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(54) **DATA DISPLAYS IN A TILE-BASED USER INTERFACE**

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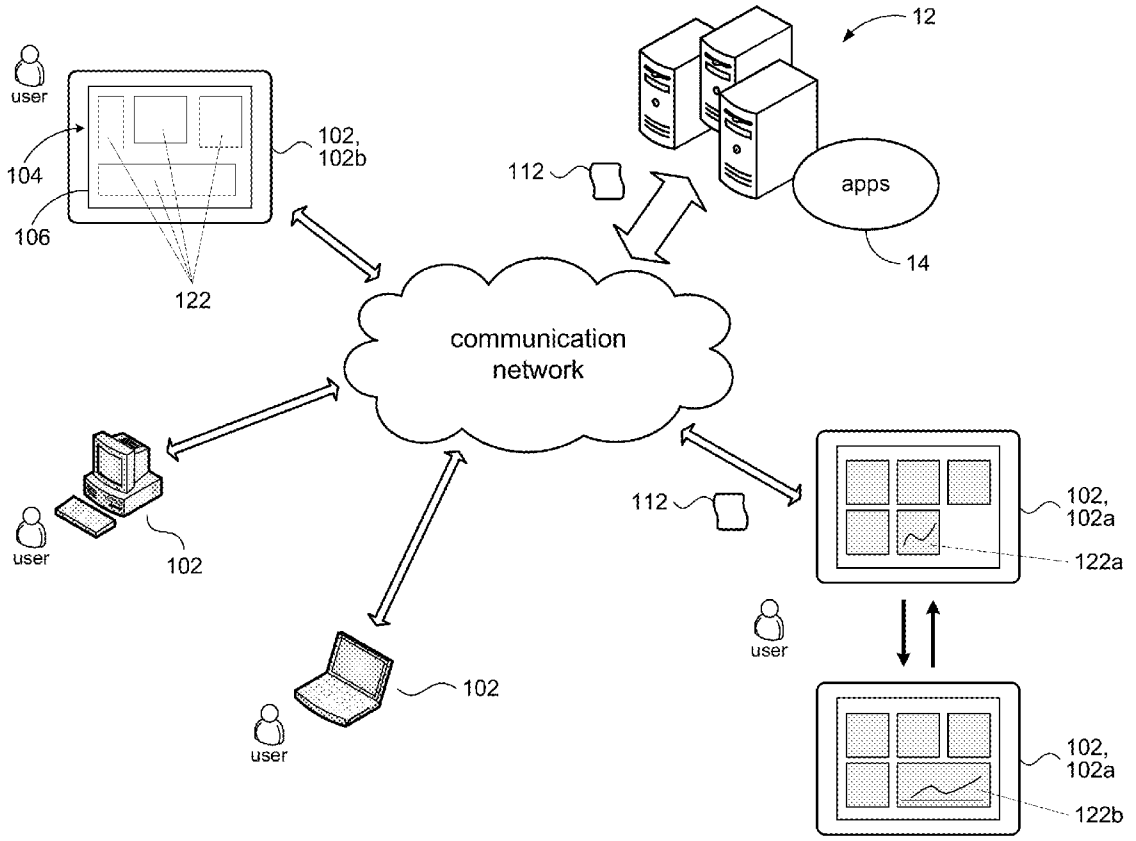
(57) **ABSTRACT**

A computing device may present a display of tiles to present therein data feeds, analytics, news items and so on. A user may expand a tile to show more additional details of data in a tile. The additional data details in the expanded tile may comprise different detailed data than the data in the original tile.



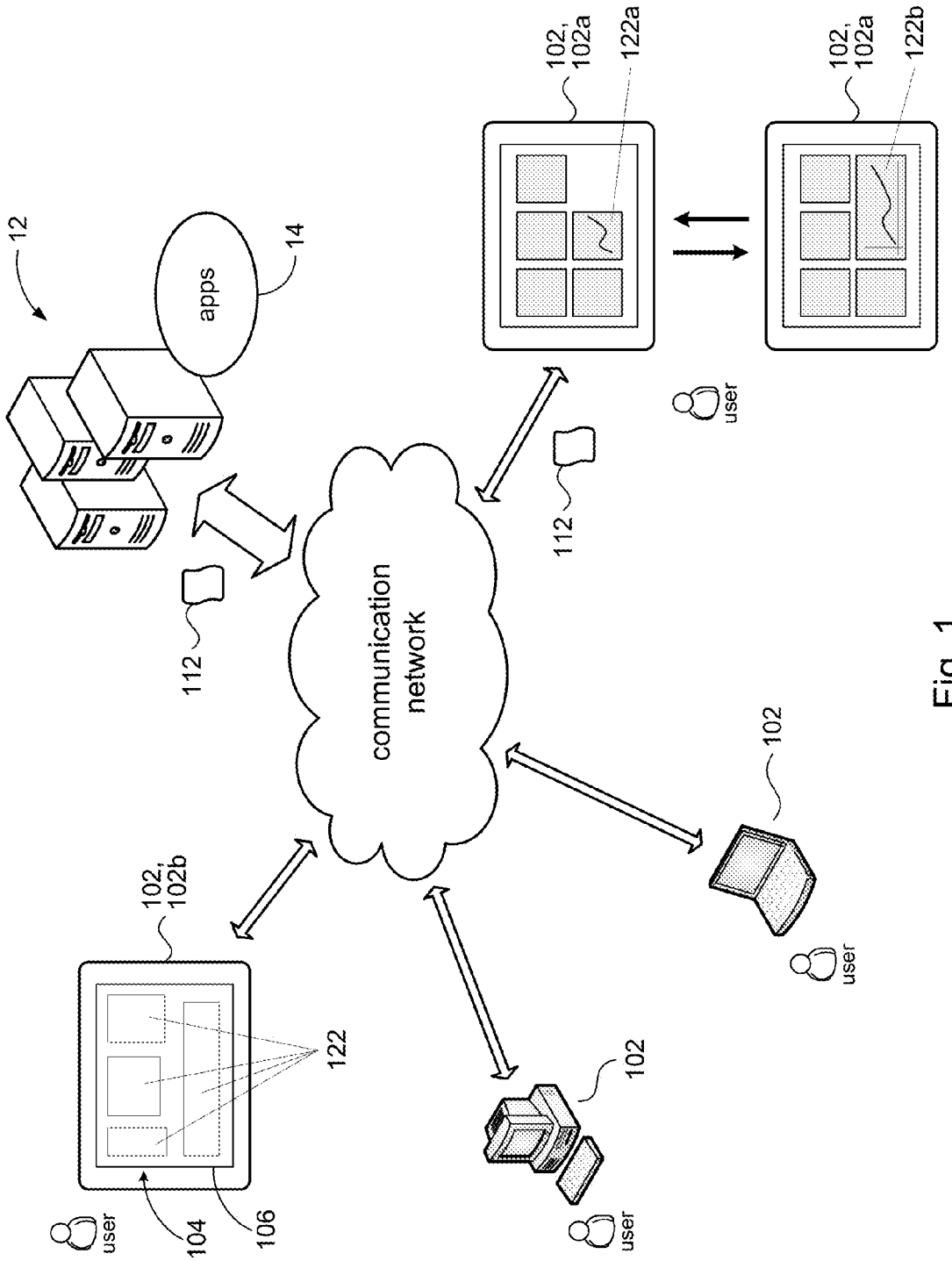

12
apps
14
communication network
112
112
102, 102a
122a
102, 102a
122b
user
102, 102b
122
104
106
user
102
user
102
user

