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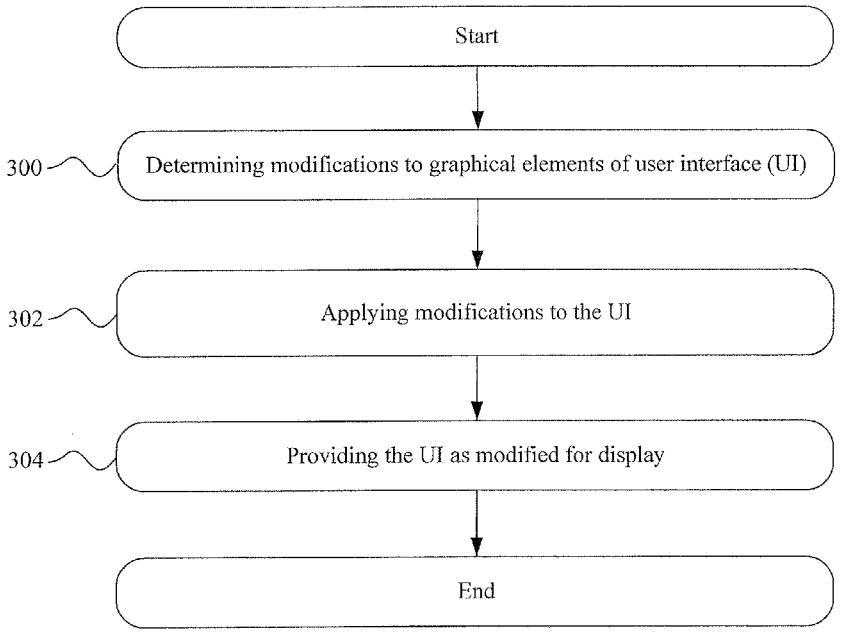

(57) **Abstract**: In one embodiment, a method includes determining, relative to a base user experience (UX), one or more modifications to one or more graphical elements of a user interface (UI) for display to a particular user. The modifications are configured to personalize the UI individually to the particular user and based on a computational determination of one or more categories applicable to the particular user. The method also includes applying the modifications to the UI; and providing the UI as modified for display to the particular user.

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USER EXPERIENCE/USER INTERFACE BASED ON INTERACTION HISTORY

TECHNICAL FIELD

[1] This disclosure generally relates to a user interface (UI).

BACKGROUND

[2] A social-networking system, which may include a social-networking website, may enable its users (such as persons or organizations) to interact with it and with each other through it. The social-networking system may, with input from a user, create and store in the social-networking system a user profile associated with the user. The user profile may include demographic information, communication-channel information, and information on personal interests of the user. The social-networking system may also, with input from a user, create and store a record of relationships of the user with other users of the social-networking system, as well as provide services (e.g. wall posts, photo-sharing, event organization, messaging, games, or advertisements) to facilitate social interaction between or among users.

[3] The social-networking system may transmit over one or more networks content or messages related to its services to a mobile or other computing device of a user. A user may also install software applications on a mobile or other computing device of the user for accessing a user profile of the user and other data within the social-networking system. The social-networking system may generate a personalized set of content objects to display to a user, such as a newsfeed of aggregated stories of other users connected to the user.

[4] A mobile computing device—such as a smartphone, tablet computer, or laptop computer—may include functionality for determining its location, direction, or orientation, such as a GPS receiver, compass, or gyroscope. Such a device may also include functionality for wireless communication, such as BLUETOOTH communication, near-field communication (NFC), or infrared (IR) communication or communication with a wireless local area networks (WLANs) or cellular-telephone network. Such a device may also include one or more cameras, scanners, touchscreens, microphones, or speakers. Mobile computing devices may also execute

software applications, such as games, web browsers, or social-networking applications. With social-networking applications, users may connect, communicate, and share information with other users in their social networks.

SUMMARY OF PARTICULAR EMBODIMENTS

[4a] A first aspect of the present disclosure provides a method comprising:

by a computing device, accessing a base user experience (UX) of a social-networking system comprising a user interface (UI) corresponding to one or more features of the social-networking system;

by the computing device, computationally determining one or more user categories based at least in part on information associated with previous interactions by a plurality of users with the social-networking system;

by the computing device, classifying a particular user into one or more of the user categories based at least in part on the interactions of the particular user with the social-networking system, wherein the classification comprises applying a machine-learning algorithm to the interactions of the particular user, and wherein the machine-learning algorithm is trained using the previous interactions by the plurality of users;

by the computing device, determining, relative to the base UX, one or more modifications comprising an addition of one or more graphical elements of the UI for display to the particular user, one or more of the graphical elements comprising a guided tour illustrating one or more of the features of the UI, the modifications being configured to personalize the UI individually to the particular user based at least in part on the computational determination of one or more of the user categories applicable to the particular user;

by the computing device, assigning a value to a particular functionality based at least in part on an objective of a computing system comprising the computing device;

by the computing device, selecting one or more of the graphical elements corresponding to the particular functionality with a highest value relative to the objective;

by the computing device, applying the modifications to the UI; and

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by the computing device, providing the UI as modified for display to the particular user.

