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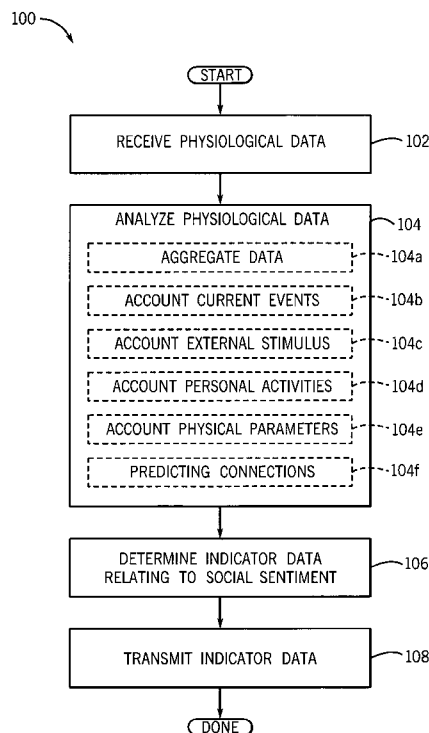


FIG. 1

(57) Abstract: Methods and systems for predicting social sentiment of one or more persons using physiological data. In certain embodiments, a method involves receiving the data from one or more persons at a computing device, analyzing the data, determining indicator data relating to social sentiment of the one or more persons such that the indicator data is determined from the data, and displaying and/or transmitting the indicator data. The computing device may include a server or some other remote computing device. The physiological data may be received over a network and/or transmitted over the same or different network. In certain embodiments, the indicator data includes advance warning information.





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DETERMINING SOCIAL SENTIMENT USING PHYSIOLOGICAL DATA

Background

[0001] This relates to crowd sourced data collection.

[0002] With the proliferation of Internet technologies and new forms of communications, such as blogs and social networks, social sentiment has been gaining considerable interest. Social sentiment may involve reviews, ratings, and recommendations of other users, businesses, policies, and other aspects of everyday life.

[0003] Typically, social sentiment is constructed based on various data provided by users online, such as text strings and click streams. Even these rather limited forms of data provide valuable tools for businesses and other groups (e.g., governments) for marketing their products, identifying new opportunities and needs, managing their reputations, and soliciting public opinions.

[0004] While many techniques have been proposed to filter the noise created by random and unrelated information widely spread on the Internet, there are many limitations in the very nature of the available data. Often, users pursue specific goals while sharing their data, such as driving web traffic to their web pages and accounts, which causes data misinterpretation and confusion. Various other factors, such as peer pressure and social stigma, may further contribute to inaccuracies.

Brief Description Of The Drawings

[0005] Some embodiments are described with respect to the following figures:

FIG. 1 is a flowchart illustrating a method for predicting social sentiment of one or more persons using physiological data, in accordance with certain embodiments.

FIG. 2 illustrates a network used for predicting social sentiment of one or more persons using physiological data, in accordance with certain embodiments.

FIG. 3 is a block diagram of an exemplary computing system that may be utilized to practice aspects of the present disclosure.

FIG. 4 shows a social sentiment map according to one embodiment.

Detailed Description

[0006] Physiological data may be used for monitoring and predicting social sentiment of a plurality of persons. As used herein, the term "physiological data" will be understood to mean physiological data, psychophysiological data, or a combination thereof. In certain embodiments, a method involves receiving physiological data at a computing device, analyzing the physiological data, determining indicator data relating to social sentiment, such that the indicator data is determined from the physiological data, and transmitting the indicator data. The computing device may include a server or some other remote computing device. The physiological data may be received over a network and transmitted over the same or different network. The indicator data may include advance warning information and be transmitted, in certain embodiments, back to the users.

[0007] In certain embodiments, physiological data is received from a person using a single sensor. This may be done for a plurality of people, where a given person's data is received a single sensor. In some embodiments, multiple sensors may be used to receive data from a person. For example, a user device may be equipped with only a single sensor for obtaining physiological data from the user. Even a single sensor implementation may be able to provide various types of physiological data, such as a body temperature and a heart rate. In other words, a single sensor may serve as a multifunctional sensor. Operations of the sensor, and/or the sensor(s) itself, may be hidden from a user, such that physiological data is collected in a covert manner without any specific action from the user and possibly without knowledge of the user.

[0008] When multiple persons are involved in providing physiological data, some relationships may exist among users and/or data points provided from different users. Analyzing physiological data may involve aggregating data from multiple persons to provide a more comprehensive analysis. In certain embodiments,

analyzing physiological data may involve accounting for current events, personal activities, and/or physical parameters of a person. For example, physical parameters may include a health condition, age, gender, weight, body fat percentage, genetics, biometric, and physical location. These parameters may be combined with the physiological data or used to interpret the physiological data.

[0009] Analyzing physiological data may involve predicting one or more connections between two or more persons. Connections may be genetic, familial, and/or social and may be based on the physiological data of all users or a subset of users. Furthermore, analyzing the physiological data may involve analyzing a change in the physiological data due to some external stimulus, such as visual stimulus, audio stimulus, and/or other sensory stimulus. In certain embodiments, a method may also involve determining a response differential between two or more persons based on the presence or absence of a variable.

[0010] A system for predicting social sentiment of one or more persons using physiological data may include a memory for storing data, a receiving module, an analyzing module, an indicator data determining module, and a transmitting module, as well as a processor for executing the receiving module, analyzing module, indicator data determining module, transmitting module, and a display module. The processor may be adapted to receive physiological data from one or more persons at a computing device, analyze the physiological data, determine indicator data relating to social sentiment of the one or more persons, with the indicator data being determined from the physiological data, and display and/or transmit the indicator data. The computing device may be a server, and the physiological data may be received by the receiving module and transmitted over a network by the transmitting module.

