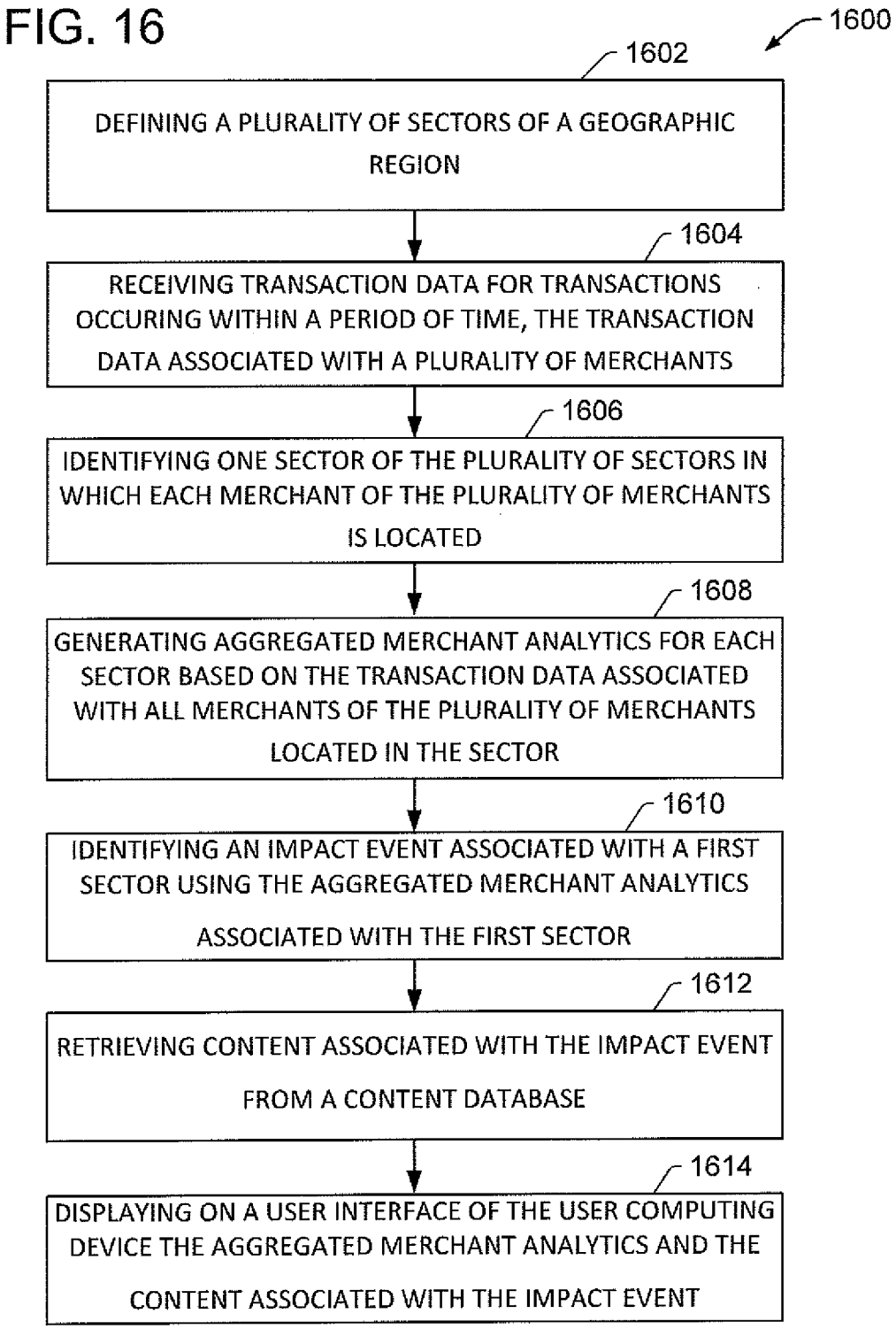