[4b] A second aspect of the present disclosure provides one or more computer-readable non-transitory storage media embodying software configured when executed to:

access a base user experience (UX) of a social-networking system comprising a user interface (UI) corresponding to one or more features of the social-networking system;

computationally determine one or more user categories based at least in part on information associated with previous interactions by a plurality of users with the social-networking system;

classify a particular user into one or more of the user categories based at least in part on the interactions of the particular user with the social-networking system, wherein the classification comprises applying a machine-learning algorithm to the interactions of the particular user, and wherein the machine-learning algorithm is trained using the previous interactions by the plurality of users;

determine, relative to the base UX, one or more modifications comprising an addition of one or more graphical elements of the UI for display to the particular user, one or more of the graphical elements comprising a guided tour illustrating one or more of the features of the UI, the modifications being configured to personalize the UI individually to the particular user based at least in part on the computational determination of one or more of the user categories applicable to the particular user;

assign a value to a particular functionality based at least in part on an objective of a computing system;

select one or more of the graphical elements corresponding to the particular functionality with a highest value relative to the objective;

apply the modifications to the UI; and

provide the UI as modified for display to the particular user.

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[4c] A third aspect of the present disclosure provides a device comprising:

a processor; and

one or more computer-readable non-transitory storage media coupled to the processor and embodying software that:

access a base user experience (UX) of a social-networking system comprising a user interface (UI) corresponding to one or more features of the social-networking system;

computationally determine one or more user categories based at least in part on information associated with previous interactions by a plurality of users with the social-networking system;

classify a particular user into one or more of the user categories based at least in part on the interactions of the particular user with the social-networking system, wherein the classification comprises applying a machine-learning algorithm to the interactions of the particular user, and wherein the machine-learning algorithm is trained using the previous interactions by the plurality of users;

determine, relative to a base UX, one or more modifications comprising an addition of one or more graphical elements of the UI for display to the particular user, one or more of the graphical elements comprising a guided tour illustrating one or more of the features of the UI, the modifications being configured to personalize the UI individually to the particular user being based at least in part on the computational determination of one or more of the user categories applicable to the particular user;

assign a value to a particular functionality based at least in part on an objective of a computing system;

select one or more of the graphical elements corresponding to the particular functionality with a highest value relative to the objective;

apply the modifications to the UI; and

provide the UI as modified for display to the particular user.

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[5] In particular embodiments, each user of a mobile application or website may be identified as belonging to a category of users and each user is provided with a base user experience (UX) when interacting with the mobile application or website. The base user experience may be further customized for each particular user based on the interactions of the particular user with the application logged over a period of time that serves as training data. The signals used to tailor the base user experience may include recent actions, location, age, affinities, number of friends, number of times the application is run in the foreground, or any combination of these. In particular embodiments, the application or website may further customize the user experience based on a particular goal of the system hosting the website or application, such as for example, increasing the amount of user interaction or engagement with the social-networking system. For example, candidate elements of the user experience (e.g. push notifications or user education) may be assigned a particular value based on its importance to the particular goal and the candidate elements may be presented to the particular user in accordance with their particular value.

[6] For example, a particular image/photo sharing feature of the mobile application or website may automatically upload and store images captured by a mobile computing device of the user. The user may choose to share the uploaded images with their friends. The image sharing feature might be enabled for a target group of users of the social-networking system. An example target group may include users who take a large number of images or who frequently use the current image sharing features of the social-networking system. Users in the target group may be provided a guided tour explaining how the particular image sharing feature is used. The user experience in regard to the guided tour may be further customized based on the logged interactions. For example, a first user in the target group may be presented with a "pop-up" view

associated with the particular image sharing feature, while a second user may be shown a guided interface tour associated with the particular image sharing feature.

[7] As another example, a particular feature of a newsfeed may allow users to delete posts from the newsfeed. The deletion feature may have a "high value" in regard to a particular goal of increasing user interaction with the social-networking system and the social-networking system may modify the user experience to include information associated with the particular deletion feature over other candidate elements. The user experience educating users on the particular deletion feature may be based on the logged interactions of each user. For example, the user experience for a first user may include a video guiding the first user on how to use the particular deletion function, while a second user may be presented with a pop-up view displaying a summary of how to use the particular deletion function.

BRIEF DESCRIPTION OF THE DRAWINGS

[8] FIGURE 1 illustrates an example network environment associated with a social-networking system.

[9] FIGURE 2 illustrates an example method for modifying a user interface (UI).

[10] FIGURE 3 illustrates an example mobile device.

[11] FIGURE 4 illustrates an example social graph.

[12] FIGURE 5 illustrates an example computing system.

DESCRIPTION OF EXAMPLE EMBODIMENTS

[13] FIGURE 1 illustrates an example network environment 100 associated with a social-networking system. Network environment 100 includes a client system 130, a social-networking system 160, and a third-party system 170 connected to each other by a network 110. Although FIGURE 1 illustrates a particular arrangement of client system 130, social-networking system 160, third-party system 170, and network 110, this disclosure contemplates any suitable

arrangement of client system 130, social-networking system 160, third-party system 170, and network 110. As an example and not by way of limitation, two or more of client system 130, social-networking system 160, and third-party system 170 may be connected to each other directly, bypassing network 110. As another example, two or more of client system 130, social-networking system 160, and third-party system 170 may be physically or logically co-located with each other in whole or in part. Moreover, although FIGURE 1 illustrates a particular number of client systems 130, social-networking systems 160, third-party systems 170, and networks 110, this disclosure contemplates any suitable number of client systems 130, social-networking systems 160, third-party systems 170, and networks 110. As an example and not by way of limitation, network environment 100 may include multiple client system 130, social-networking systems 160, third-party systems 170, and networks 110.