[0011] In certain embodiments, the physiological data may be received from one or more persons using a single sensor per person. The physiological data may be received seamlessly from a person using a single or multiple sensors. When multiple persons are involved, they may have a relationship with one other. Analyzing the physiological data may involve aggregating data from a plurality of

persons. In certain embodiments, analyzing the physiological data may include taking current events, personal activities, and/or physical parameters of a person into account. Physical parameters may include, for example, one or more of health condition, age, gender, weight, body fat percentage, genetics, biometrics, and physical location. In certain embodiments, the indicator data includes advance warning information. Some other aspects of analyzing the physiological data referenced above may be provided with reference to various operations that may be implemented within a computer system.

[0012] A computer-readable storage medium may have a program embodied thereon, executable by a processor to perform a method for monitoring and predicting social sentiment of one or more persons using physiological data. The method may involve receiving the physiological data from one or more persons at a computing device, analyzing the physiological data, determining indicator data relating to social sentiment of the one or more persons, with the indicator data being determined from the physiological data, and displaying and/or transmitting the indicator data.

[0013] There exists a need to objectively monitor and predict social sentiment. Monitoring of physiological data can provide direct data for monitoring and predicting of social sentiment. Social sentiment is an assessment of public or mass opinion, feelings or attitudes tied to a particular location or locations.

[0014] FIG. 1 is a flowchart illustrating a sequence 100 for predicting social sentiment of one or more persons (i.e., users) using physiological data, in accordance with certain embodiments. The sequence may be implemented in software, firmware, and/or hardware. In software and firmware embodiments, it may be implemented using computer executed instructions stored on one or more non-transitory computer readable media, such as optical, magnetic, or semiconductor storages.

[0015] Social sentiment typically contains information about these users, their social and/or geographic environments, and various groups that these persons naturally belong to or are assigned to by applications of this method. As further

explained herein, this information may be provided back to the users or used to generate custom content for the users, such as target advertisements and information about various related services. Social sentiment may be shared with other parties, such as businesses and government agencies for example, in order to provide services to the users. Various security and privacy features may be provided to ensure controlled dissemination of the sensitive information to minimize privacy concerns.

[0016] Social sentiment has been gaining increased interest with the rise of Internet communication technologies and new forms of communications such as blogs and social networks. Social sentiment may involve reviews, ratings, and recommendations of other users, business, policies, and other aspects of everyday life. Typically, social sentiment is constructed based on various data provided by users online, such as text strings and click streams. Even these rather limited forms of data provide valuable tools for businesses and other groups (e.g., governments) for marketing their products, identifying new opportunities and needs, managing their reputations, and soliciting public opinions. While many techniques have been proposed to filter the noise created by random and unrelated information widely spread on the Internet, there are many limitations in the very nature of the available data. Users often pursue specific goals while sharing their data, such driving web traffic to their web pages and accounts, which causes data misinterpretation and confusion. Various other factors, such as peer pressure and social stigma, may further contribute to inaccuracies. Methods and systems described herein utilize physiological data, which inherently tends to be more accurate and provide many new opportunities for service providers.

[0017] Physiological data may be collected through user devices. This data may be transmitted to servers for aggregating and analyzing the data in more comprehensive fashion than has been previously available. Some examples of physiological data include heart rate, body impedance, body temperature, and so forth. Physiological data may be categorized as objective data since it corresponds to objective physical characteristics of the users' bodies. This type of data is easily distinguishable from subjective data types, such as verbal and written expressions in

a form of blog posts and news feeds. The subjective data may be easily skewed by various other factors that may be impossible to separate analytically from each other. As such, physiological data may be generally much more valuable than other data traditionally used to construct social sentiment.

[0018] During analysis of physiological data (and even while obtaining such data), it may be supplemented with other data, such as users' geographic location, their demographic information, click-stream data, pre-filled and post-filled surveys, external data feeds, and many other types and forms of data. Collectively, all data feeds may be used to construct and refine social sentiment. It should be noted that in some embodiments, social sentiment may only be an intermediate product provided by the proposed methods and systems and may be used to develop and provide additional services and products to the users and users' communities.

[0019] Sequence 100 may commence with receiving physiological data from one or more persons at a computing device in operation 102. The received information may be sent by one or more user devices. It should be noted that multiple users may share the same user device. These devices may be used to obtain physiological data or to communicate with further upstream devices used for obtaining such data. Some exemplary user devices may include personal computers, laptops, mobile telephones, etc. The user devices may be equipped with one or more sensors for collecting such data as a part of a dedicated data collection operation (e.g., prompting a user to operate or interact with a sensor) or as a part of another operation (e.g., while obtaining biometric information for authentication purposes, which also may involve capturing one or more of EKG, body fat percentage, body temperature, pulse, any other physiological data, etc.).

[0020] Physiological data obtained at a user device level may be then transmitted to a server. The transmission may be performed over one or more networks, further described with reference to FIG. 2. The server is defined as a computer system that is separate from a user device used for collecting physiological data. In that regard, a server typically does not have the capability of obtaining physiological data directly from one or more persons (i.e., it may not be equipped with a sensor in some

embodiments). Instead, the server is communicatively coupled with multiple user devices for collecting physiological data from these devices. In certain embodiments, one of the user devices used for collecting physiological data may perform some or all server functions described herein.

[0021] While references are made to a single server, one having ordinary skills in the art would understand that various combinations of hardware and software systems may be used for the back-end receiving and processing of physiological data. Specifically, FIG. 2 illustrates that there are two servers used; however any number of servers may be used. It is important to note that, in certain embodiments, a server is configured to collect and aggregate such data from multiple users. As described below, the data may reflect relationships between some users or be analyzed in light of some predefined relationships. Sometimes collection and analysis of physiological data is referred to as "physiological polling."

[0022] In operation 104, the sequence 100 may proceed with analyzing physiological data. In certain embodiments, this operation may be combined with determining indicator data relating to social sentiment of the one or more persons, which is presented below as operation 106. The analyzing operation may involve grouping some physiological data, combining it with and/or, more generally, analyzing it in light of other data, and producing some form of an output. Operation 104 may involve various optional embodiments, which will now be described in more detail. It should be noted that each of these additional sub-operations may be practiced by itself or combined with various other operations.