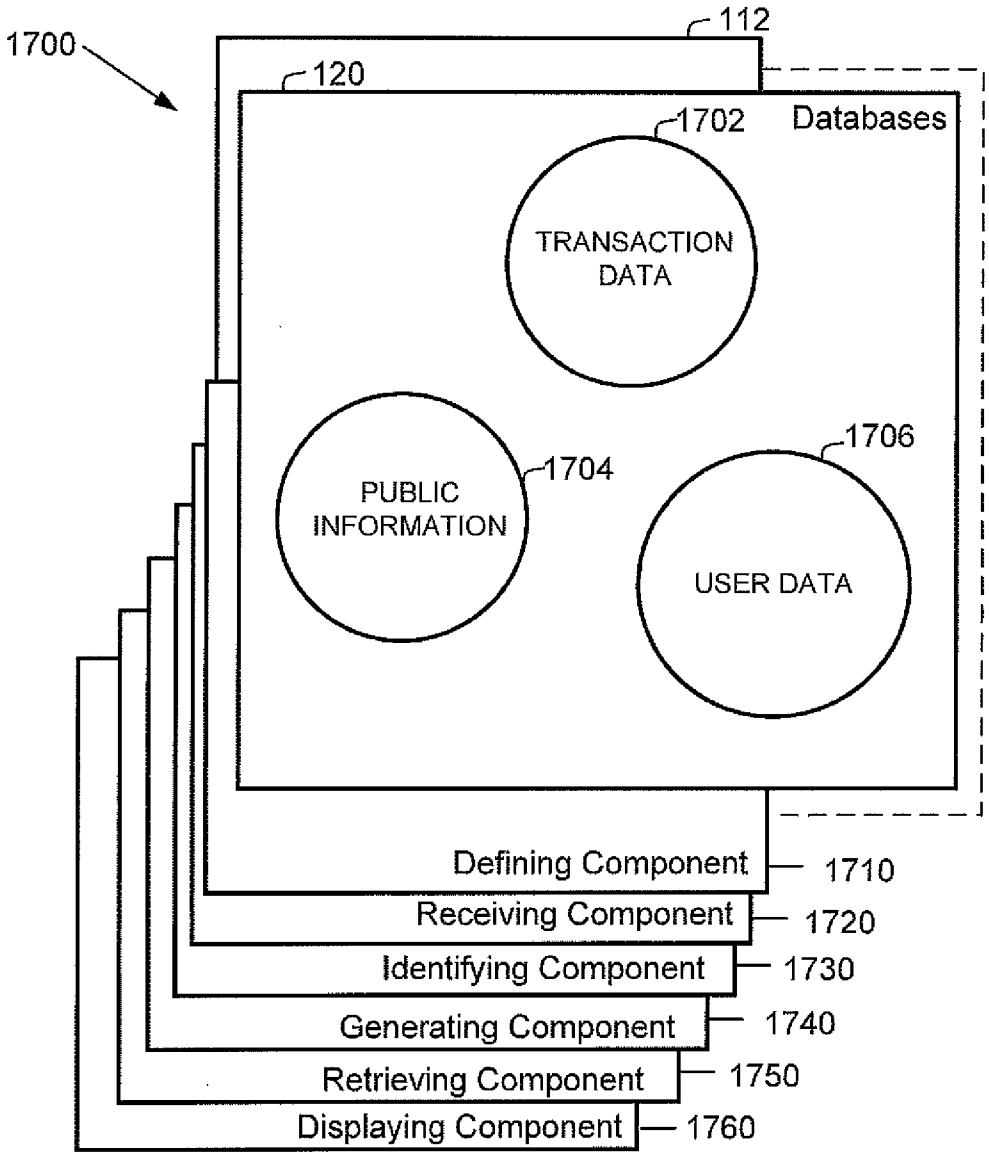