Fig. 1

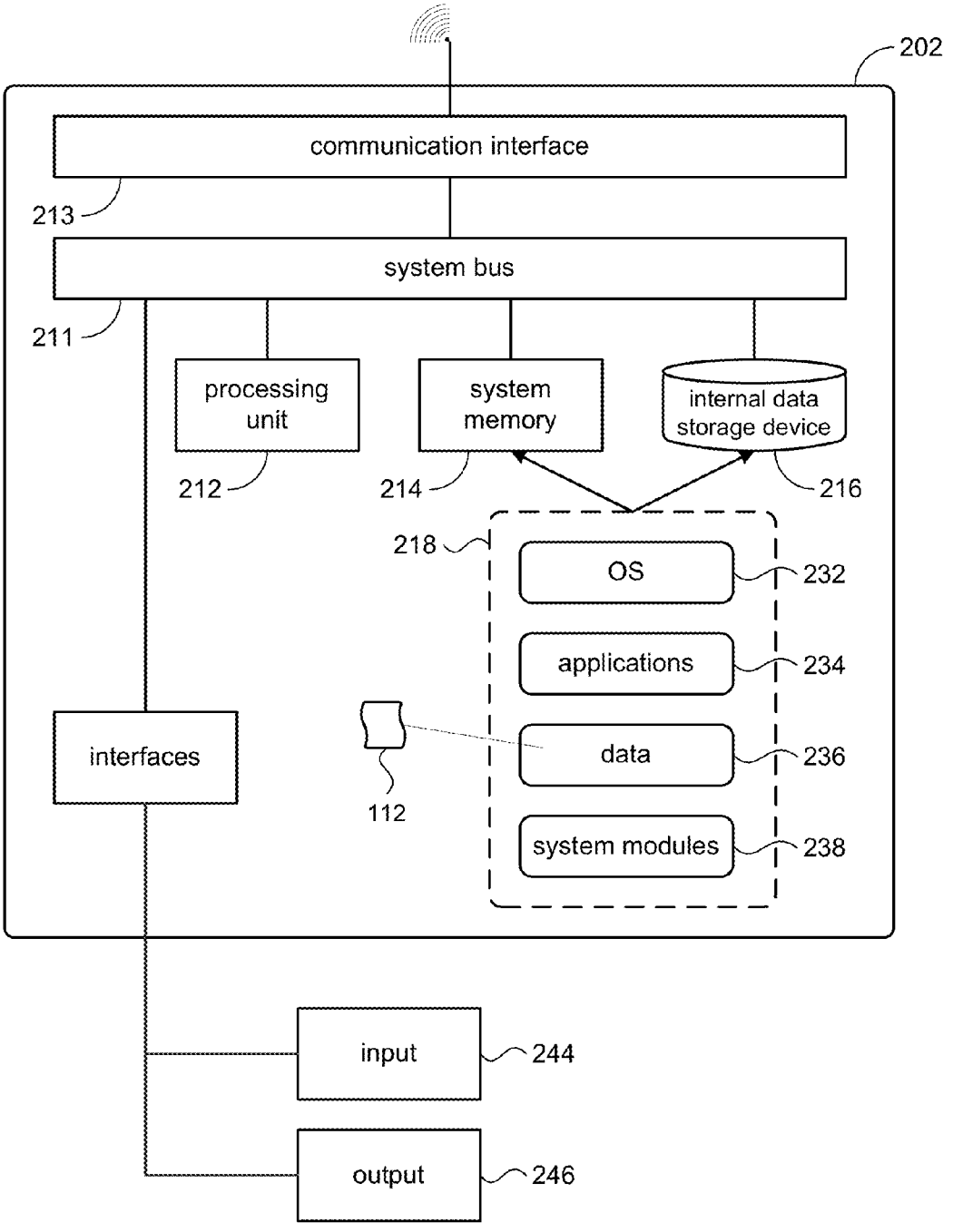

202
communication interface
213
system bus
211
processing unit
212
system memory
214
internal data storage device
216
218
OS
232
applications
234
data
236
system modules
238
interfaces
112
input
244
output
246

Fig. 2

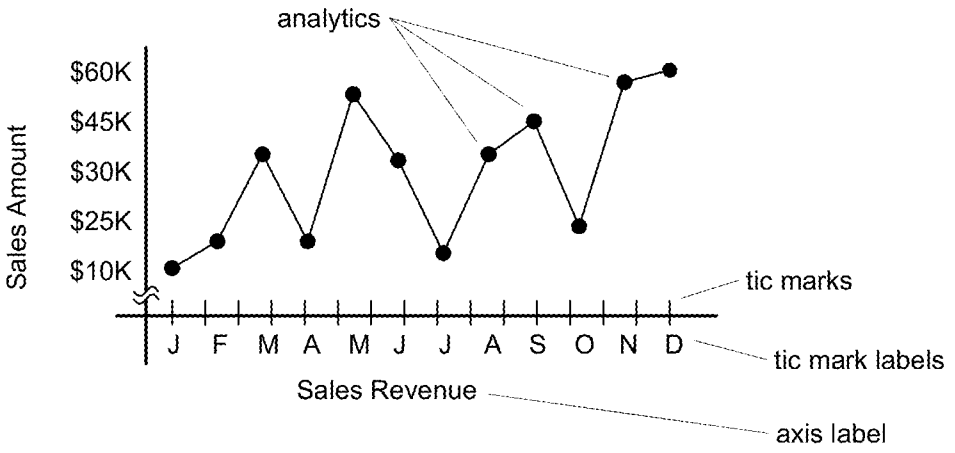


Fig. 3A
(prior art)

Fig. 3B
(prior art)

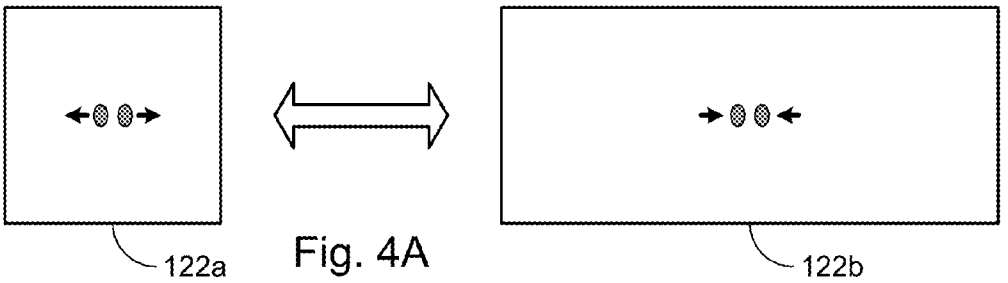


Fig. 4A

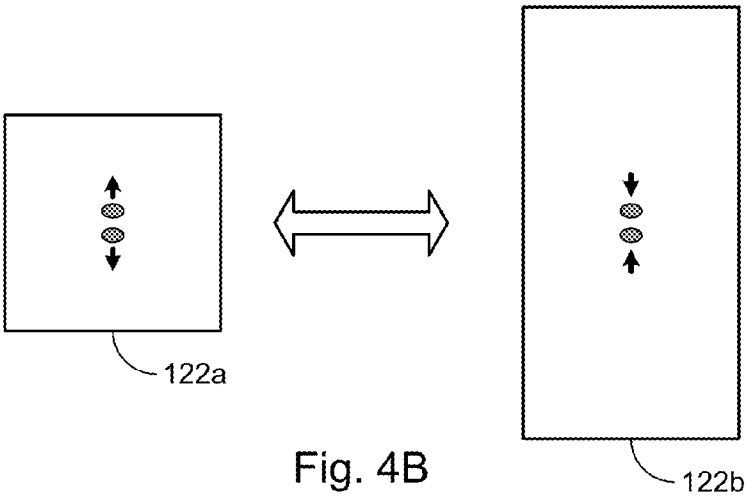


Fig. 4B

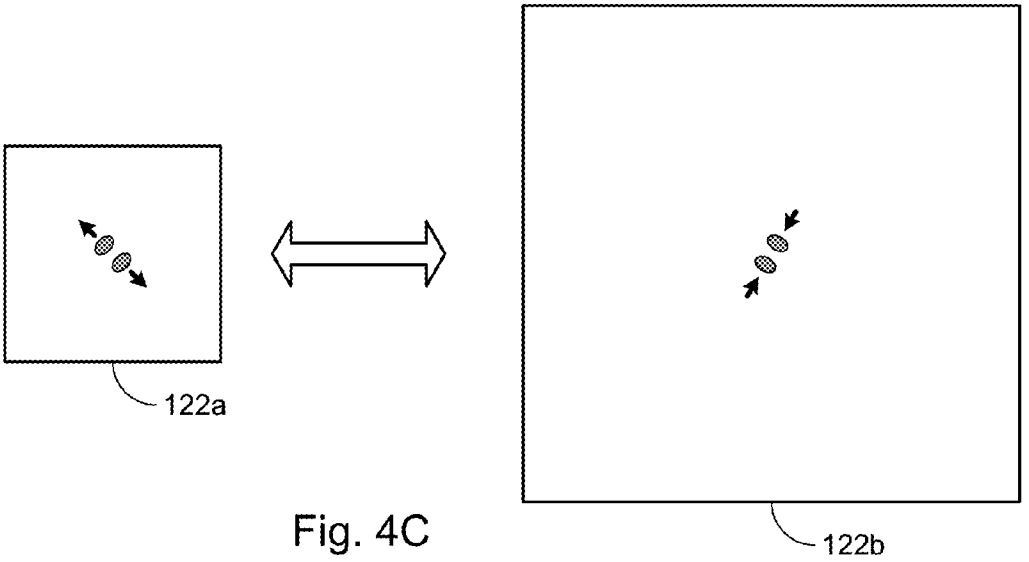
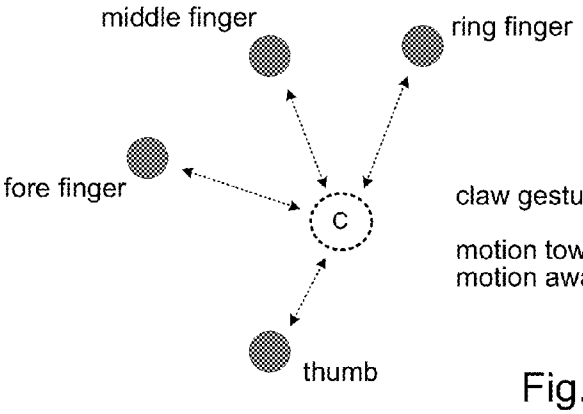