[0023] In some embodiments, analyzing physiological data involves aggregating such data from multiple users (i.e., a plurality of persons (optional operation 104a)). Unlike analyzing data from a single user, collecting data from multiple users allows for a more comprehensive analysis of the physiological data of an entire group and even for individual users. For example, an indication that one user has a fever has limited value, while an indication that a large group of people in the same geographic location has such a condition may be indicative of an epidemic, for example. In addition to being warned about their own fever conditions, the users will also

appreciate information about an epidemic. For example, such collective information may be used for dispatching medical services and warning all users to avoid possibly dangerous areas.

[0024] A specific example may provide a better understanding of some implementations of this optional operation. A user device may capture a body temperature of its user, for example, during periodic contact of the user with one or more sensors. The data is sent to a server, which has some additional information about the user, such as a specific geographic location of the user. The server may search for and even request similar data corresponding to other users in this location. The comprehensive analysis of the data may help to determine trends (e.g., epidemic trends etc.) and issue warning messages.

[0025] As presented in the above example, physiological data may be received from multiple users who have various relationships with one other. Some examples of such relationships include family ties, social network, geographic locations, and certain demographic groupings (e.g., by gender, age, and so forth). The data may be grouped, categorized, and analyzed to reflect these relationships.

[0026] In certain embodiments, physiological data is grouped according to personal space maps and/or geographic position maps. Personal space maps are identified based on "emotional proximity" of the users, frequency of their interactions, claimed professional/social/family relationships, and other related factors. Personal space maps may help to analyze physiological data in a specific context provided by these factors and to draw appropriate conclusions, for example, about the social dynamics of a specific group. In certain embodiments, physiological data itself is used in identifying personal space maps. In addition to mapping in terms of inter-personal and geographical/physical relationships, other type of relationships may be mapped and analyzed. These types of relationship may include but are not limited to relationships to organizations or hierarchies (e.g., businesses, armies, religious organizations, and political parties, etc.) and so forth.

[0027] Geographic position maps group people based on their physical proximity to each other and/or some geographic boundaries, such as city limits for example.

Various geographic tracking systems, such as a global positioning system (GPS) and cell phone usage or triangulation may be used to associate individuals with certain areas on these maps. For example, GOOGLE LATITUDE® service available from Google in Menlo Park, CA may be used for such purposes. In some exemplary embodiments, geographic position maps are combined with personal space maps to perform a more encompassing analysis of physiological data. For example, geographic position maps may be used to revise personal space maps. Without being restricted to any particular theory, it is often believed that people who are in close physical proximity tend to influence each other more than people located far away from each other. Of course, this theory should account for availability and usage of communication tools by users that would further influence the proposed dependence of the two types of maps. It is envisioned that other types of maps may be used as well, such as maps built on demographic factors and certain physiological data trends. Grouping maps may be relatively static (e.g., city limits, family relationships) or dynamic (e.g., physical proximity of users).

[0028] Analyzing physiological data may also involve aggregating and examining/analyzing physiological data over periods of time. This may involve determining various time trends, since data tends to vary over time. Some statistical methods may be applied for such purposes. The time dependence of physiological data is an important factor to consider in constructing algorithms for analyzing physiological data. For example, after experiencing a certain stimulation (e.g., seeing a visual image), a human body may go through various stages. The body may go through an initial reaction, which may be referred to as an initial "shock." This may encompass either a strong or weak reaction, and a positive or negative reaction, such as panic, hate, pleasure, etc. During this initial period, the human body may generate more pronounced signals associated with the received stimulation, and physiological data collected tends to be the most relevant. The body may then recover and be subjected to new unrelated stimuli. Not only may the physiological data show little correlation to the initial stimulant, it may also provide false signals. Furthermore, certain stimulations may generate delayed bodily, physical, and/or psychological reactions.

[0029] In keeping with embodiments according to the present technology, analyzing physiological data involves accounting for current events (optional operation 104b) or, more specifically, correlating physiological data to the current events to provide some understanding and meaning (which otherwise may be relatively abstract data). Current events may be defined as various external data (usually presented in a form of some stimulus) that may influence physiological data or at least put physiological data into some context. Examples of such current events may involve global events, such as major political or financial news, disasters, wars and coups, as well as local events, such as a death or birth in the family and special events (e.g., birthdays, weddings, promotions, etc.).

[0030] One specific example is a trial balloon, which is information shared with a specific purpose of observing the reaction of an audience (i.e., users of the system). Trial balloons may be used by businesses to send out press releases to judge reaction by customers (e.g., anticipated product releases) or they can be used by politicians or other entities deliberately leaking information on a policy change that may be under consideration. In the past, observing public reaction was difficult to accomplish, typically involving expensive and often inaccurate surveys. Novel combinations of information and sensor technologies may be used to capture relevant data in an efficient and precise manner. Specifically, once information is "leaked" in the initial stages of the trial balloon process, users' physiological data may be immediately collected. This information may be complemented by other data points, such as information reflecting how soon the information reached each user and levels of interest in the information by the users (e.g., click stream data). As mentioned above, physiological data is generally more reflective than other forms of users' responses (e.g., responses to survey questions etc.) and such data may be collected in a covert manner, which makes the entire process less intrusive and efficient. In other words, some or all users may not even be aware that they are being monitored.

[0031] In certain embodiments, analyzing physiological data includes analyzing changes in the physiological data to external stimuli (optional operation 104c). Some examples of such stimuli include visual images, audio, and various other sensory

stimuli (smell, touch, etc.). This type of operation may overlap with other similar operations. External stimuli may be provided by a user device using its video and audio outputs. As noted above, the user device may also be equipped with a sensor. For example, users' physiological data may be collected and synchronized with an image of a computer or cell phone display. In a particular embodiment, a photo of a political candidate may be sent to user devices and, upon users' viewing of the photo, the data is collected and received on the server. This viewing/data collection may be performed over a period of time in comparison to more traditional mass media options. This, in turn, adds to the flexibility of this method.