1600
1602
DEFINING A PLURALITY OF SECTORS OF A GEOGRAPHIC REGION
1604
RECEIVING TRANSACTION DATA FOR TRANSACTIONS OCCURING WITHIN A PERIOD OF TIME, THE TRANSACTION DATA ASSOCIATED WITH A PLURALITY OF MERCHANTS
1606
IDENTIFYING ONE SECTOR OF THE PLURALITY OF SECTORS IN WHICH EACH MERCHANT OF THE PLURALITY OF MERCHANTS IS LOCATED
1608
GENERATING AGGREGATED MERCHANT ANALYTICS FOR EACH SECTOR BASED ON THE TRANSACTION DATA ASSOCIATED WITH ALL MERCHANTS OF THE PLURALITY OF MERCHANTS LOCATED IN THE SECTOR
1610
IDENTIFYING AN IMPACT EVENT ASSOCIATED WITH A FIRST SECTOR USING THE AGGREGATED MERCHANT ANALYTICS ASSOCIATED WITH THE FIRST SECTOR
1612
RETRIEVING CONTENT ASSOCIATED WITH THE IMPACT EVENT FROM A CONTENT DATABASE
1614
DISPLAYING ON A USER INTERFACE OF THE USER COMPUTING DEVICE THE AGGREGATED MERCHANT ANALYTICS AND THE CONTENT ASSOCIATED WITH THE IMPACT EVENT