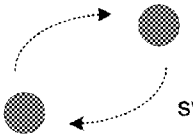
Fig. 4C



claw gesture

motion toward the center – reduce
motion away from the center enlarge

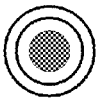
Fig. 4D



swipe motion (e.g., with fore finger)

swipe left- to- right – enlarge
swipe right-to-left – reduce

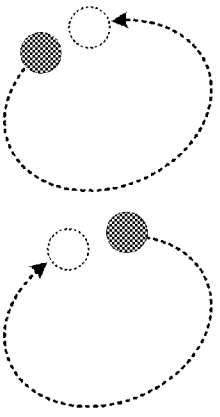
Fig. 4E



tap gesture (e.g., double tap), toggles

first double tap – enlarge
second double tap – reduce

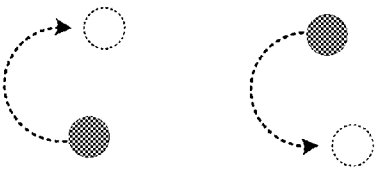
Fig. 4F



circular gesture:

counter clockwise – enlarge
clockwise – reduce

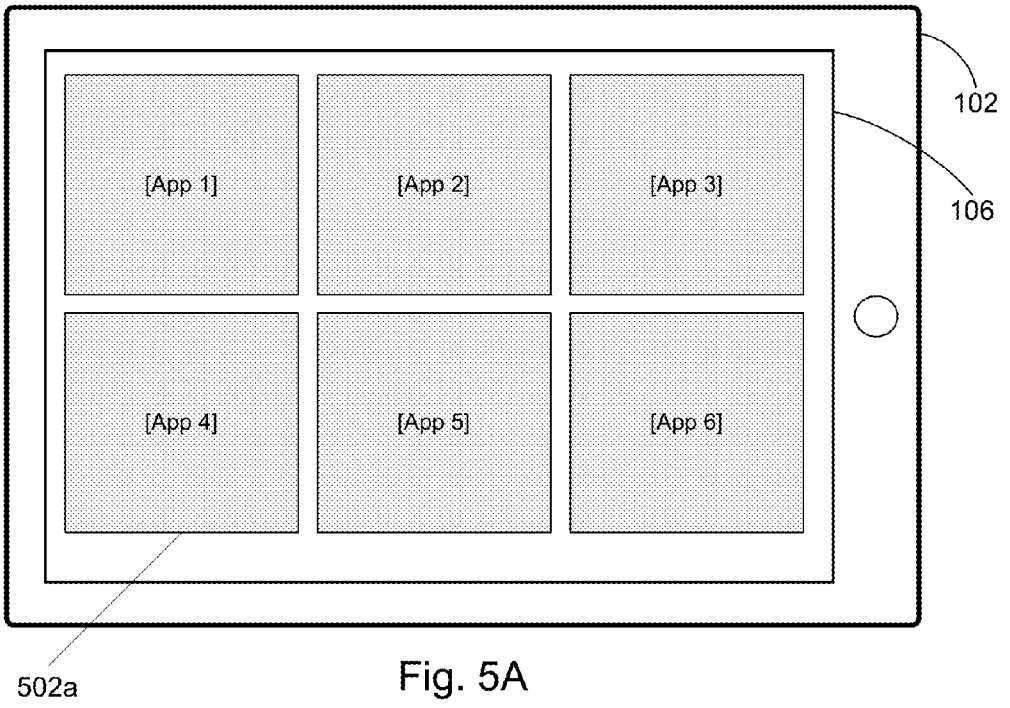
Fig. 4G



semi-circular gesture:

clockwise – enlarge
counter clockwise – reduce

Fig. 4H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[App 2]
[App 3]
[App 4]
[App 5]
[App 6]
102
106
502a

Fig. 5A

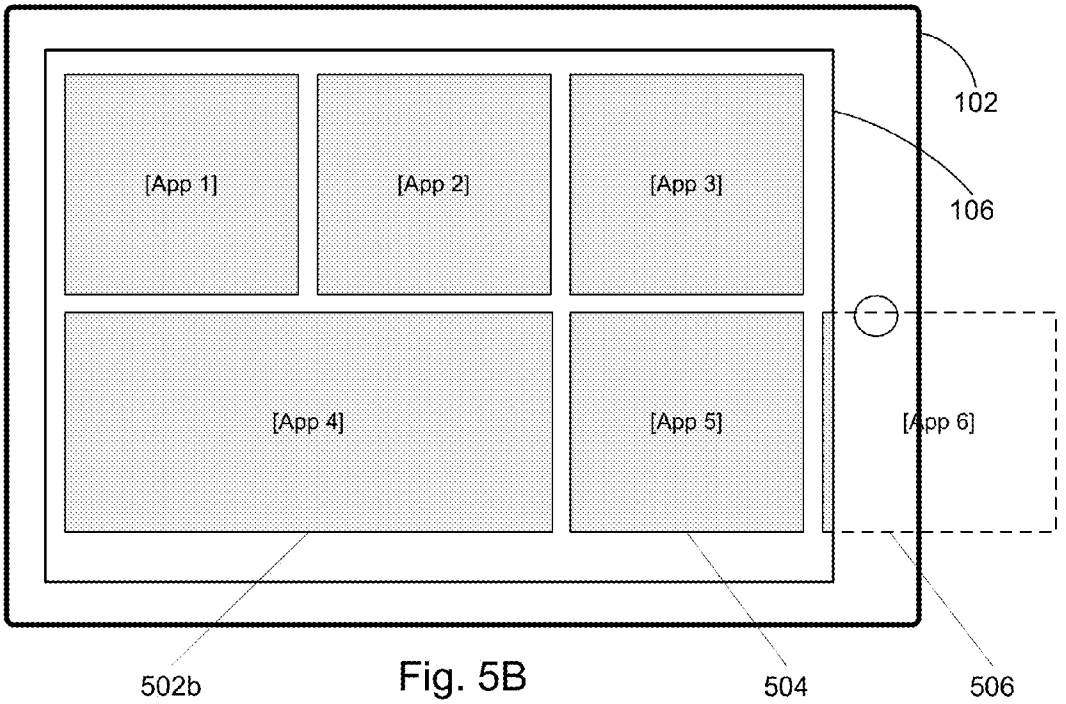
[App 1]
[App 2]
[App 3]
[App 4]
[App 5]
[App 6]
102
106
502b
504
506

Fig. 5B

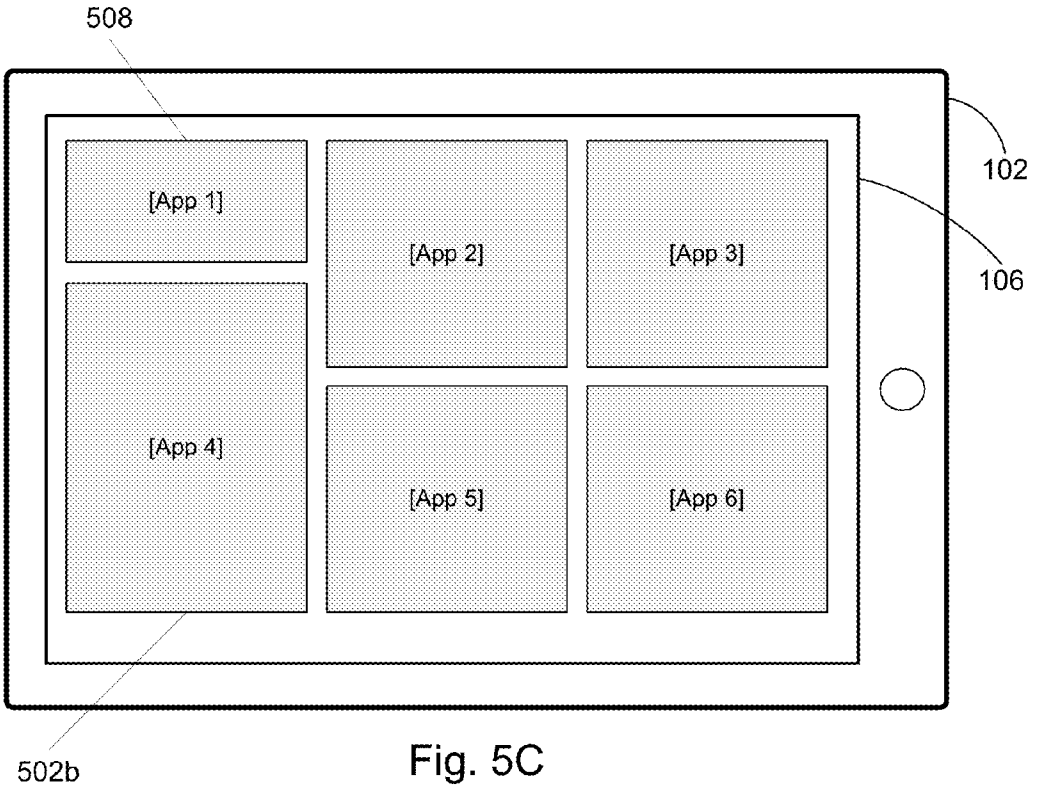
508
[App 1]
[App 2]
[App 3]
[App 4]
[App 5]
[App 6]
102
106
502b