[0032] A particular implementation of this optional operation 104c is soliciting donations for various causes. Different users may be receptive to different causes. These correlations may be established by providing various external stimuli associated with these different causes and selecting ones that generate the most pronounced emotions based on the received physiological data. The solicitation may then be tailored to the users based on their different reactions to the causes.

[0033] In some embodiments, analyzing physiological data involves taking personal activities into account (optional operation 104d). Similar to current events described above with reference to optional operation 104b, personal activities may help to provide some reflection on physiological data and help to better understand this data. Some examples of personal activities include social network usage (e.g., postings, messages, status updates, etc.), click streams, search-streams from user devices, and other types of data collected by user devices (e.g., weight monitoring applications, physical activity applications, schedules, to-do lists, and so forth).

[0034] The operation may involve designing and providing to users specific surveys for supplementing and interpreting collected physiological data. For example, a user device may register that its user has a fever. The user device may then prompt the user to answer certain health related questions to help identifying and providing a precise diagnosis and/or prognosis. In some embodiments, the system may analyze other user activities (e.g., intense physical activity registered by another application etc.) to explain the data. Moreover, the system may detect the

user typing a message on the device indicating some pointers to the user's health status (e.g., asking for a sick day).

[0035] Modern social networks present ample sources of information about users and their environments. A large number of tech savvy people are active members of social networks. Methods and systems disclosed herein may be designed to continuously collect information about its users from such sources. For example, respective user accounts may be associated with a specifically designed web crawler to collect information pertaining to personal activities of that user.

[0036] In certain embodiments, analyzing physiological data involves accounting for physical parameters of a user (optional operation 104e). Some examples of physical parameters include health conditions, age, gender, weight, genetics, biometric, and physical location. There may be some overlap with other analyzing operations. For example, a user's physical location may be associated with current events, or personal activities such as jogging and the like. Furthermore, some users may object to the usage and sharing of such personal data. Some proposed methods and systems provide for various security measures limiting access to this data, as set by the user or other criteria.

[0037] It is noteworthy that various other types of measures may be taken and used in accordance with embodiments according to the present technology. Some of these types include but are not limited to blood flow (e.g., to assess sexual arousal), EEG, ECG, eye movements, pupil size (e.g., in assessing the effect of advertisements on people, blinks, muscle activity, skin perspiration, etc.

[0038] In one example, a user device is equipped with a GPS device or other types of location devices and/or systems (e.g., cell phone usage, cell phone triangulation system, Wi-Fi hubs, and Internet Protocol (IP) addresses). This location information may be used to form groups for analyzing the data based on specific geographic locale. For example, a strong deviation in certain physiological parameters in a particular region may be indicative of an epidemic or allergy outbreak. People may be warned to avoid these areas.

[0039] Some physical parameters may be used to generate and update other parameters. For example, physical location may be used to determine local weather conditions (e.g., outside temperature, rain etc.) and then correlate this information with physiological data to determine the effects of one on another. In a specific example, a cold temperature may explain a local outbreak of a fever.

[0040] In certain embodiments, one or more heart beat authentication techniques are implemented to provide physical parameters of a user. These techniques can be implemented on a user device equipped with near-field communication (NFC) capabilities. For example, a process may include obtaining heart beat information that is then used to provide mood/sentiment feedback. This feedback can be shared with a service provider as an indication of the level of satisfaction (or lack thereof) from a particular transaction completed by the user (e.g., a purchase of a product, etc.). In some embodiments, coupons (or anything else) may be sent to one or more individuals based on mood or other data. This may be accomplished via e-mail, SMS, snail mail, or any other suitable method.

[0041] In some embodiments, analyzing physiological data involves predicting a connection or relationship between two or more persons (optional operation 104f). Some examples of connection/relationship types include a genetic connection, a familial connection, a social connection etc. Strong correlation of certain physiological data may be indicative that two people have similar genetic make-up, which may further indicate that the two people are relatives. Furthermore, this information may be used to identify possible organ donors even though two people may not necessarily be related. Also, some physiological data may predict positive or negative relationships of two or more people in various social and professional settings, such as marriage, friendship, or other relationships or affiliations. Embodiments herein may also be applied to flash mobs, protests, other gatherings, and so forth.

[0042] In certain embodiments, a method includes determining a response differential between two or more persons based on a presence or absence of one or more variables. In other words, physiological data corresponding to one or more

users are compared to the same type of data of one or more other users. The same type of comparison may be implemented over time for the same group of one or more individuals.

[0043] At a certain point, method 100 may proceed with determining indicator data relating to social sentiment of one or more persons during operation 106. Without being restricted to any particular theory, it is believed by many that physiological data may be a more advanced predictor of social sentiment than other types of user's input, such as blog postings and social network postings. This indicator data may include some kind of advance warning information. The indicator data may be then transmitted back to the user device for displaying on a user interface in operation 108. For example, the indicator data may include some interpretation of the physiological data, such as a preliminary medical diagnosis, a health tip, mental state, mood, etc. In some embodiments, a system may be configured to compile a health dashboard on a user device based on various data points collected over time. Generally, indicator data will include some information that would encourage users to continue providing physiological data.

[0044] The indicator data may be also valuable to entities other than the users providing the data. In certain embodiments, the data may be transmitted to marketing agencies, government agencies, military authorities, medical entities, and other types of entities interested in the data. Various financial and security arrangements may be implemented in this system. For example, government agencies may be interested in the health or other status of various regions, and collecting physiological data may help such agencies in this regard. In certain embodiments, the indicator data may be used to customize other content provided back to the user device, such as to target advertisements.

[0045] Various examples of a sequence 100 described above may be implemented for different applications. For example, similar to social network posts of status and relationship information, users may be interested in sharing their health and mental state information with their networks. For example, physiological data may be interpreted to determine a user's mood, which may be a useful and/or fun or

entertaining fact to share with others. There could be clinical uses for broadcasting mood. Someone trying to stop smoking, stop overeating, or cure some other addiction or undesirable behavior, might be able to implement this aspect so that friends or a therapist can monitor their mood and provide moral support.