FIG. 17


1700
112
120
1702
Databases
TRANSACTION DATA
PUBLIC INFORMATION
1704
1706
USER DATA
Defining Component
1710
Receiving Component
1720
Identifying Component
1730
Generating Component
1740
Retrieving Component
1750
Displaying Component
1760

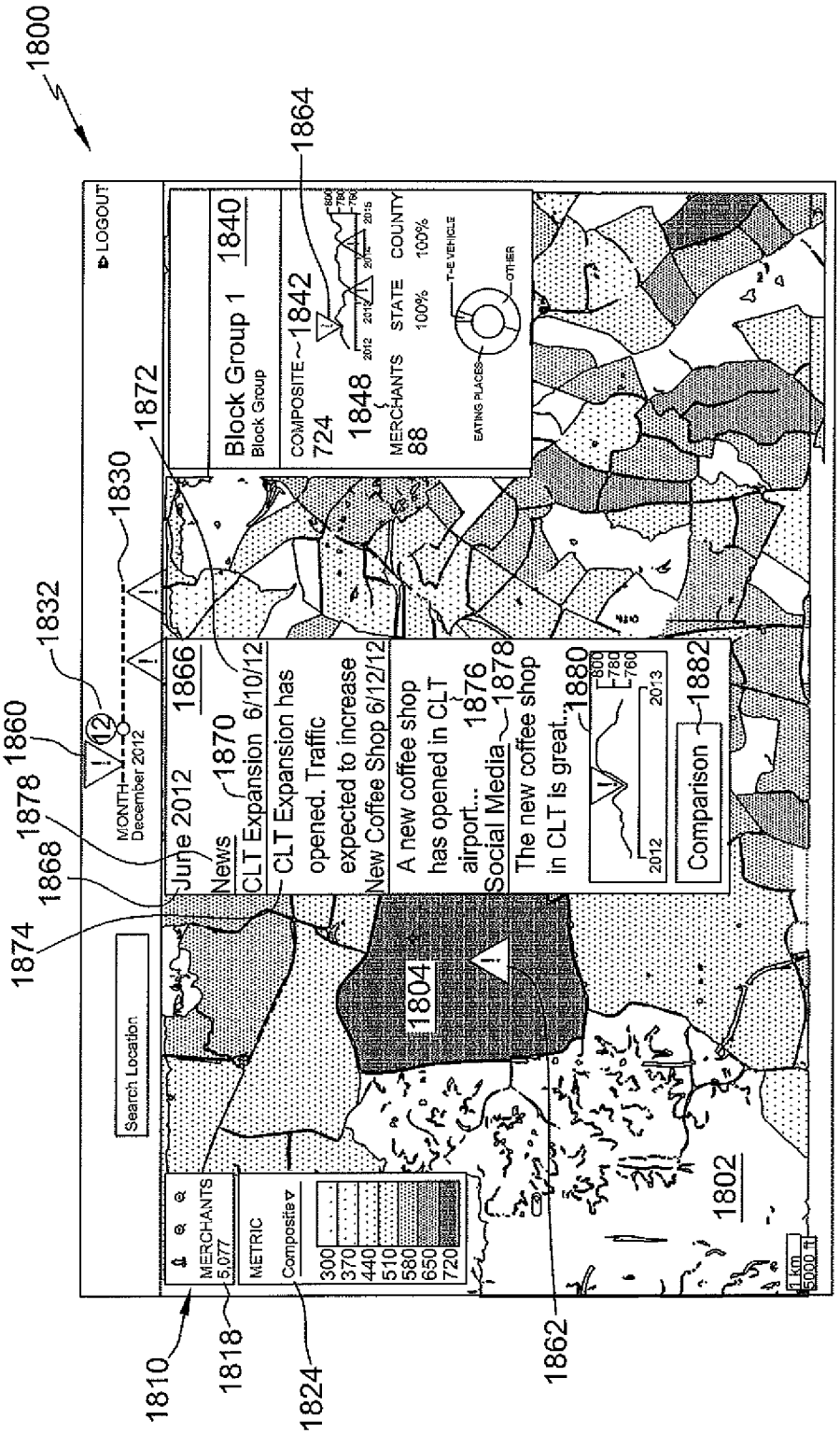

1800
LOGOUT
1864
1840
Block Group 1
Block Group
COMPOSITE
724
1842
1848
MERCHANTS
88
STATE
100%
COUNTY
100%
EATING PLACES
THE VEHICLE
OTHER
1872
1830
1832
1860
MONTH
December 2012
1878
1868
1874
Search Location
1866
June 2012
News
1870
CLT Expansion 6/10/12
CLT Expansion has opened. Traffic expected to increase
New Coffee Shop 6/12/12
A new coffee shop has opened in CLT airport...
1876
Social Media
1878
The new coffee shop in CLT is great...
1880
2012
2013
Comparison
1882
1804
1802
MERCHANTS
5,077
METRIC
Composite
300
370
440
510
580
650
720
1 km
5000 ft
1810
1818
1824
1862