Fig. 5C

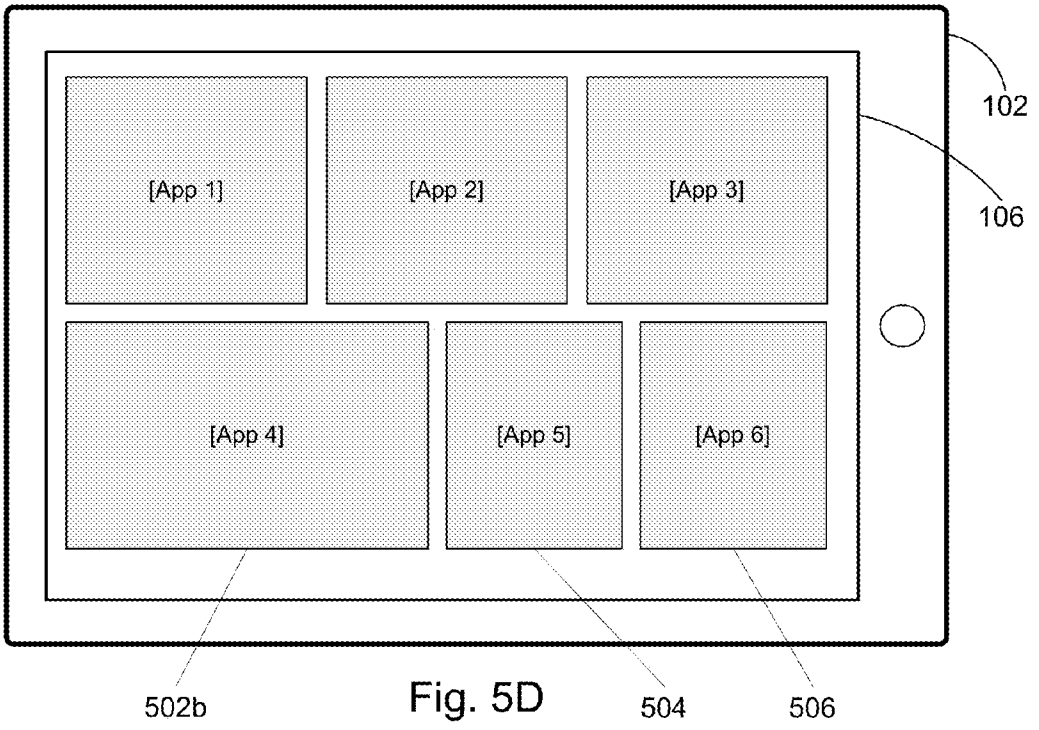
[App 1]
[App 2]
[App 3]
[App 4]
[App 5]
[App 6]
102
106
502b
504
506