[14] This disclosure contemplates any suitable network 110. As an example and not by way of limitation, one or more portions of network 110 may include an ad hoc network, an intranet, an extranet, a virtual private network (VPN), a local area network (LAN), a wireless LAN (WLAN), a wide area network (WAN), a wireless WAN (WWAN), a metropolitan area network (MAN), a portion of the Internet, a portion of the Public Switched Telephone Network (PSTN), a cellular telephone network, or a combination of two or more of these. Network 110 may include one or more networks 110.

[15] Links 150 may connect client system 130, social-networking system 160, and third-party system 170 to communication network 110 or to each other. This disclosure contemplates any suitable links 150. In particular embodiments, one or more links 150 include one or more wireline (such as for example Digital Subscriber Line (DSL) or Data Over Cable Service Interface Specification (DOCSIS)), wireless (such as for example Wi-Fi or Worldwide Interoperability for Microwave Access (WiMAX)), or optical (such as for example Synchronous Optical Network (SONET) or Synchronous Digital Hierarchy (SDH)) links. In particular embodiments, one or more links 150 each include an ad hoc network, an intranet, an extranet, a VPN, a LAN, a WLAN, a WAN, a WWAN, a MAN, a portion of the Internet, a portion of the PSTN, a cellular technology-based network, a satellite communications technology-based

network, another link 150, or a combination of two or more such links 150. Links 150 need not necessarily be the same throughout network environment 100. One or more first links 150 may differ in one or more respects from one or more second links 150.

[16] In particular embodiments, client system 130 may be an electronic device including hardware, software, or embedded logic components or a combination of two or more such components and capable of carrying out the appropriate functionalities implemented or supported by client system 130. As an example and not by way of limitation, a client system 130 may include a computer system such as a desktop computer, notebook or laptop computer, netbook, a tablet computer, e-book reader, GPS device, camera, personal digital assistant (PDA), handheld electronic device, cellular telephone, smartphone, other suitable electronic device, or any suitable combination thereof. This disclosure contemplates any suitable client systems 130. A client system 130 may enable a network user at client system 130 to access network 110. A client system 130 may enable its user to communicate with other users at other client systems 130.

[17] In particular embodiments, client system 130 may include a web browser 132, such as MICROSOFT INTERNET EXPLORER, GOOGLE CHROME or MOZILLA FIREFOX, and may have one or more add-ons, plug-ins, or other extensions, such as TOOLBAR or YAHOO TOOLBAR. A user at client system 130 may enter a Uniform Resource Locator (URL) or other address directing the web browser 132 to a particular server (such as server 162, or a server associated with a third-party system 170), and the web browser 132 may generate a Hyper Text Transfer Protocol (HTTP) request and communicate the HTTP request to server. The server may accept the HTTP request and communicate to client system 130 one or more Hyper Text Markup Language (HTML) files responsive to the HTTP request. Client system 130 may render a webpage based on the HTML files from the server for presentation to the user. This disclosure contemplates any suitable webpage files. As an example and not by way of limitation, webpages may render from HTML files, Extensible Hyper Text Markup Language (XHTML) files, or Extensible Markup Language (XML) files, according to particular needs. Such pages may also execute scripts such as, for example and without limitation, those written in

JAVASCRIPT, JAVA, MICROSOFT SILVERLIGHT, combinations of markup language and scripts such as AJAX (Asynchronous JAVASCRIPT and XML), and the like. Herein, reference to a webpage encompasses one or more corresponding webpage files (which a browser may use to render the webpage) and vice versa, where appropriate.

[18] In particular embodiments, social-networking system 160 may be a network-addressable computing system that can host an online social network. Social-networking system 160 may generate, store, receive, and send social-networking data, such as, for example, user-profile data, concept-profile data, social-graph information, or other suitable data related to the online social network. Social-networking system 160 may be accessed by the other components of network environment 100 either directly or via network 110. In particular embodiments, social-networking system 160 may include one or more servers 162. Each server 162 may be a unitary server or a distributed server spanning multiple computers or multiple datacenters. Servers 162 may be of various types, such as, for example and without limitation, web server, news server, mail server, message server, advertising server, file server, application server, exchange server, database server, proxy server, another server suitable for performing functions or processes described herein, or any combination thereof. In particular embodiments, each server 162 may include hardware, software, or embedded logic components or a combination of two or more such components for carrying out the appropriate functionalities implemented or supported by server 162. In particular embodiments, social-networking system 164 may include one or more data stores 164. Data stores 164 may be used to store various types of information. In particular embodiments, the information stored in data stores 164 may be organized according to specific data structures. In particular embodiments, each data store 164 may be a relational, columnar, correlation, or other suitable database. Although this disclosure describes or illustrates particular types of databases, this disclosure contemplates any suitable types of databases. Particular embodiments may provide interfaces that enable a client system 130, a social-networking system 160, or a third-party system 170 to manage, retrieve, modify, add, or delete, the information stored in data store 164.

[19] In particular embodiments, social-networking system 160 may store one or more social graphs in one or more data stores 164. In particular embodiments, a social graph may include multiple nodes—which may include multiple user nodes (each corresponding to a particular user) or multiple concept nodes (each corresponding to a particular concept)—and multiple edges connecting the nodes. Social-networking system 160 may provide users of the online social network the ability to communicate and interact with other users. In particular embodiments, users may join the online social network via social-networking system 160 and then add connections (e.g., relationships) to a number of other users of social-networking system 160 whom they want to be connected to. Herein, the term "friend" may refer to any other user of social-networking system 160 with whom a user has formed a connection, association, or relationship via social-networking system 160.