[0046] Other types of data may be also used for entertainment, social, professional, and medical reasons. For example, health conditions of an employee may prompt an employer to offer a day off, with the overall goal to increase the person's productivity. Indications that many people in a particular area, affiliation, or network are in a bad "mood" or poor health may prompt others to stay away from this area.

[0047] A computer network description presented below will help to provide some context for collecting and analyzing physiological data in the context of networks and multiple users connected to a service provider through these networks. FIG. 2 illustrates an exemplary network segment 200 in which various embodiments of the method described above may be implemented. As shown, multiple user devices or clients 202a-202d may be communicatively coupled with network 204 to provide various types of physiological data to servers 206 and 208 hosted by a service provider. User devices 202a-202d may be equipped with one or more sensors for collecting information from their respective users. In certain embodiments, at least some of user devices 202a-202d includes only one sensor.

[0048] Software applications associated with the above method include methods that may be implemented on any number of servers even though only two servers 206 and 208 are illustrated. These servers may have access to one or more databases (not shown) within which physiological data and other types of data are retained. Servers 206 and 208 may be used to subscribe user devices 202a-202d to the provided services. Therefore, servers 206 and 208 may also store various user-related information, such as subscription information and demographic information. Servers 206 and 208 may be also used to transmit indicator data to user devices 202a-202d.

[0049] Network 204 may take any suitable form, such as a wide area network (WAN) or Internet and/or one or more local area networks (LANs). The network 204 may include any suitable number and type of devices (e.g., routers, switches, etc.) for forwarding requests from respective clients to a particular server application, forwarding application results back to the requesting clients, or forwarding data between various servers.

[0050] Methods described above may be practiced in a wide variety of network environments (represented by network 204), telecommunications networks, wireless networks, mobile networks, and the like. In addition, the computer program instructions may be stored in any type of computer-readable media, and may be executed according to a variety of computing models, including a client/server model, a peer-to-peer model, on a stand-alone computing device, or according to a distributed computing model in which various of the functionalities described herein may be affected or employed at different locations.

[0051] FIG. 3 illustrates a computer system 300 that, when appropriately configured or designed, can be used for receiving physiological data from one or more persons, analyzing the physiological data, determining indicator data relating to social sentiment of the one or more persons from the physiological data, and displaying and/or transmitting the indicator data. Computer system 300 includes any number of processors 302 (also referred to as central processing units (CPUs)) that are coupled to storage devices, including primary storage 306 (typically a random access memory, (RAM)) and primary storage 304 (typically a read only memory (ROM)). Processors 302 may be of various types, including microcontrollers and microprocessors, such as programmable devices (e.g., CPLDs and FPGAs), and non-programmable devices, such as gate array ASICs or general-purpose microprocessors. Primary storage 304 acts to transfer data and instructions unidirectionally to the processor 302 and primary storage 306 is typically used to transfer data and instructions in a bi-directional manner. Both of these primary storage devices may include any suitable computer-readable media, such as those described herein. A mass storage device 308 is also coupled bi-directionally to processor 302 and provides additional data storage capacity, and may include any of

the computer-readable media described herein. Mass storage device 308 may be used to store programs, data and the like and is typically a secondary storage medium (such as a hard disk). It will be appreciated that the information retained within the mass storage device 308, may, in appropriate cases, be incorporated in standard fashion as part of primary storage 306 as virtual memory. A specific mass storage device such as a CD-ROM 313 may also pass data uni-directionally to the processor 302.

[0052] Processor 302 is also communicatively coupled with an interface 310 that communicatively couples with one or more input/output devices, such as video monitors, track balls, mice, keyboards, microphones, touch-sensitive displays, transducer card readers, magnetic or paper tape readers, tablets, styluses, voice or handwriting recognizers, or other well-known input devices such as, of course, other computers. Finally, processor 302 optionally may be coupled to an external device such as a database, a computer, or a telecommunications network using an external connection as shown generally at 312. With such a connection, it is contemplated that the processor 302 might receive information from the network, or might output information to the network in the course of performing the method steps described herein.

[0053] In some embodiments, the physiological data may be collected by components integral with processor-based systems, such as computers, tablets, cellular telephones, medical test equipment, and input/output devices for such equipment, including remote controls for televisions, mice, and touchpads, to mention some examples. Thus, as shown in Figure 3, in one embodiment, a pair of contacts 324 may be provided on a button 322 of a mouse 320. Then when the user merely rests the user's finger on the mouse button 322, physiological data may be taken. This physiological data may be used to constantly collect information about the physiological states of users of large numbers of computing devices. If sufficient data can be collected, more meaningful trends can be developed.

[0054] According to some embodiments, the physiological data may be associated with position information. Specifically, the location with relatively fine

granularity of the user whose physiological data may be taken, may be appended to that data in a way such that mapping software may be used to indicate changes in physiological data and thereby changes in social sentiment on a geographic basis.

[0055] For example, as shown in Figure 4, a region of a map showing counties indicated as boxes 402, 404, 406, and 408 is indicated. The region 402 may have a different social sentiment than the regions 404, 406, 408, as compiled and illustrated on the map. In this way, geographic differences and geographic based trends may be better understood.

[0056] In some embodiments, the sensors may be connected to an interface, such as the interface depicted in Figure 3, which does filtering and signal processing using conventional techniques. Then this data, once it is analyzed, may be sent on over computer networks for aggregation with information from a wide variety of other users. In the embodiments in which that data is linked to particular geographic locations, social sentiment changes on a geographic basis may be identified and depicted visually in some embodiments.

[0057] Regardless of the system's configuration, it may employ one or more memories or memory modules configured to store data, program instructions for the general-purpose processing operations and/or the inventive techniques described herein. The program instructions may control the operation of an operating system and/or one or more applications, for example. The memory or memories may also be configured to store representational information regarding one or more of the following: account or subscription information, messages, message semantic features, classification information, feature vectors, class lexicons, topic models, statistics regarding messages and classification, and the like.