Fig. 5D

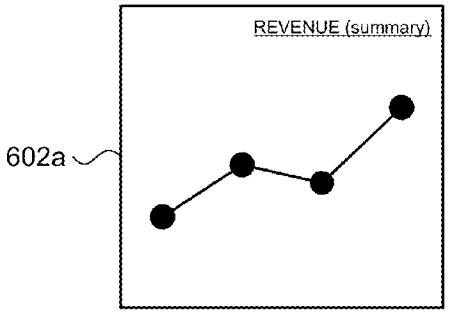

Fig. 6

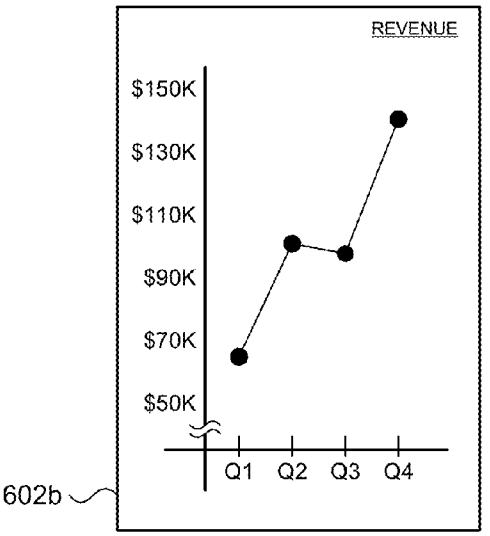

Fig. 6A

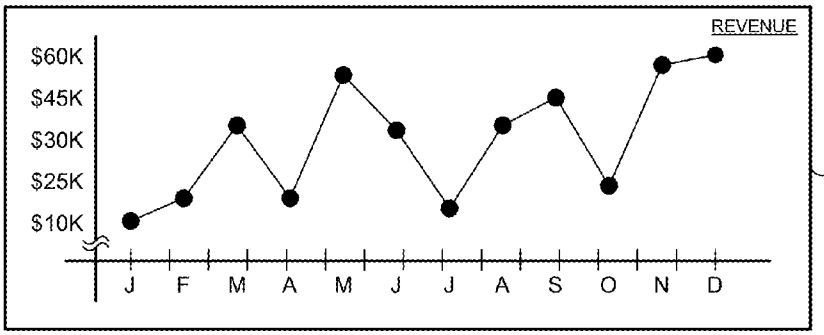

Fig. 6B

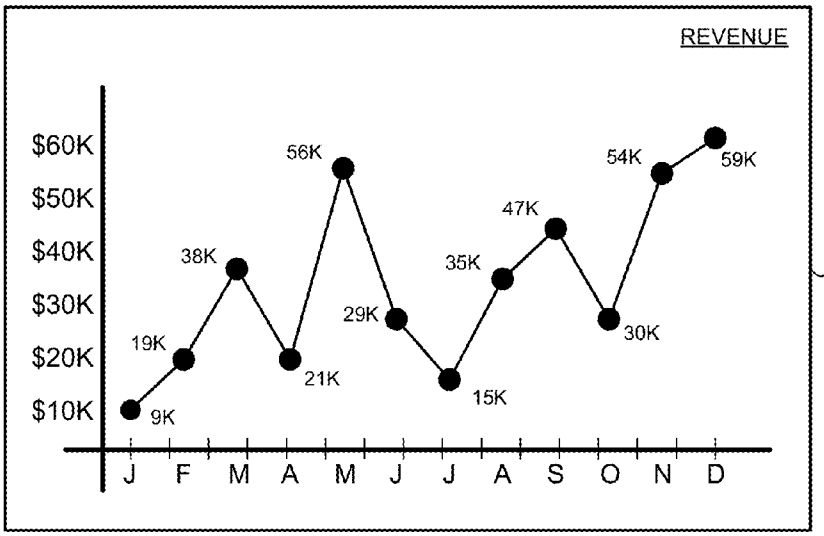

Fig. 6C

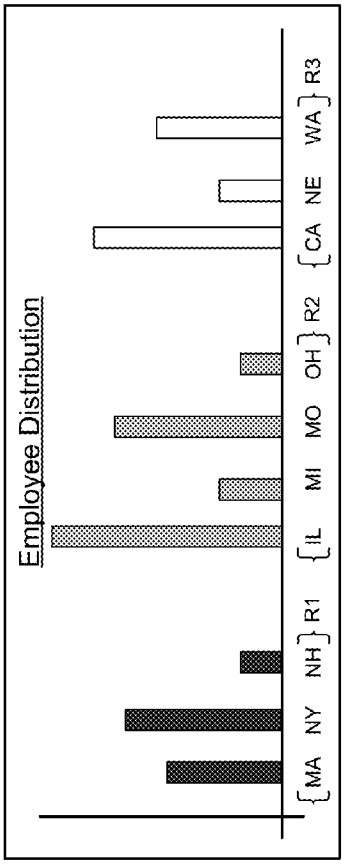

Fig. 7B

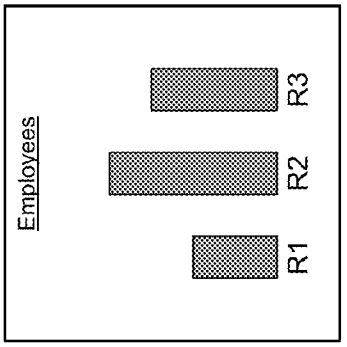

Fig. 7A

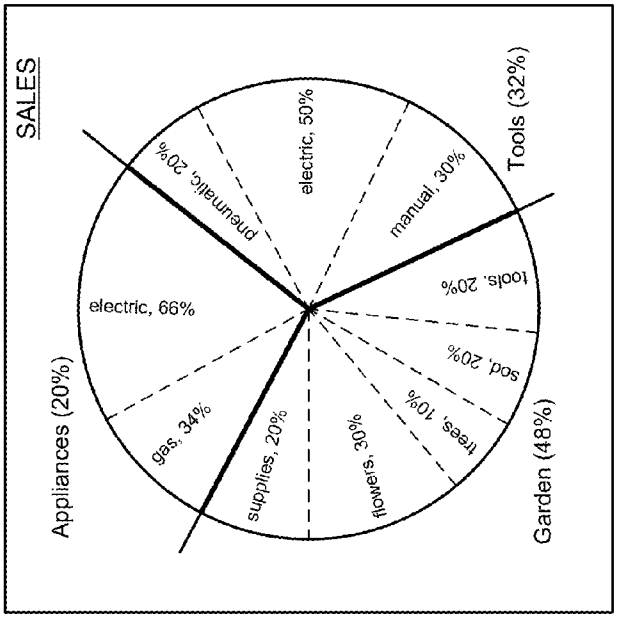

Fig. 8B

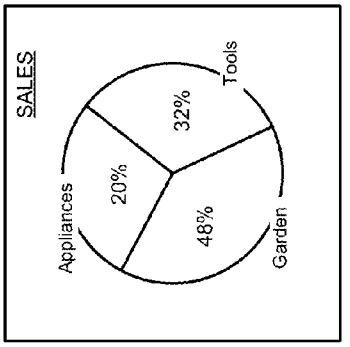

Fig. 8A

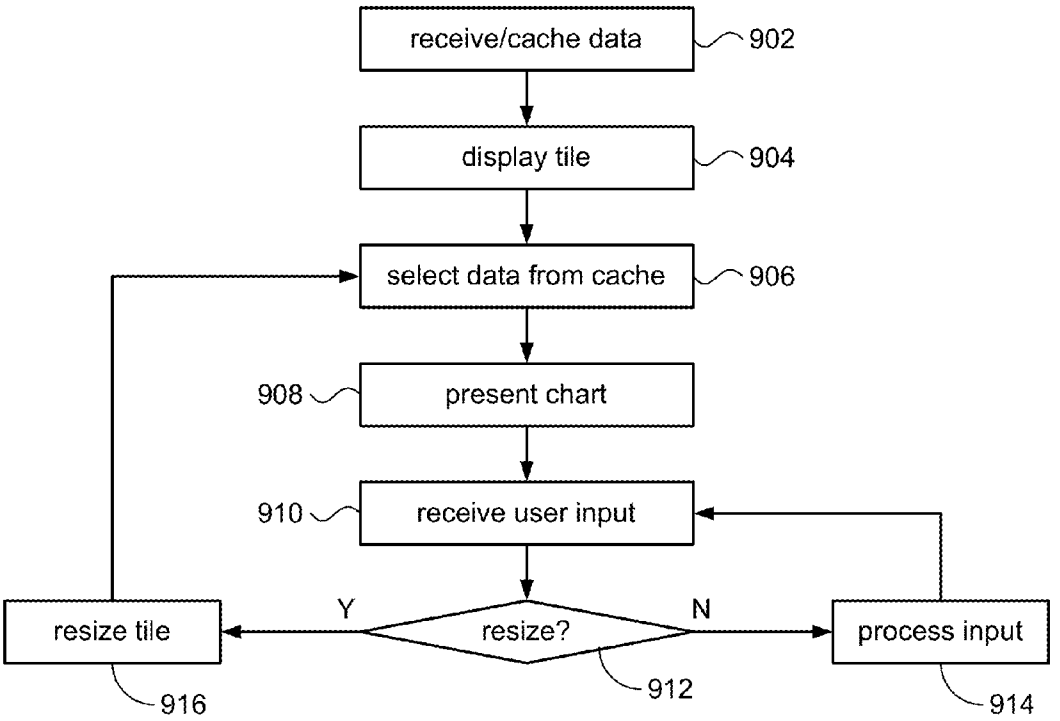
receive/cache data
902
display tile
904
select data from cache
906
908
present chart
910
receive user input
Y
resize?
N
resize tile
process input
912
916
914

Fig. 9A

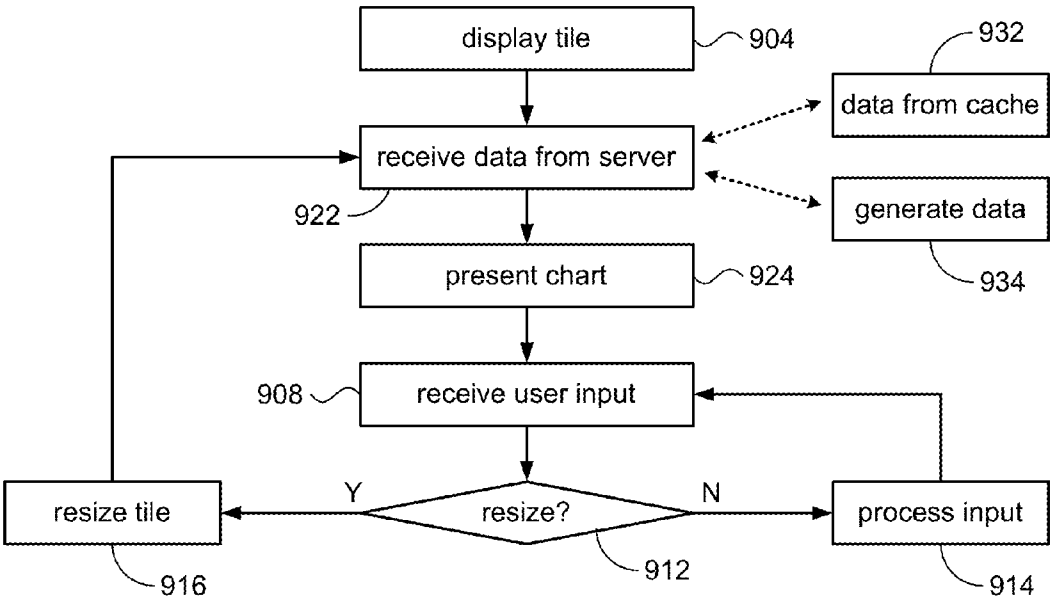
display tile
904
932
data from cache
receive data from server
922
generate data
934
present chart
924
908
receive user input
Y
resize?
N
resize tile
process input
912
916
914

Fig. 9B

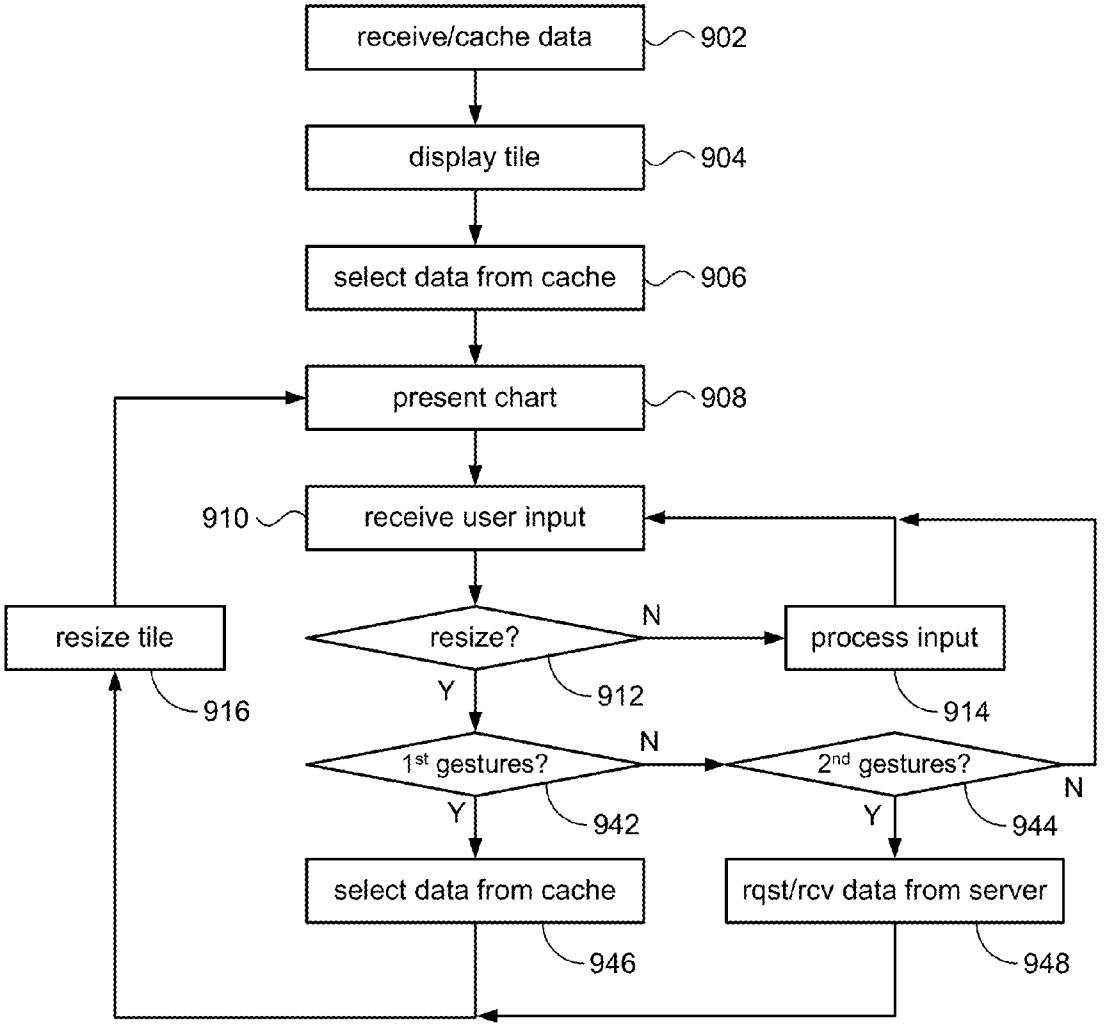
receive/cache data
902
display tile
904
select data from cache
906
present chart
908
910
receive user input
resize tile
916
resize?
912
N
Y
process input
914
1st gestures?
942
N
Y
2nd gestures?
944
N
Y
select data from cache
946
rqst/rcv data from server
948

Fig. 9C

DATA DISPLAYS IN A TILE-BASED USER INTERFACE

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present disclosure relates to commonly owned, concurrently filed U.S. application Ser. No. 13/931,592, filed Jun. 28, 2013, entitled "PINCH GESTURES IN A TILE-BASED USER INTERFACE," the content of which is incorporated herein by reference in its entirety for all purposes.

BACKGROUND

[0002] Unless otherwise indicated herein, the approaches described in this section are not prior art to the claims in this application and are not admitted to be prior art by inclusion in this section.

[0003] Tile-based user interfaces (UIs) are becoming increasingly common in mobile computing devices. A tile-based application may present its UI in a tile that is displayed among several other tiles in the display area of an output device. The amount of information available from a tile is limited because the tile typically occupies only a small portion of the display area. Similarly, the functionality that is available through a tile is limited due to the small size of the tile. Access to the detailed information and full functionality of a tile-based application requires the user to bring up a full-screen view of the application's UI.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] FIG. **1** shows a system in accordance with the present disclosure.