FIG. 18

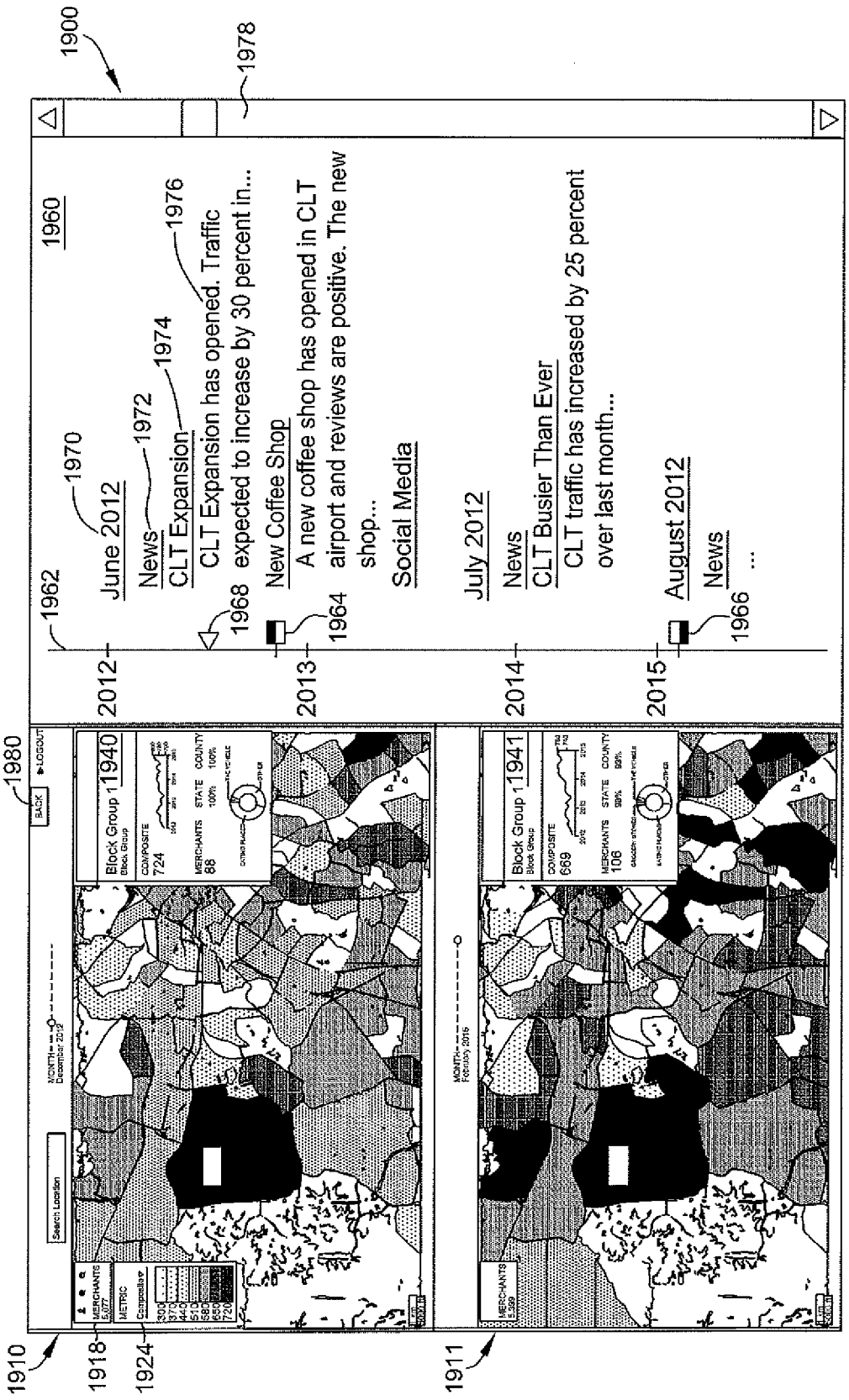

1900
1978
1960
1962
1970
June 2012
1972
News
1974
CLT Expansion
1976
CLT Expansion has opened. Traffic expected to increase by 30 percent in...
1968
New Coffee Shop
1964
A new coffee shop has opened in CLT airport and reviews are positive. The new shop...
Social Media
July 2012
News
CLT Busier Than Ever
CLT traffic has increased by 25 percent over last month...
August 2012
News
1966 ...
2012
2013
2014
2015
1980
BACK
LOGOUT
Search Location
Block Group 1 1940
Block Group
COMPOSITE
724
MERCHANTS
88
STATE
100%
COUNTY
100%
Block Group 1 1941
669
106
1910
1918
1924
1911