[0058] It is noteworthy that various modules and engines may be located in different places in various embodiments. Modules and engines mentioned herein can be stored as software, firmware, hardware, as a combination, or in various other ways. It is contemplated that various modules and engines can be removed or included in other suitable locations besides those locations specifically disclosed

herein. In various embodiments, additional modules and engines can be included in the exemplary embodiments described herein.

[0059] Although the foregoing concepts have been described in some detail for purposes of clarity of understanding, it will be apparent that certain changes and modifications may be practiced within the scope of the appended claims. It should be noted that there are many alternative ways of implementing the processes, systems, and apparatuses. Accordingly, the present embodiments are to be considered as illustrative and not restrictive.

What is claimed is:

- 1 1. A method for predicting social sentiment of a plurality of persons using
2 physiological data, the method comprising:
3 receiving physiological data from the plurality of persons on a plurality of
4 computing devices;
5 analyzing the physiological data; and
6 determining a social sentiment of the persons using the physiological data.
- 1 2. The method of claim 1, including receiving the computing devices comprise a
2 server and the physiological data over a network.
- 1 3. The method of claim 1, including receiving the physiological data from a
2 person using a single sensor.
- 1 4. The method of claim 1, including receiving from a plurality of persons having a
2 relationship with one another.
- 1 5. The method of claim 1, wherein analyzing the physiological data comprises
2 aggregating data from a plurality of persons.
- 1 6. The method of claim 1, wherein analyzing the physiological data comprises
2 taking current events into account.
- 1 7. The method of claim 1, wherein analyzing the physiological data comprises
2 taking personal activities into account.
- 1 8. The method of claim 1, wherein analyzing the physiological data comprises
2 taking physical parameters of a person into account.

1 9. The method of claim 8, wherein the physical parameters comprise one or
2 more of health condition, age, gender, weight, body fat percentage, genetics,
3 biometrics, and physical location.

1 10. The method of claim 1, wherein analyzing the physiological data comprises
2 predicting a connection between two or more persons.

1 11. The method of claim 10, where the connection comprises one or more of the
2 following types of connections: a genetic connection, a familial connection, and a
3 social connection.

1 12. The method of claim 1, wherein analyzing the physiological data comprises
2 analyzing change in the physiological data due to an external stimulus.

1 13. A system for predicting social sentiment of one or more persons using
2 physiological data, the system comprising:
3 a memory for storing a receiving module, an analyzing module, an indicator
4 data determining module, and a transmitting module; and
5 a processor for executing the receiving module, analyzing module, indicator
6 data determining module, and transmitting module, the processor adapted to:
7 receive physiological data from one or more persons at a computing device;
8 analyze the physiological data; and
9 determine social sentiment of the one or more persons using the physiological
10 data.

1 14. The system of claim 13, wherein the computing device comprises a server
2 and the physiological data is received over a network by the receiving module and
3 transmitted over a network by the transmitting module.

1 15. The system of claim 13, wherein the physiological data is received from a
2 person using a single sensor.

- 1 16. The system of claim 13, wherein the physiological data is received seamlessly
2 from a person using a single sensor or multiple sensors.
- 1 17. The system of claim 13, wherein the physiological data is received from a
2 plurality of persons having a relationship with one another.
- 1 18. The system of claim 13, wherein analyzing the physiological data comprises
2 aggregating data from a plurality of persons.
- 1 19. The system of claim 13, wherein analyzing the physiological data comprises
2 taking current events into account.
- 1 20. The system of claim 13, wherein analyzing the physiological data comprises
2 taking personal activities into account.
- 1 21. The system of claim 13, wherein analyzing the physiological data comprises
2 taking physical parameters of a person into account.
- 1 22. The system of claim 21, wherein the physical parameters comprise one or
2 more of health condition, age, gender, weight, body fat percentage, genetics,
3 biometrics, and physical location.
- 1 23. The system of claim 13, wherein the indicator data comprises advance
2 warning information.
- 1 24. One or more non-transitory computer-readable storage media having a
2 program embodied thereon, the program executable by a processor to perform a
3 method for predicting social sentiment of one or more persons using physiological
4 data, the method comprising:
5 receiving physiological data from one or more persons at a computing device;
6 analyzing the physiological data; and

7 determining social sentiment of the one or more persons based on the
8 physiological data.

1 25. The media of claim 24 further storing instructions to receive global positioning
2 system coordinates with said data to identify a person's geographic location.