[20] In particular embodiments, social-networking system 160 may provide users with the ability to take actions on various types of items or objects, supported by social-networking system 160. As an example and not by way of limitation, the items and objects may include groups or social networks to which users of social-networking system 160 may belong, events or calendar entries in which a user might be interested, computer-based applications that a user may use, transactions that allow users to buy or sell items via the service, interactions with advertisements that a user may perform, or other suitable items or objects. A user may interact with anything that is capable of being represented in social-networking system 160 or by an external system of third-party system 170, which is separate from social-networking system 160 and coupled to social-networking system 160 via a network 110.

[21] In particular embodiments, social-networking system 160 may be capable of linking a variety of entities. As an example and not by way of limitation, social-networking system 160 may enable users to interact with each other as well as receive content from third-party systems 170 or other entities, or to allow users to interact with these entities through an application programming interfaces (API) or other communication channels.

[22] In particular embodiments, a third-party system 170 may include one or more types of servers, one or more data stores, one or more interfaces, including but not limited to

APIs, one or more web services, one or more content sources, one or more networks, or any other suitable components, e.g., that servers may communicate with. A third-party system 170 may be operated by a different entity from an entity operating social-networking system 160. In particular embodiments, however, social-networking system 160 and third-party systems 170 may operate in conjunction with each other to provide social-networking services to users of social-networking system 160 or third-party systems 170. In this sense, social-networking system 160 may provide a platform, or backbone, which other systems, such as third-party systems 170, may use to provide social-networking services and functionality to users across the Internet.

[23] In particular embodiments, a third-party system 170 may include a third-party content object provider. A third-party content object provider may include one or more sources of content objects, which may be communicated to a client system 130. As an example and not by way of limitation, content objects may include information regarding things or activities of interest to the user, such as, for example, movie show times, movie reviews, restaurant reviews, restaurant menus, product information and reviews, or other suitable information. As another example and not by way of limitation, content objects may include incentive content objects, such as coupons, discount tickets, gift certificates, or other suitable incentive objects.

[24] In particular embodiments, social-networking system 160 also includes user-generated content objects, which may enhance a user's interactions with social-networking system 160. User-generated content may include anything a user can add, upload, send, or "post" to social-networking system 160. As an example and not by way of limitation, a user communicates posts to social-networking system 160 from a client system 130. Posts may include data such as status updates or other textual data, location information, photos, videos, links, music or other similar data or media. Content may also be added to social-networking system 160 by a third-party through a "communication channel," such as a newsfeed or stream.

[25] In particular embodiments, social-networking system 160 may include a variety of servers, sub-systems, programs, modules, logs, and data stores. In particular embodiments, social-networking system 160 may include one or more of the following: a web server, action logger, API-request server, relevance-and-ranking engine, content-object classifier, notification

controller, action log, third-party-content-object-exposure log, inference module, authorization/privacy server, search module, advertisement-targeting module, user-interface module, user-profile store, connection store, third-party content store, or location store. Social-networking system 160 may also include suitable components such as network interfaces, security mechanisms, load balancers, failover servers, management-and-network-operations consoles, other suitable components, or any suitable combination thereof. In particular embodiments, social-networking system 160 may include one or more user-profile stores for storing user profiles. A user profile may include, for example, biographic information, demographic information, behavioral information, social information, or other types of descriptive information, such as work experience, educational history, hobbies or preferences, interests, affinities, or location. Interest information may include interests related to one or more categories. Categories may be general or specific. As an example and not by way of limitation, if a user "likes" an article about a brand of shoes the category may be the brand, or the general category of "shoes" or "clothing." A connection store may be used for storing connection information about users. The connection information may indicate users who have similar or common work experience, group memberships, hobbies, educational history, or are in any way related or share common attributes. The connection information may also include user-defined connections between different users and content (both internal and external).

[26] A web server may be used for linking social-networking system 160 to one or more client systems 130 or one or more third-party system 170 via network 110. The web server may include a mail server or other messaging functionality for receiving and routing messages between social-networking system 160 and one or more client systems 130. An API-request server may allow a third-party system 170 to access information from social-networking system 160 by calling one or more APIs. An action logger may be used to receive communications from a web server about a user's actions on or off social-networking system 160. In particular embodiments, users may be classified into particular categories of users by social-networking system 160 computationally determining one or more categories applicable to the user. As an example and not by way of limitation, social-networking system 160 may computationally

determine a category of the user based at least in part on the connection information of the connection store or actions of the action logger. In particular embodiments, social-networking system 160 may provide a base user experience (UX) for interacting with social-networking system 160 through a mobile application executed on client system 130 or website hosted by a computing system (e.g. social-networking 160 or third-party 170 system). The base UX may include one or more graphical elements of a user interface (UI) corresponding to features or functions provided to client system 130 of a user interacting with a particular computing system, such as for example social-networking system 160. Furthermore, social-networking system 160 may personalize or customize the base UX for each user based on their particular category.