FIG. 19

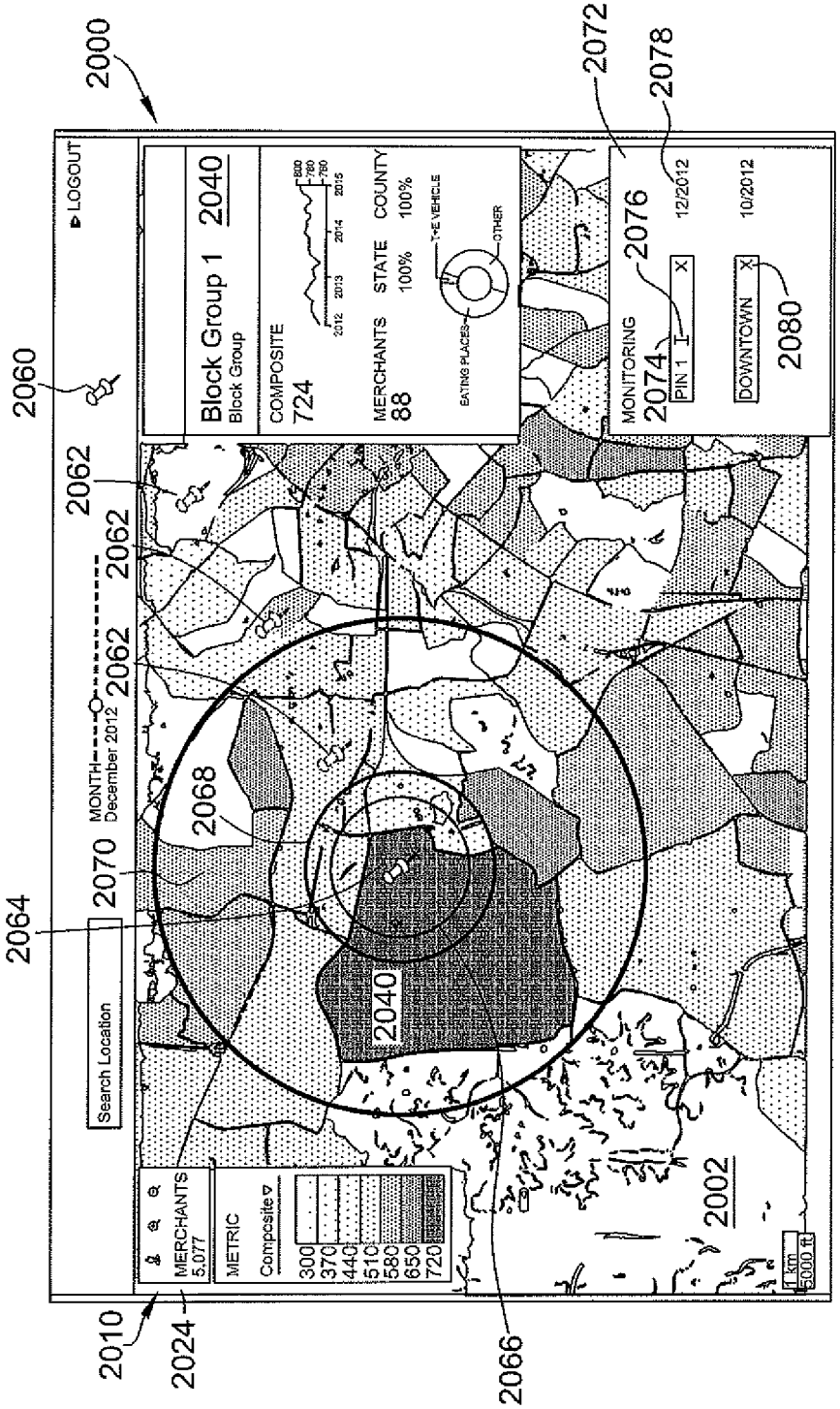

2000
LOGOUT
2072
2078
2060
2062
2062
2062
2062
MONTH
December 2012
2068
2070
2064
2040
Search Location
Block Group 1 2040
Block Group
COMPOSITE
724
MERCHANTS
88
STATE
100%
COUNTY
100%
EATING PLACES
TYPE VEHICLE
OTHER
MONITORING
2076
2074
PIN 1
12/2012
DOWNTOWN
10/2012
2080
MERCHANTS
5,077
METRIC
Composite
300
370
440
510
580
650
720
2002
1 km
5000 ft
2010
2024
2066