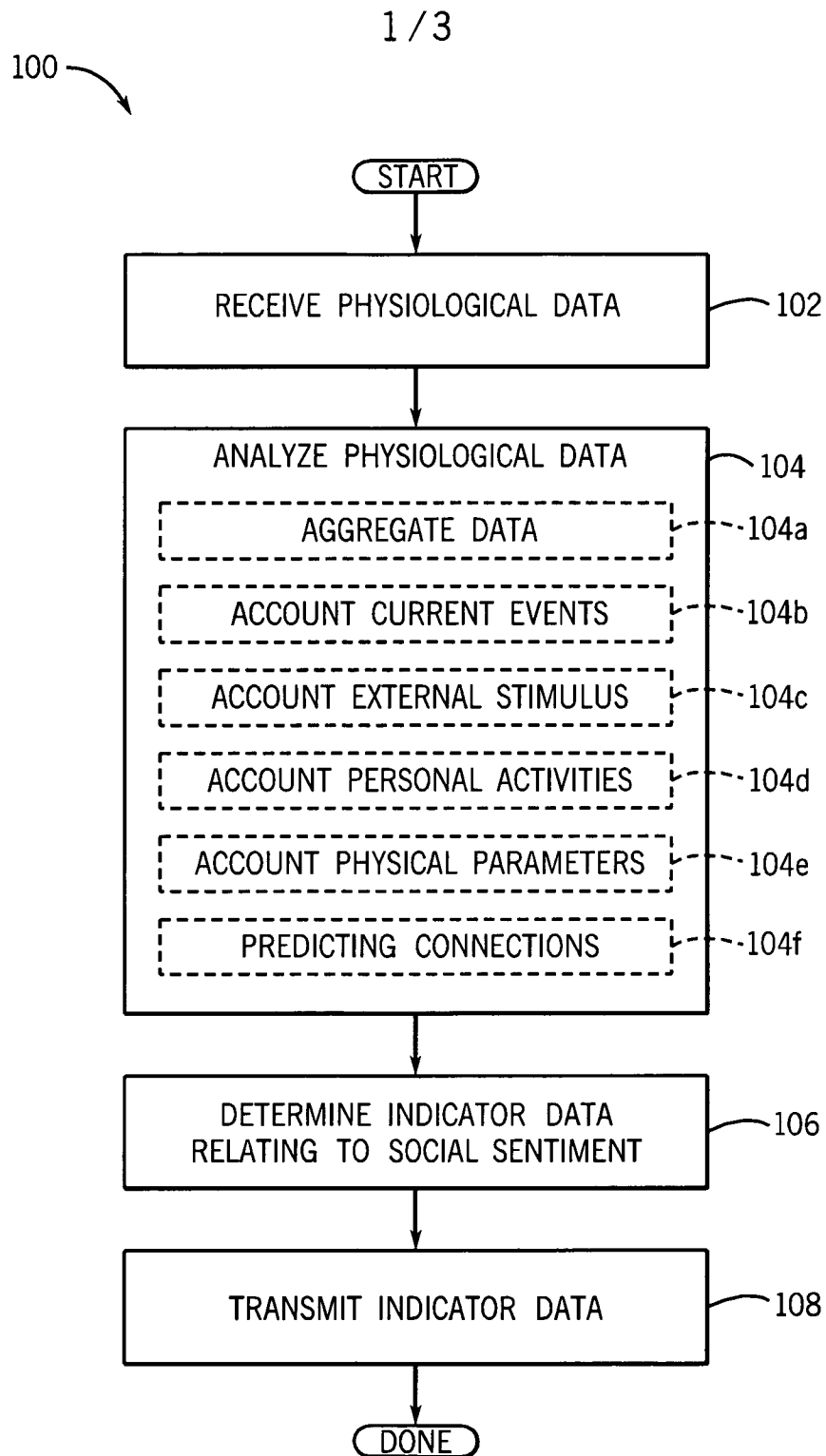


FIG. 1

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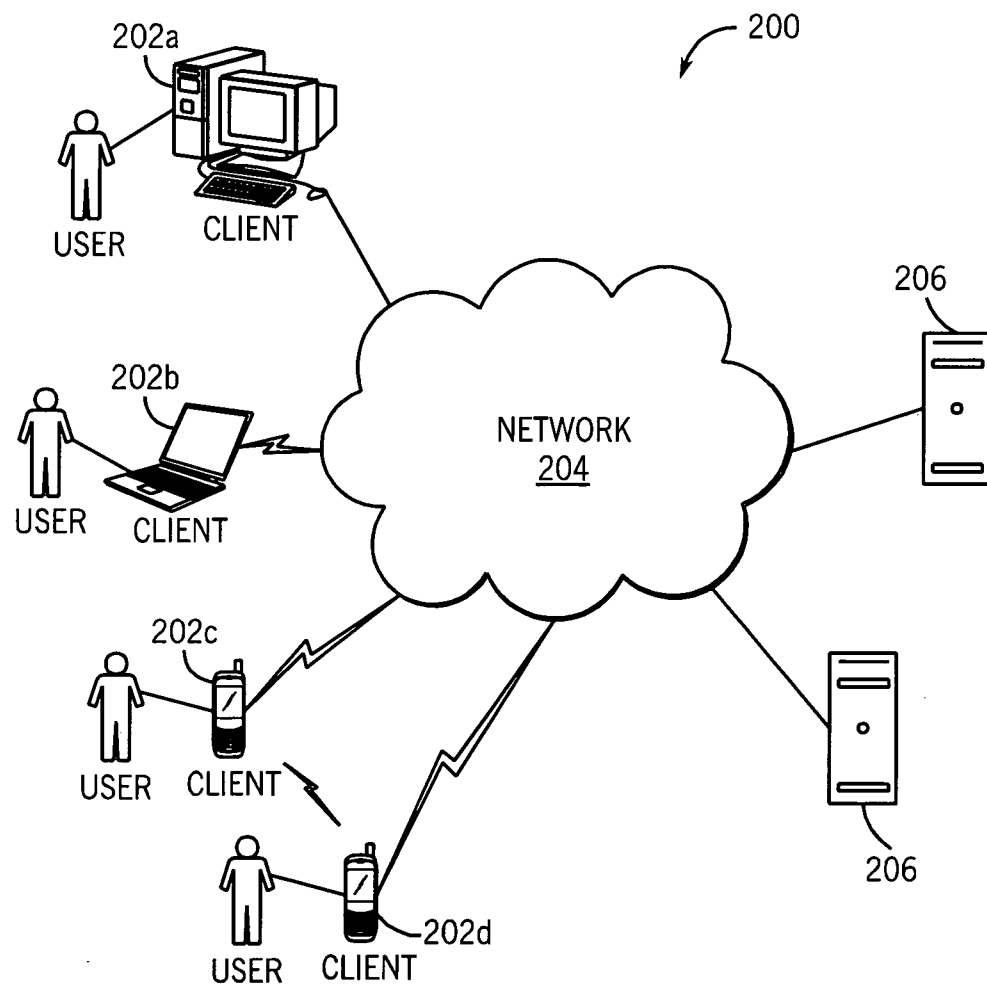
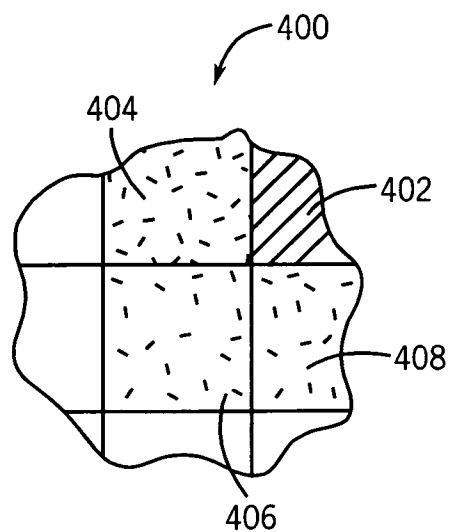
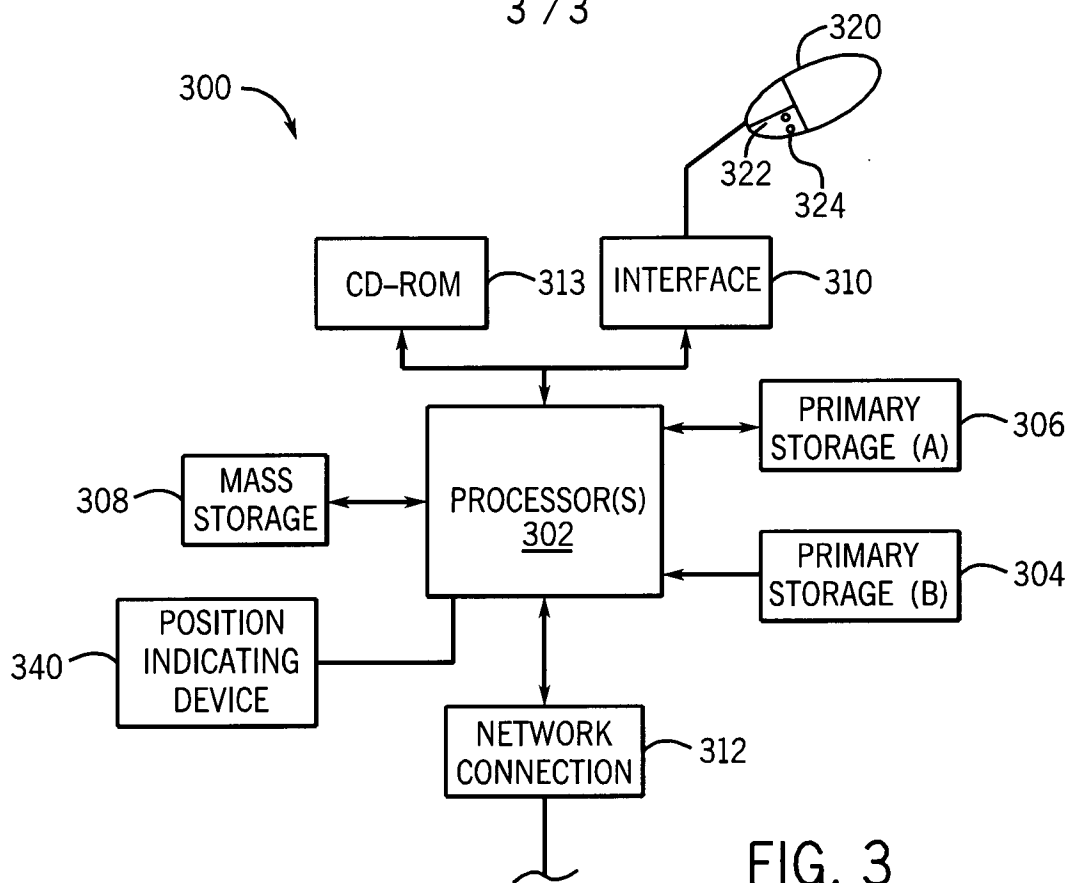


FIG. 2

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/068205**A. CLASSIFICATION OF SUBJECT MATTER****G06F 19/00(2011.01)i**

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)

G06F 19/00; G06F 15/16; G06F 15/00; G06F 17/18; G06F 17/30; H04W 4/00; A61B 5/00

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: social, network, sentiment, physiology, biology, health, gender, sensor, analyze

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2012-0124122 A1 (RANA EL KALIOUBY et al.) 17 May 2012 See paragraphs [0005]-[0007], [0021]-[0023], [0026], [0028]-[0034], [0039]-[0041], [0060]; claims 1, 30; and figures 3-4, 6-7, 10-11.	1-25
A	US 2010-0023300 A1 (MICHAEL FARRY et al.) 28 January 2010 See paragraphs [0010]-[0012], [0020]-[0027]; and figure 1.	1-25