[27] Personalization of the base UX may direct or adjust the base UX for individual users or all the users within a category of users. As described below, personalization of the base UX may include determining one or more modifications to one or more graphical elements of the UI relative to a base user experience (UX) based on information or interactions of each user. As an example and not by way of limitation, users classified as new users to social-networking system 160 may be provided one set of functionality when interacting with social-networking system 160. For example, social-networking system 160 may computationally determine particular users belong to a category of users that may benefit from extra guidance or explanation how to use features of the UI based on the particular users performing a number of seemingly random or contradictory actions on the UI. As described below, the UI for these users may include one or more graphical elements that correspond to a "guided tour" illustrating how to use a particular functionality.

[28] As another example, users classified as experienced users may be provided with another set of functionality. For example, social-networking system 160 may computationally determine particular users belong to a category of users that does not want guidance for particular features of the UI. For example, social-networking system 160 may computationally determine particular users belong to a category of users that does not want guidance or explanation how to use features of the UI based on the particular users dismissing or closing help windows on the UI. As described below, the UI for these users may include one or more

graphical elements that correspond to a "pop-up" window providing a brief overview illustrating how to use a particular functionality. Although this disclosure describes personalizing or customizing the base UX on a particular type of computing system, this disclosure contemplates personalizing or customizing the UX on any suitable computing system, such as for example the third-party system described above.

[29] In particular embodiments, user actions or connection information logged over a pre-determined period of time, such as for example by the action logger of social-networking system 160, may be used as training data for personalizing the base UX for individual users. In particular embodiments, personalization of the base UX may applied to all the users within a category of users. Particular information that may be used as training data may include recent actions performed by the user, a geo-location associated with the user, age, affinities, number of friends of the user, the number of times a particular application is run in the foreground, or any combination thereof. In particular embodiments, information of the user logged by the action logger of social-networking system 160 may function as training data for a machine-learning algorithm, such as for example support-vector machine (SVM), k-means, or a neural network, executed on social-networking system 160. As an example and not by way of limitation, one or more servers of social-networking system 160 may receive training data from each user interacting with social-networking system 160 and use a machine-learning algorithm to computationally determine one or more particular categories applicable to each user as described above. Furthermore, the base UX presented by social-networking system 160 may be personalized based at least in part on the training data. In particular embodiments, computational determination of the particular category associated with each user may be revaluated in response to receiving subsequent updated training data.

[30] In particular embodiments, functionality or features may be added to the base UX based at least in part on the training data of the user. As an example and not by way of limitation, particular users of social-networking system 160 that upload a large number of images to social-networking system 160 may provided access to an updated image-sharing functionality that automatically uploads and stores images. As another example, the image-sharing

functionality may be provided to users that frequently use a current image-sharing functionality. In particular embodiments, customization of the base UX may be personalized based at least in part of the particular category associated with the targeted users, as described above. As an example and not by way of limitation, the UI provided to a first category of users (e.g. experienced users) of social-networking system 160 may include one or more graphical elements corresponding to "pop-up" views explaining one or more features of the updated image-sharing functionality, while the UI provided to a second category of users (e.g. new users) may include a graphical element corresponding to a "guided tour" illustrating how to use the updated image-sharing functionality.

[31] In particular embodiments, the base UX may be customized based on a goal or objective of a computing system hosting the particular website or application. As an example and not by way of limitation, an objective of social-networking system 160 may be to increase the amount of user engagement or interaction on social-networking system 160. In particular embodiments, additional functionality may be added to the UI associated with the base UX based at least in part on an assigned value each additional functionality has in regard to the particular objective. As an example and not by way of limitation, additional functionality may be selected that has a highest assigned value relative to the particular objective. For example, a particular functionality, such as for example functionality to delete posts from a newsfeed, may be provided to users of social-networking system 160. Furthermore, the functionality to delete posts from a newsfeed may be assigned a high value in regard to the objective of increasing engagement on social-networking system 160 relative to other candidate functionality. In particular embodiments, the base UX for users provided access to the particular functionality may be modified to provide information in regard to features of the particular functionality. Furthermore, the modification of the base UX may be based on actions of the user logged by the action log as described above. As an example and not by way of limitation, the base UX of a user may include a video providing guidance illustrating how to use the particular feature based on actions classifying the user in a category of users that need extra guidance. As another example, the base UX of another user may include a pop-up view that may provide a summary of

how to use the particular feature based on actions classifying the user in a category of users that want minimal guidance.

[32] In conjunction with the action log, a third-party-content-object log may be maintained of user exposure to third-party-content objects. A notification controller may provide information regarding content objects to a client system 130. Information may be pushed to a client system 130 as notifications, or information may be pulled from client system 130 responsive to a request received from client system 130. Authorization servers may be used to enforce one or more privacy settings of the users of social-networking system 160. A privacy setting of a user determines how particular information associated with a user can be shared. The authorization server may allow users to opt in to or opt out of having their actions logged by social-networking system 160 or shared with other systems (e.g., third-party system 170), such as, for example, by setting appropriate privacy settings. Third-party-content-object stores may be used to store content objects received from third parties, such as a third-party system 170. Location stores may be used for storing location information received from client systems 130 associated with users. Advertisement-pricing modules may combine social information, the current time, location information, or other suitable information to provide relevant advertisements, in the form of notifications, to a user.