[0005] FIG. **2** illustrates a high level block diagram of an implementation in accordance with the present disclosure.

[0006] FIGS. **3**A and **3**B illustrate examples of charts.

[0007] FIGS. **4**A, **4**B, and **4**C illustrate examples of pinch gestures performed on tiles in accordance with the present disclosure.

[0008] FIGS. **4**D-**4**H illustrate various gestures that can be performed on tiles.

[0009] FIGS. **5**A, **5**B, **5**C, and **5**D illustrate tile resizing in accordance with the present disclosure.

[0010] FIGS. **6**, **6**A, **6**B, and **6**C illustrate an example of chart resizing in accordance with the present disclosure.

[0011] FIGS. **7**A and **7**B illustrate another example of chart resizing in accordance with the present disclosure.

[0012] FIGS. **8**A and **8**B illustrate yet another example of chart resizing in accordance with the present disclosure.

[0013] FIGS. **9**A, **9**B, and **9**C show processing in accordance with some embodiments of the present disclosure.

DETAILED DESCRIPTION

[0014] In the following description, for purposes of explanation, numerous examples and specific details are set forth in order to provide a thorough understanding of the present disclosure. It will be evident, however, to one skilled in the art that the present disclosure as expressed in the claims may include some or all of the features in these examples alone or in combination with other features described below, and may further include modifications and equivalents of the features and concepts described herein.

[0015] FIG. **1** shows a user environment in accordance with embodiments of the present disclosure. Users may access a server system **12** over a suitable communication network using their computing devices **102**. In some embodiments, for example, the users may be workers in an organization such as a business enterprise. The server systems **12** may be various backend systems in the enterprise to support the user's efforts in the enterprise. The server systems **12** may include, for example, customer relationship management (CRM) systems, enterprise resource planning (ERP) systems, and so on. The backend systems **12** may execute various applications **14** in order to provide information access and other services to users who need to access the backend systems **12**.

[0016] Users may access applications **14** running on the backend systems **12** using their computing devices **102**. Applications **14** may access services provided by the backend systems **12** using, for example, web interface technology such as the web services description language (WSDL), the simple object access protocol (SOAP), and so on. Typical computing devices **102** include desktop computers, laptop computers, and the like. In accordance with the present disclosure, the backend systems **12** may be accessed using mobile computing devices **102***a*, **102***b*, such as computing tablets, smart phones, and the like.

[0017] "Tiling" may be used to allow users to have concurrent access to several applications at a time on their computing devices **102**. For example, computing device **102***a* shows a display having several tiles **122** presented in the display area **106** of the display device **104**. Tiles **122** are typically displayed in the display area **106** in non-overlapping fashion.

[0018] Each tile **122** may be associated with an application **14**, for example, to provide feeds, analytics, social networking, news, etc. Some tiles (e.g., tile **122***a* in computing device **102***a*) may present data generated by their respective applications in the form of charts. In accordance with the present disclosure, a user may change the size of a tile **122***a* to view more (or less) information presented by the chart, for example, by presenting a different chart in the re-sized tile **122***b*.

[0019] The backend systems **12** may provide chart data **112** to the computing device **102** that comprises the different data presented by the different charts. In some embodiments, the chart data **112** may be received from the backend systems **12** and cached in local memory in the computing device **102** to provide a fast the response time in presenting the chart in a resized tile. In other embodiments, the chart data **112** may be provided in real time (on the fly) from the backend systems **12** as tiles are re-sized. This aspect of the present disclosure will be discussed in more detail below.

[0020] Referring to FIG. **2**, an illustrative implementation of computing device **102** in accordance with the present disclosure may include a computing part **202** having a processing unit **212**, a system memory **214**, and a system bus **211**. The system bus **211** may connect various system components including, but not limited to, the processing unit **212**, the system memory **214**, an internal data storage device **216**, and a communication interface **213**. In a configuration where the computing device **102** is a mobile device (e.g., smartphone, computer tablet), the communication interface **213** may be an interface for wireless communication such as over a cellular network, using a WiFi® connection, etc.

[0021] The processing unit **212** may comprise a single-processor configuration, or may be a multi-processor architecture. The system memory **214** may include read-only memory

[0022] (ROM) and random access memory (RAM). The internal data storage device **216** may be an internal hard disk

drive (HDD), a magnetic floppy disk drive (FDD, e.g., to read from or write to a removable diskette), an optical disk drive (e.g., for reading a CD-ROM disk, or to read from or write to other high capacity optical media such as the DVD), and so on. In a configuration where the computing device **102** is a mobile device, the internal data storage **216** may be a flash drive.

[0023] The internal data storage device **216** and its associated non-transitory computer-readable storage media provide nonvolatile storage of data, data structures, computer-executable instructions, and so forth. Although the description of computer-readable media above refers to an HDD, a removable magnetic diskette, and a removable optical media such as a CD or DVD, it is noted that other types of media which are readable by a computer, such as zip drives, magnetic cassettes, flash memory cards, cartridges, and the like, may also be used, and further, that any such media may contain computer-executable instructions for performing the methods disclosed herein.

[0024] The system memory **214** and/or the internal data storage device **216** may store a number of program modules, including an operating system (OS) **232**, one or more application programs **234**, data **236**, and other program/system modules **238**. For example, the application programs **234**, which when executed, may cause the computing part **202** to perform method steps disclosed herein. The application programs **234** and/or the OS **232** may include a tile manager for managing the display of tiles **122** in the display area **106**. In addition, in some embodiments, the data **236** stored in system memory **214** may include chart data **112** provided by the backend systems **12** and cached in the computing device **102**.

[0025] In some embodiments, access to the computing part **202** may be provided by an input component **244** (e.g., keyboard, mouse, etc.) and an output component **246**. In some embodiments, where the computing device **102** is mobile device, the input **244** and output **246** may be components of a touch-sensitive device. In other embodiments, such as in a laptop computer, the input **244** may include a touch pad device and the output **246** may be a display panel.

[0026] Though the idea of charts are well known, a brief discussion about charts, nonetheless, will be made to a more complete understanding of the present disclosure. As used herein, the term "chart" will be understood to refer to diagrammatic representations of data. In some embodiments, the data that is represented by a chart is analytics data, which refers to source data that has been subjected to one or more analytics (computations, computed data, etc.). For example, the source data may be sales receipts of a store collected during the week. An example of analytics that may be generated from the source data may include daily receipts, where the analytics involves grouping the receipts by day and then computing the sum of each day's receipts.

[0027] Charts may include graphs, bar charts, pie charts, line charts, data tables, and so on. Charts typically include labels to inform the user as to the nature of the data that is being represented by the chart. Some charts may be annotated in addition to the labels to convey additional information about the data. FIG. **3**A, for example, shows a graph, and FIG. **3**B shows an example of a bar chart.

[0028] In accordance with the present disclosure, a tile (e.g., **122***a*) that is displayed in the display area **106** of the computing device **102** may present a chart that represents data generated from "source data" that is associated with the tile. For example, the application **14** may be a sales forecasting application that uses sales and other data for generating a sales forecast, which is then presented in the tile **122***a*. The sales and related data would be the source data that is associated with the tile **122***a*.

[0029] When the tile **122***a* is resized to a larger size (e.g., **122***b*), the resized tile is still associated with the source data, but may present a chart that represents different data generated from that source data. For example, different computations may be performed for different tile sizes, the source data may be grouped differently, and so on. In some embodiments, the chart presented in the expanded tile **122***b* may include additional data or information that was not presented in the smaller tile **122***a*.

[0030] Referring to FIGS. **4**A-**4**C, illustrative examples of tile resizing are shown for a touch screen display device. As conventionally known, finger gestures may serve as a source of user input on the touch screen display device. In some embodiments, two-finger gestures called "pinch" may be used to resize a tile from its original (default) size to a larger size, and vice-versa. FIG. **4**A illustrates an example of a horizontal pinch gesture. The figure shows a horizontal pinch out (reverse pinch) gesture made on the tile **122***a* to enlarge the size of the tile **122***b* in the horizontal direction (width). Likewise, a horizontal pinch gesture (pinch in) may be made on the tile **122***b* to reduce the size of the tile **122***a* in the horizontal direction. FIG. **4**B illustrates a vertical pinch out gesture made on tile **122***a* to enlarge the tile **122***b* in the vertical direction (height), and a vertical pinch gesture to reduce the tile **122***a* in the vertical direction. In some embodiments, a diagonal pinch as shown in FIG. **4**C may be made on the tile to enlarge or reduce the tile along a diagonal direction.

[0031] In some embodiments, the re-sizing may be constrained to pre-defined incremental (step) sizes, where the number of increments can be one or more. Thus, each gesture may change the tile size by one increment. For example, enlargement may occur at 50% size increments, where the next size is changed by 50% from the previous size. Thus, a first horizontal pinch out gesture may expand the width of the tile by 50%, a second horizontal pinch out gesture may expand the tile by another 50%, and so on. Likewise a pinch in gesture may reduce a large tile back to its original size in 50% size increments.

[0032] It will be appreciated that the finger gestures need not be two-finger pinch gestures. In other embodiments, any one-, two- or more finger gestures may be used to resize a tile. Referring to FIGS. **4**D-**4**H, a non-exhaustive list of alternative finger gestures is shown, including a claw gesture (FIG. **4**D), a swiping motion with one or more fingers (FIG. **4**E), one or more taps (FIG. **4**F), circular gestures (FIG. **4**G), semi-circular gestures (FIG. **4**H), and so on.