FIG. 20

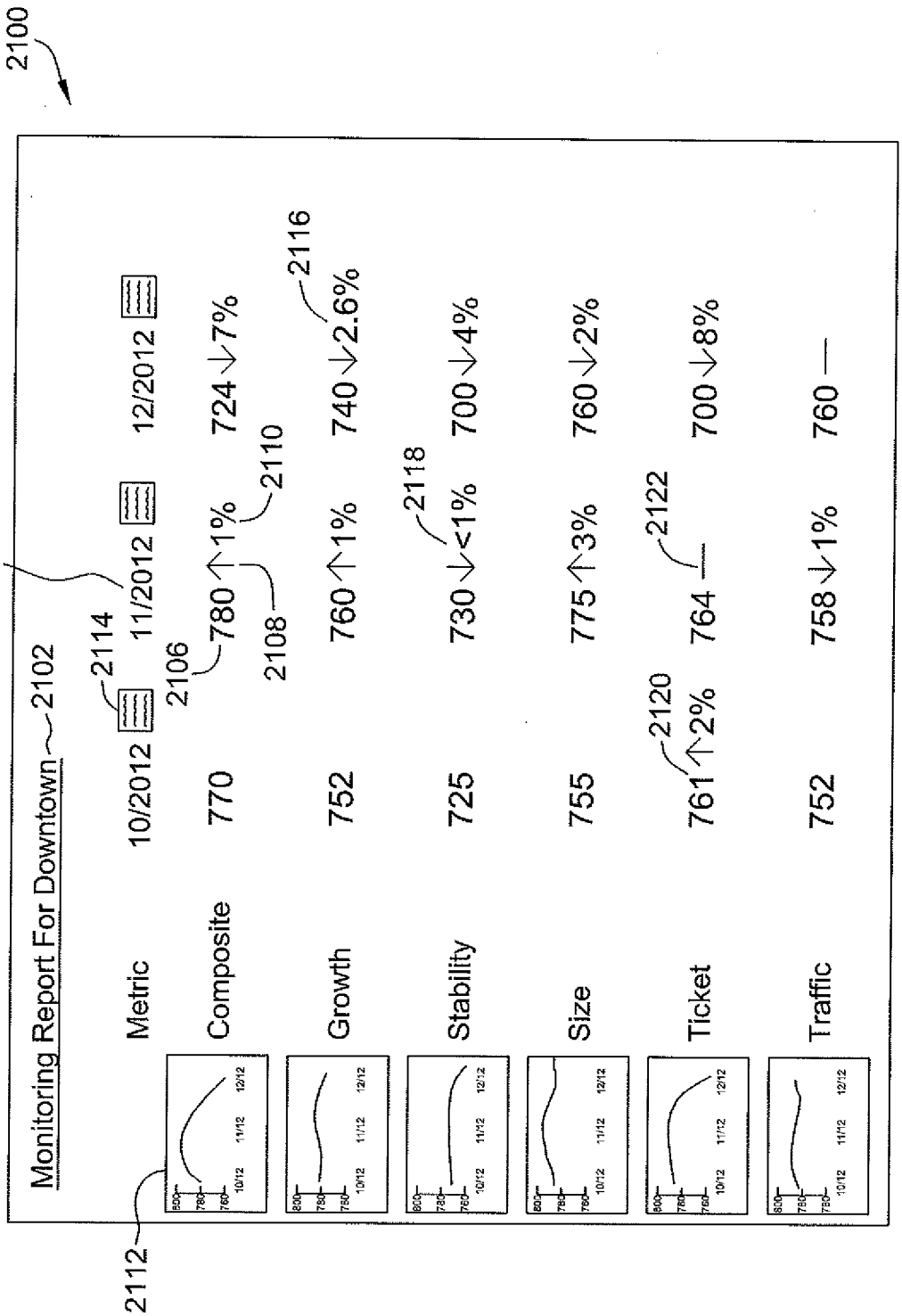

2100
2104
Monitoring Report For Downtown
2102
2114
2106
2108
2110
2116
2118
2120
2122
2112
Metric
10/2012
11/2012
12/2012
Composite
770
780 ↑1%
724 ↓7%
Growth
752
760 ↑1%
740 ↓2.6%
Stability
725
730 ↓<1%
700 ↓4%
Size
755
775 ↑3%
760 ↓2%
Ticket
761 ↑2%
764 —
700 ↓8%
Traffic
752
758 ↓1%
760 —

FIG. 21

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2016/031759

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06Q30/02
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2015/032565 A1 (WEIS DAVID [US] ET AL) 29 January 2015 (2015-01-29) abstract; figure 2 paragraph [0004] - paragraph [0006]	1-20
X	US 2014/278744 A1 (LO FARO WALTER [US] ET AL) 18 September 2014 (2014-09-18) abstract; figures 2,3,10 paragraphs [0040], [0048], [0081]	1-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 June 2016	29/06/2016

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Peller, Ingrid

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2016/031759

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2015032565 A1	29-01-2015	NONE	
US 2014278744 A1	18-09-2014	NONE	