[33] In particular embodiments, one or more of the content objects of the online social network may be associated with a privacy setting. The privacy settings (or "access settings") for an object may be stored in any suitable manner, such as, for example, in association with the object, in an index on an authorization server, in another suitable manner, or any combination thereof. A privacy setting of an object may specify how the object (or particular information associated with an object) can be accessed (e.g., viewed or shared) using the online social network. Where the privacy settings for an object allow a particular user to access that object, the object may be described as being "visible" with respect to that user. As an example and not by way of limitation, a user of the online social network may specify privacy settings for a user-profile page identify a set of users that may access the work experience information on the user-profile page, thus excluding other users from accessing the information. In particular

embodiments, the privacy settings may specify a "blocked list" of users that should not be allowed to access certain information associated with the object. In other words, the blocked list may specify one or more users or entities for which an object is not visible. As an example and not by way of limitation, a user may specify a set of users that may not access photos albums associated with the user, thus excluding those users from accessing the photo albums (while also possibly allowing certain users not within the set of users to access the photo albums). In particular embodiments, privacy settings may be associated with particular social-graph elements. Privacy settings of a social-graph element, such as a node or an edge, may specify how the social-graph element, information associated with the social-graph element, or content objects associated with the social-graph element can be accessed using the online social network. As an example and not by way of limitation, a particular concept node 204 corresponding to a particular photo may have a privacy setting specifying that the photo may only be accessed by users tagged in the photo and their friends. In particular embodiments, privacy settings may allow users to opt in or opt out of having their actions logged by social-networking system 160 or shared with other systems (e.g., third-party system 170). In particular embodiments, the privacy settings associated with an object may specify any suitable granularity of permitted access or denial of access. As an example and not by way of limitation, access or denial of access may be specified for particular users (e.g., only me, my roommates, and my boss), users within a particular degrees-of-separation (e.g., friends, or friends-of-friends), user groups (e.g., the gaming club, my family), user networks (e.g., employees of particular employers, students or alumni of particular university), all users ("public"), no users ("private"), users of third-party systems 170, particular applications (e.g., third-party applications, external websites), other suitable users or entities, or any combination thereof. Although this disclosure describes using particular privacy settings in a particular manner, this disclosure contemplates using any suitable privacy settings in any suitable manner.

[34] In particular embodiments, one or more servers 162 may be authorization/privacy servers for enforcing privacy settings. In response to a request from a user (or other entity) for a particular object stored in a data store 164, social-networking system 160 may send a request to

the data store 164 for the object. The request may identify the user associated with the request and may only be sent to the user (or a client system 130 of the user) if the authorization server determines that the user is authorized to access the object based on the privacy settings associated with the object. If the requesting user is not authorized to access the object, the authorization server may prevent the requested object from being retrieved from the data store 164, or may prevent the requested object from be sent to the user. In the search query context, an object may only be generated as a search result if the querying user is authorized to access the object. In other words, the object must have a visibility that is visible to the querying user. If the object has a visibility that is not visible to the user, the object may be excluded from the search results. Although this disclosure describes enforcing privacy settings in a particular manner, this disclosure contemplates enforcing privacy settings in any suitable manner.

[35] FIGURE 2 illustrates an example method for modifying a UI. The method may start at step 300, where a computing device determines, relative to a base UX, one or more modifications to one or more graphical elements of a UI for display to a particular user. In particular embodiments, the modifications may be configured to personalize the UI individually to the particular user and may be based on a computational determination of one or more categories applicable to the particular user as described above. As an example and not by way of limitation, computation determination of a category applicable to the user may be performed through a machine-learning algorithm, as described above. Step 302, by the computing device, applying the modifications to the UI. In particular embodiments, the modifications may include a "pop-up" window in the UI corresponding to a guided tour of a particular feature. At step 304, the computing device provides the UI as modified for display to the particular user, at which point the method may end. Although this disclosure describes and illustrates particular steps of the method of FIGURE 2 as occurring in a particular order, this disclosure contemplates any suitable steps of the method of FIGURE 2 occurring in any suitable order. Particular embodiments may repeat one or more steps of the method of FIGURE 2, where appropriate. Moreover, although this disclosure describes and illustrates particular components carrying out particular steps of the method of FIGURE 2, this disclosure contemplates any suitable

combination of any suitable components carrying out any suitable steps of the method of FIGURE 2.

[36] FIGURE 3 illustrates an example mobile computing device. In particular embodiments, the client system may be a mobile computing device 10 as described above. This disclosure contemplates mobile computing device 10 taking any suitable physical form. In particular embodiments, mobile computing device 10 may be a computing system as described below. As example and not by way of limitation, mobile computing device 10 may be a single-board computer system (SBC) (such as, for example, a computer-on-module (COM) or system-on-module (SOM)), a laptop or notebook computer system, a mobile telephone, a smartphone, a personal digital assistant (PDA), a tablet computer system, or a combination of two or more of these. In particular embodiments, mobile computing device 10 may have a touch sensor 12 as an input component. In the example of FIGURE 3, touch sensor 12 is incorporated on a front surface of mobile device 10. In the case of capacitive touch sensors, there may be two types of electrodes: transmitting and receiving. These electrodes may be connected to a controller designed to drive the transmitting electrodes with electrical pulses and measure the changes in capacitance from the receiving electrodes caused by a touch or proximity input. In the example of FIGURE 3, one or more antennae 14A-B may be incorporated into one or more sides of mobile computing device 10. Antennae 14A-B are components that convert electric current into radio waves, and vice versa. During transmission of signals, a transmitter applies an oscillating radio frequency (RF) electric current to terminals of antenna 14A-B, and antenna 14A-B radiates the energy of the applied the current as electromagnetic (EM) waves. During reception of signals, antennae 14A-B convert the power of an incoming EM wave into a voltage at the terminals of antennae 14A-B. The voltage may be transmitted to a receiver for amplification.