[0033] Referring to FIGS. **5**A and **5**B, an illustrative example of tiles displayed in display area **106** of computing device **102** shows a typical arrangement of non-overlapping tiles. Each tile may be initially displayed at a default size. In some embodiments, a single default size may be applied to all tiles. In other embodiments, each tile may have its own default size. The default size may be any suitable shape such as a square, rectangle, and so on.

[0034] The display area **106** shows only a portion of all the tiles in a larger logical "grid" of tiles. Each tile in the grid may be associated with an application **14** (e.g., executing on the backend systems **12**) and presents output generated by that application. Other tiles in the grid that are beyond the viewing area of display area **106** may be brought into view by drag-

ging another portion of the grid into the viewing area. When a user moves a tile (e.g., using a drag and drop gesture) to another location, other tiles in the grid may be re-arranged in the grid to accommodate the tile's new location. When a user resizes a tile **502***a* (FIG. **5**A) to a larger size (e.g., tile **502***b*, FIG. **5**B), other tiles may be displaced and re-arranged in the grid to accommodate the resized tile. FIG. **5**B, for example, shows that the resized tile **502***b* has displaced tiles **504** and **506** horizontally to the right. Tile **506** is now largely off-screen, showing only a sliver of the tile in display area **106**. More generally, tiles in the grid may be displaced in the vertical direction, horizontal direction, or both when a tile is re-sized. The specific re-arrangement of tiles will depend on the algorithm used.

[0035] Referring to FIG. **5**C and **5**D, in some embodiments, when a user resizes a tile **502***a*, neighboring tiles may be resized. In some embodiments, tiles adjacent to a resized tile **502***a* may automatically resize in response to tile the being resized. In other embodiments, tiles in the neighborhood of a resized tile **502***a* (e.g., two tiles away from the resized tile) may automatically resize. In some embodiments, only nearby tiles above and/or below a resized tile will automatically resize if the resizing is in the vertical direction. Similarly, only nearby tiles to the left and/or right of the resized tile will automatically resize if the resizing is in the horizontal direction. Generally, in accordance with the present disclosure, one or more tiles may be moved, resized, or moved and resized when the user resizes a nearby tile.

[0036] FIG. **5**C shows an example where the tile **502***b* has been resized in the vertical direction. In this particular example, the only one adjacent tile **508** (above) has automatically resized to a smaller size in the vertical direction. The amount that the adjacent tile **508** is automatically resized by may be equal to or different from the amount that the tile **502***a* has been resized. FIG. **5**D shows an example where the tile **502***b* has been resized in the horizontal direction. In this particular example, than one tile (e.g., tiles **504** and **506**) have automatically resized, in this case in the horizontal direction.

[0037] In accordance with the present disclosure, if the user reduces a tile, one or more adjacent or neighboring tiles may automatically be resized to a larger size to fill the space left by the reduced sized tile. This may be illustrated, for example, by viewing FIG. **5**C and considering that the user has reduced the size of tile **502***b* in the vertical direction. FIG. **5**A, for example, may show that the tile **508** (for Appl) has increased in the vertical direction.

[0038] In accordance with the present disclosure, when a tile is automatically resized due to the user resizing a nearby tile, the data representation in the automatically resized tile may change in the manner according to the present disclosure as if the user had resized that tile. In other words, if a tile is automatically increased in size, then a more detailed representation of the underlying source data associated with that tile may be presented in that tile. Conversely, if a tile is automatically reduced in size, then a higher level (less detailed) representation of the underlying source data associated with that tile may be presented in that tile.

[0039] Referring to FIGS. **6** and **6**A-**6**C, an illustrative example of tile resizing and different data presentations in accordance with the present disclosure will be discussed. FIG. **6** represents an initial (default) size of tile **602***a*. The application associated with the tile **602***a* may report revenue using the enterprise's annual sales receipts as the source data. The size of the default tile **602***a* may only allow for quarterly results to be charted and presented in the tile. Accordingly, the computations performed on the source data may include summing the sales receipts for January to March and representing that sum on the chart as a data point for one quarter's revenue. Similar computations may be made with sales receipts for April to June, July to September, and October to December.

[0040] FIG. **6** further illustrates that the default tile size may not allow for the chart to include labels or other information regarding the nature of the chart. For this reason, the default-sized tile **602***a* may serve to provide a high level summary of the source data that is associated with the tile.

[0041] In accordance with the present disclosure, the user may view more detailed information by resizing the tile **602***a* using a pinch out gesture; e.g., horizontal pinch out, vertical pinch out, diagonal pinch out, etc. FIG. **6**A shows the tile **602***a* as a vertically re-sized tile **602***b*. The increased tile size may provide additional display area in the tile **602***b* so that additional information, such as axes and labels, can be added to the chart to give the user more information about the data that the chart represents.

[0042] It is noted here that the chart in tile **602***b* does not constitute a mere scaling of the image of the chart presented in the tile **602***a* in FIG. **6**; if that were the case, then tile **602***b* would simply present a vertically stretched image of the chart in tile **602***a*. Rather, the chart presented in tile **602***b* includes additional information that is not present in tile **602***a*. For example, tile **602***a* does not include axes or labeling of the axes, whereas tile **602***b* does.

[0043] Referring to FIG. **6**B, instead of making a vertical pinch out gesture on the default tile **602***a* of FIG. **6**, the user may make a horizontal pinch out gesture. FIG. **6**B shows an example of tile **602***a* as horizontally re-sized tile **602***c*. Since the tile **602***c* is wider, the chart can represent data, computed or otherwise generated from the source data, that is different from the data represented by the chart in tile **602***a*. Thus, instead of quarterly figures (tile **602***a*), the chart in tile **602***c* may represent monthly figures computed from the source data. The computations performed on the source data may include grouping the sales receipts according to month, summing each month's sales receipts, and then presenting the monthly sums in a chart.

[0044] It is noted here that the tile **602***c* in FIG. **6**B presents a chart that represents different data than is represented by the chart of tile **602***a* in FIG. **6**; the chart in tile **602***c* is not merely a resizing of the image of the chart in tile **602***a*. The chart in tile **602***a* represents quarterly data computed from the annual sales receipts (source data), while the chart in tile **602***c* represents monthly totals, which is different data than quarterly totals.

[0045] FIG. **6**C illustrates an example of a diagonally re-sized tile **602***d* in which the tile **602***a* has been expanded in both the vertical direction and the horizontal direction. In accordance with the present disclosure, the larger tile **602***d* may allow for additional information such as annotations. For example, the chart presented in tile **602***d* may include labeling of the data points with the actual monthly revenue figures in addition to chart labels.

[0046] The data that is represented by the chart presented in tile **602***a* of FIG. **6** is an example of "chart data" (e.g., **112** in FIG. **1**). Chart data is data that is computed from the source data (e.g., annual sales receipts) that is associated with the tile in which the chart is presented. Thus, the chart data **112** that is represented by the chart in tile **602***a* is quarterly sales data computed from the annual sales receipts associated with that

tile. Likewise, the chart data **112** that is represented by the chart in tile **602***c* is monthly sales data computed from the annual sales receipts.

[0047] The chart data **112** may include additional data such a labels for the chart, labeling of data points, and so on. The chart data **112** may also include meta data which describes how to display the chart, for example the kind of chart (bar chart, pie chart, line graph, etc.), the scale ranges, number of tic marks, number of pie segments, and so on.

[0048] FIGS. **7**A and **7**B illustrate another example of tile resizing of a tile that presents, n this example, a bar chart. Here, the underlying source data that is associated with the tile may be an employee database (e.g., from an HR backend system). The bar chart may represent the distribution of employees among the enterprise's sales offices, manufacturing facilities, and so on. FIG. **7**A shows a default tile that presents a high level summary of employee distribution. At this level of detail, for example, the distribution chart may be based on regions of the country. Thus, the total number of employees in region R1 may be computed from the employee database, and similarly for regions R2 and R3.

[0049] If the user horizontally expands the tile (e.g., using a horizontal pinch out gesture), the tile may now present a chart using more detailed data generated from the same employee database. FIG. **7**B illustrates an example. The bar chart that is presented in the tile of FIG. **7**B, being wider, can provide additional detail about employee distribution within each region, R1, R2, R3. For example, the constituent states within each region may be identified, and the number of employees in each state may be charted.

[0050] The data that is represented by the chart in FIG. **7**A is different from the data that is represented by the chart in FIG. **7**B. In the former, the data is computed by grouping the employees by region and summed, whereas in the latter, the data is computed by grouping the employees by states.

[0051] Yet another example is illustrated in FIGS. **8**A and **8**B. A pie chart is presented in the tile in FIG. **8**A, showing at a high level sales levels for three categories of goods (Appliances, Garden, Tools) in a store. The data that the chart represents may be computed from the store's sales records (source data). FIG. **8**B illustrates an example where the user may expand the tile with a diagonal pinch out gesture. The enlarged pie chart can represent different data than the pie chart of FIG. **8**A. For example, the pie chart in FIG. **8**B may include additional slices for subcategories of Appliances, Garden, and Tools.

[0052] Referring now to FIG. **9**A, a high level logical description of processing performed by the computing device **102** in accordance with some embodiments of the present disclosure will now be discussed. It will be appreciated that the specific algorithms and process flows will vary depending on a particular implementation of the present disclosure.