A	WO 2011-153318 A2 (Q-TEC SYSTEMS LLC) 08 December 2011 See paragraphs [0005]-[0011], [0029]-[0034]; and figures 1 and 5.	1-25
A	US 2012-0130196 A1 (JAWAHAR JAIN et al.) 24 May 2012 See paragraphs [0018]-[0031], [0051]-[0055]; and figures 1-3, 5.	1-25
A	US 2012-0095979 A1 (OMAR AFTAB et al.) 19 April 2012 See paragraphs [0015], [0019], [0031], [0034]; and figures 1, 4.	1-25



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"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

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2013/068205

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2012-0124122 A1	17/05/2012	AU 2011-329025 A1 CN 103209642 A EP 2641228 A2 WO 2012-068193 A2 WO 2012-068193 A3	23/05/2013 17/07/2013 25/09/2013 24/05/2012 19/07/2012
US 2010-0023300 A1	28/01/2010	None	
WO 2011-153318 A2	08/12/2011	US 2011-300847 A1 WO 2011-153318 A3	08/12/2011 12/04/2012
US 2012-0130196 A1	24/05/2012	EP 2479692 A2 EP 2479692 A3 JP 2012-110716 A	25/07/2012 21/11/2012 14/06/2012
US 2012-0095979 A1	19/04/2012	CN 102521019 A	27/06/2012