[37] Mobile computing device 10 many include a communication component coupled to antennae 14A-B for communicating with an Ethernet or other wire-based network or a wireless NIC (WNIC), wireless adapter for communicating with a wireless network, such as for example a WI-FI network or modem for communicating with a cellular network, such third generation mobile telecommunications (3G), or Long Term Evolution (LTE) network. This

disclosure contemplates any suitable network and any suitable communication component for it. As an example and not by way of limitation, mobile computing device 10 may communicate with an ad hoc network, a personal area network (PAN), a local area network (LAN), a wide area network (WAN), a metropolitan area network (MAN), or one or more portions of the Internet or a combination of two or more of these. One or more portions of one or more of these networks may be wired or wireless. As another example, mobile computing device 10 may communicate with a wireless PAN (WPAN) (such as, for example, a BLUETOOTH WPAN), a WI-FI network, a WI-MAX network, a cellular telephone network (such as, for example, a Global System for Mobile Communications (GSM), 3G, or LTE network), or other suitable wireless network or a combination of two or more of these. Mobile computing device 10 may include any suitable communication component for any of these networks, where appropriate.

[38] In particular embodiments, a user of mobile computing device 10 may interact with a computing system, such as for example, a social-networking system through an application executed by a processor of mobile computing device 10. Furthermore, the application executed on mobile computing device 10 may natively provide a UI displayed on mobile computing device 10. In particular embodiments, the application executed on mobile computing device 10 may provide the UI through a browser-supported programming language, such as for example, JAVASCRIPT combined with HTML provided by a computing system (e.g. a social-networking system). As described above, the UI of the base UX provided to the user of mobile computing device 10 may be personalized for each user or each user within a category of users. As an example and not by way of limitation, interactions of the user with the UI displayed on mobile computing device 10 may be logged by the action logger of a social-networking system and modifications of the UI may be determined based at least in part on the interactions through the UI. Furthermore, the modifications of the base UX for a particular user may vary based on the type of client system used to interact with the computing system. For example, the UX for a particular user may differ when interaction to a computing system through website displayed on a personal computer compared to an application executed on mobile computing device 10. Although this disclosure illustrates and describes a particular type of

computing device, this disclosure contemplates modifying the UX, that includes a UI, of any suitable type of client system, such as for example, a personal computer, tablet computer, connected television, or a smartphone, as described above.

[39] FIGURE 4 illustrates an example social graph. In particular embodiments, social-networking system 160 may store one or more social graphs 200 in one or more data stores. In particular embodiments, social graph 200 may include multiple nodes—which may include multiple user nodes 202 or multiple concept nodes 204—and multiple edges 206 connecting the nodes. Example social graph 200 illustrated in FIGURE 4 is shown, for didactic purposes, in a two-dimensional visual map representation. In particular embodiments, a social-networking system 160, client system 130, or third-party system 170 may access social graph 200 and related social-graph information for suitable applications. The nodes and edges of social graph 200 may be stored as data objects, for example, in a data store (such as a social-graph database). Such a data store may include one or more searchable or queryable indexes of nodes or edges of social graph 200.

[40] In particular embodiments, a user node 202 may correspond to a user of social-networking system 160. As an example and not by way of limitation, a user may be an individual (human user), an entity (e.g. an enterprise, business, or third-party application), or a group (e.g. of individuals or entities) that interacts or communicates with or over social-networking system 160. In particular embodiments, when a user registers for an account with social-networking system 160, social-networking system 160 may create a user node 202 corresponding to the user, and store the user node 202 in one or more data stores. Users and user nodes 202 described herein may, where appropriate, refer to registered users and user nodes 202 associated with registered users. In addition or as an alternative, users and user nodes 202 described herein may, where appropriate, refer to users that have not registered with social-networking system 160. In particular embodiments, a user node 202 may be associated with information provided by a user or information gathered by various systems, including social-networking system 160. As an example and not by way of limitation, a user may provide his or her name, profile picture, contact information, birth date, sex, marital status, family status, employment, education

background, preferences, interests, or other demographic information. In particular embodiments, a user node 202 may be associated with one or more data objects corresponding to information associated with a user. In particular embodiments, a user node 202 may correspond to one or more webpages. As described above, users associated with user nodes 202 may be classified into particular categories based at least in part on information associated with user nodes 202. As an example and not by way of limitation, users may be categorized based at least in part on age, location, number of friends, or any combination thereof. Furthermore, the users may be classified based on information associated with user nodes 202 in conjunction with other information associated with the users stored in an action log, as described above, such as for example recent actions performed by users on social-networking system 160.