[0053] At a block **902**, the computing device **102** may receive from the backend systems **12** one or more sets of pre-computed chart data **112** for a tile to be displayed in the display area **106**. The pre-computed chart data **112** may include chart data for a chart to be presented in default-sized tile and chart data for each incremental change in tile size. For example, the incremental tile sizes may be predefined, and the charts to be presented in each tile size increment may likewise be predefined. The chart data may then be pre-computed for each chart. The chart data **112** may be stored (cached) in a local memory of the computing device **102**, allowing for a quick response time in the display of a resized tile.

[0054] At a block **904**, the computing device **102** may display the tile in the display area **106**. The initial display of the tile may be the default-size of the tile. At block **906**, the computing device **102** may select from local memory the cached chart data **112** that is associated with the present size of the tile being displayed. For example, if the tile is at the default size, then the chart data **112** that corresponds to the default-sized tile is selected. At block **908**, the computing device **102** may use the selected chart data **112** to generate and present the chart in the tile.

[0055] At block **910**, the computing device **102** may receive user input; e.g., a gesture, data input, etc. At block **912**, if the user input is not a re-sizing kind of input, then the computing device **102** may process the user input accordingly at block **914**. Processing may continue at block **910** to receive the next user input.

[0056] If at block **912**, the user input is a re-sizing gesture (e.g., horizontal pinch out), then at block **916**, the computing device **102** may resize the tile in the display area **106**, which may include re-arranging and/or resizing other tiles in the display area. Processing proceeds to block **906**, where the chart data **112** associated with the new size of the tile may be selected form among the cached chart data. At block **908**, the computing device **102** may generated and present a chart in the tile using the selected chart data **112**. Processing may then proceed to block **910** to receive the next user input.

[0057] The processing in FIG. **9**A uses locally cached pre-computed chart data **112**. This is typically the preferred configuration because of the quick response time for redisplaying tiles. However, the caching of pre-computed chart data **112** is not necessary. In other embodiments, the chart data **112** may be cached at the backend systems **12** or may even be computed on the fly at the backend systems and communicated to the computing device **102**. For example, in some embodiments, the user may be able to specify the parameters of the chart to be presented in the re-sized tile, in which case the chart data **112** may need to be computed on demand to accommodate the user's chart specifications.

[0058] FIG. **9**B shows a high level logical description of processing performed by the computing device **102** in accordance with other embodiments of the present disclosure. It will be appreciated that the specific algorithms and process flows will vary depending on a particular implementation of the present disclosure.

[0059] At block **904**, the tile may be displayed in the display area **106** of the computing device **102**. The tile may be initially displayed in its default size. At block **922**, the computing device **102** may communicate with the backend systems **12** to obtain suitable chart data **112** from the backend systems; for example, by indicating the size (dimensions) of the tile. The backend systems **12** may obtain the chart data **112** from its local cache (block **932**) or generate the chart data on the fly (block **914**).

[0060] At block **924**, the computing device **102** may receive the chart data **112** from the backend systems **12** and present a chart in the tile in accordance with the received chart data. User input may then be received at block **908**, and processed in block **914** or block **916** as described above.

[0061] In some embodiments, the user may use different gestures to use either locally cached pre-computed chart data **112** or chart data **112** produced by the backend systems **12**. This may be suitable where the user desires to view current up-to-date data from the backend systems **12**.

[0062] Accordingly, FIG. **9**C shows a high level logical description of processing performed by the computing device **102** in accordance with another embodiment of the present disclosure. It will be appreciated that the specific algorithms and process flows will vary depending on a particular implementation of the present disclosure.

[0063] Processing in FIG. **9**C is the same as explained in FIG. **9**A, up until the YES branch at block **912**. If at block **912**, the user input is a resizing gesture, then at block **942** a determination is made whether the resizing gesture is of a first type (YES branch) that signifies to select chart data **112** from the local cache, or if resizing gesture is of a second type (YES branch of block **944**) that signifies to request and receive chart data **112** from the backend system **12**.

[0064] In an embodiment, for example, gestures of the first type may include a pinch out gesture to enlarge the tile on which the gesture was made, and a pinch in gesture to reduce the tile. An example of gestures of the second type may include a swiping motion toward the right to enlarge the tile, and a swiping motion toward the left to reduce the tile.

[0065] Thus, if the resizing gesture is of the first kind, then at block **946** chart data **112** associated with the size of the tile indicated by the gesture may be selected form among the cached chart data as explained above. If the resizing gesture is of the second kind, then at block **948** a request may be sent to the backend system **12** to generate pre-determined chart data **112** using the latest data stored in the backend system. In some embodiments, the request may trigger an aggregation, report, and search process to generate chart data **112**. The request may include parameters that specify the report or aggregation, or specify the data to be used. Processing may then continue with block **916** as discussed above.

[0066] The above description illustrates various embodiments of the present disclosure along with examples of how aspects of the particular embodiments may be implemented. The above examples should not be deemed to be the only embodiments, and are presented to illustrate the flexibility and advantages of the particular embodiments as defined by the following claims. Based on the above disclosure and the following claims, other arrangements, embodiments, implementations and equivalents may be employed without departing from the scope of the present disclosure as defined by the claims.

We claim the following:

1. A computer-implemented method in a computer device comprising:

displaying a plurality of tiles on a display device; and

presenting, in a first tile, a data chart representative of data generated from computations performed on source data associated with the first tile, wherein the computations performed depend on a size of the first tile,

wherein when the first tile is at a first size, the data chart presented in the first tile is representative of first data generated from the source data using first computations,

wherein when the first tile is at a second size, the data chart presented in the first tile is representative of second data different from the first data and generated from the source data using second computations.

2. The computer-implemented method of claim **1** wherein the first and second computations include groupings the source data that depending on the size of the first tile.

3. The computer-implemented method of claim **1** wherein the data chart is a graph, bar chart, pie chart, line chart, or a data table.

4. The computer-implemented method of claim **1** wherein the data chart is a graphical representation of the data generated from the computations performed on the source data.

5. The computer-implemented method of claim **1** wherein when the first tile is at the first size then a first data chart is presented in the first tile and when the first tile is at the second size then a second data chart different from the first data chart is presented in the first tile.

6. The computer-implemented method of claim **1** further comprising:

displaying the first tile in the display area at the first size including presenting the first data chart in the first tile;

receiving user input; and

in response to the user input, displaying the first tile in the display area at the second size including presenting the second data chart in the first tile.

7. The computer-implemented method of claim **6** wherein the user input is a gesture made on a touch sensitive device using one or more fingers.

8. The computer-implemented method of claim **6** further comprising:

receiving another user input; and

in response to the other user input, displaying the first tile in the display area at a third size including presenting a third data chart in the first tile representative of data generated from the source data using third computations different from the first computations and the second computations.

9. The computer-implemented method of claim **1** wherein data generated from the source data using the first computations and data generated from the source data using the second computations are cached in a memory of the computer device.

10. The computer-implemented method of claim **1** further comprising storing in the computer device first data generated from the source data using the first computations and storing in the computer device second data generated from the source data using the second computations,

wherein when the first tile is at the first size, the data chart presented in the first tile is generated using the first data stored in the computer device,

wherein when the first tile is at the second size, the data chart presented in the first tile is generated using the second data stored in the computer device.

11. The computer-implemented method of claim **1** wherein the first data generated using the first computations and the second data generated using the second computations are received from a server system different from the computer device.

12. A computing device comprising:

a processor;

a display device; and

a data storage device having stored thereon program code, which, when executed by the processor, causes the processor to:

display a plurality of tiles on the display device;

present, in a first tile, a first chart representative of first data generated from source data associated with the first tile;

receive user input;

in response to the user input, redisplay the first tile at a different size; and

present, in the first tile at the different size, a second chart representative of second data generated from the source data different from the first data.

13. The computing device of claim **12** wherein the data storage device includes first chart data for producing the first chart and second chart data for producing the second chart.

14. The computing device of claim **12** wherein the processor accesses first chart data stored in the data storage device to generate and present the first chart, wherein the processor accesses second chart data stored in the data storage device to generate and present the second chart.

15. The computing device of claim **12** wherein the first data is generated from the source data using first computations and the second data is generated from the source data using second computations different from the first computations.

16. The computing device of claim **12** wherein the first data is generated by performing computations on first groupings of the source data and the second data is generated by performing the computations on second groupings of the source data that are different from the first groupings.

17. The computing device of claim **12** wherein the first chart is labeled differently than the second chart.

18. The computing device of claim **12** wherein the display device includes a touch sensitive layer.

19. A nonvolatile computer-readable storage medium having stored thereon computer program code, which, when executed by a data processor, causes the data processor to perform steps of:

displaying a plurality of tiles on a display device; and

presenting, in a first tile, a data chart representative of data generated from computations performed on source data associated with the first tile, wherein the computations performed depend on a size of the first tile,

wherein when the first tile is at a first size, the data chart presented in the first tile is representative of first data generated from the source data using first computations,

wherein when the first tile is at a second size, the data chart presented in the first tile is representative of second data different from the first data and generated from the source data using second computations.

20. The nonvolatile computer-readable storage medium of claim **19** wherein the computer program code, which, when executed by a data processor, further causes the data processor to perform steps of:

displaying the first tile in the display area at the first size including presenting the first data chart in the first tile;

receiving user input; and

in response to the user input, displaying the first tile in the display area at the second size including presenting the second data chart in the first tile.

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