[41] In particular embodiments, a concept node 204 may correspond to a concept. As an example and not by way of limitation, a concept may correspond to a place (such as, for example, a movie theater, restaurant, landmark, or city); a website (such as, for example, a website associated with social-network system 160 or a third-party website associated with a web-application server); an entity (such as, for example, a person, business, group, sports team, or celebrity); a resource (such as, for example, an audio file, video file, digital photo, text file, structured document, or application) which may be located within social-networking system 160 or on an external server, such as a web-application server; real or intellectual property (such as, for example, a sculpture, painting, movie, game, song, idea, photograph, or written work); a game; an activity; an idea or theory; another suitable concept; or two or more such concepts. A concept node 204 may be associated with information of a concept provided by a user or information gathered by various systems, including social-networking system 160. As an example and not by way of limitation, information of a concept may include a name or a title; one or more images (e.g. an image of the cover page of a book); a location (e.g. an address or a geographical location); a website (which may be associated with a URL); contact information (e.g. a phone number or an email address); other suitable concept information; or any suitable combination of such information. In particular embodiments, a concept node 204 may be associated with one or more data objects corresponding to information associated with concept

node 204. In particular embodiments, a concept node 204 may correspond to one or more webpages.

[42] In particular embodiments, a node in social graph 200 may represent or be represented by a webpage (which may be referred to as a "profile page"). Profile pages may be hosted by or accessible to social-networking system 160. Profile pages may also be hosted on third-party websites associated with a third-party server 170. As an example and not by way of limitation, a profile page corresponding to a particular external webpage may be the particular external webpage and the profile page may correspond to a particular concept node 204. Profile pages may be viewable by all or a selected subset of other users. As an example and not by way of limitation, a user node 202 may have a corresponding user-profile page in which the corresponding user may add content, make declarations, or otherwise express himself or herself. As another example and not by way of limitation, a concept node 204 may have a corresponding concept-profile page in which one or more users may add content, make declarations, or express themselves, particularly in relation to the concept corresponding to concept node 204.

[43] In particular embodiments, a concept node 204 may represent a third-party webpage or resource hosted by a third-party system 170. The third-party webpage or resource may include, among other elements, content, a selectable or other icon, or other inter-actable object (which may be implemented, for example, in JavaScript, AJAX, or PHP codes) representing an action or activity. As an example and not by way of limitation, a third-party webpage may include a selectable icon such as "like," "check in," "eat," "recommend," or another suitable action or activity. A user viewing the third-party webpage may perform an action by selecting one of the icons (e.g. "eat"), causing a client system 130 to transmit to social-networking system 160 a message indicating the user's action. In response to the message, social-networking system 160 may create an edge (e.g. an "eat" edge) between a user node 202 corresponding to the user and a concept node 204 corresponding to the third-party webpage or resource and store edge 206 in one or more data stores.

[44] In particular embodiments, a pair of nodes in social graph 200 may be connected to each other by one or more edges 206. An edge 206 connecting a pair of nodes may represent a

relationship between the pair of nodes. In particular embodiments, an edge 206 may include or represent one or more data objects or attributes corresponding to the relationship between a pair of nodes. As an example and not by way of limitation, a first user may indicate that a second user is a "friend" of the first user. In response to this indication, social-networking system 160 may transmit a "friend request" to the second user. If the second user confirms the "friend request," social-networking system 160 may create an edge 206 connecting the first user's user node 202 to the second user's user node 202 in social graph 200 and store edge 206 as social-graph information in one or more of data stores 24. In the example of FIGURE 4, social graph 200 includes an edge 206 indicating a friend relation between user nodes 202 of user "A" and user "B" and an edge indicating a friend relation between user nodes 202 of user "C" and user "B." Although this disclosure describes or illustrates particular edges 206 with particular attributes connecting particular user nodes 202, this disclosure contemplates any suitable edges 206 with any suitable attributes connecting user nodes 202. As an example and not by way of limitation, an edge 206 may represent a friendship, family relationship, business or employment relationship, fan relationship, follower relationship, visitor relationship, subscriber relationship, superior/subordinate relationship, reciprocal relationship, non-reciprocal relationship, another suitable type of relationship, or two or more such relationships. Moreover, although this disclosure generally describes nodes as being connected, this disclosure also describes users or concepts as being connected. Herein, references to users or concepts being connected may, where appropriate, refer to the nodes corresponding to those users or concepts being connected in social graph 200 by one or more edges 206.

[45] In particular embodiments, an edge 206 between a user node 202 and a concept node 204 may represent a particular action or activity performed by a user associated with user node 202 toward a concept associated with a concept node 204. As an example and not by way of limitation, as illustrated in FIGURE 4, a user may "like," "attended," "played," "listened," "cooked," "worked at," or "watched" a concept, each of which may correspond to a edge type or subtype. A concept-profile page corresponding to a concept node 204 may include, for example, a selectable "check in" icon (such as, for example, a clickable "check in" icon) or a selectable

"like" icon. As another example, the socialized dash of a client system may include a selectable "check in" icon (such as, for example, a clickable "check in" icon) or a selectable "like" icon. Similarly, after a user clicks these icons, social-networking system 160 may create a "like" edge or a "check in" edge in response to a user's action corresponding to a respective action. As another example and not by way of limitation, a user (user "C") may listen to a particular song ("Ramble On") using a particular application (SPOTIFY, which is an online music application). In this case, social-networking system 160 may create a "listened" edge 206 and a "used" edge (as illustrated in FIGURE 4) between user nodes 202 corresponding to the user and concept nodes 204 corresponding to the song and application to indicate that the user listened to the song and used the application. Moreover, social-networking system 160 may create a "played" edge 206 (as illustrated in FIGURE 4) between concept nodes 204 corresponding to the song and the application to indicate that the particular song was played by the particular application. In this case, "played" edge 206 corresponds to an action performed by an external application (SPOTIFY) on an external audio file (the song "Imagine"). Although this disclosure describes particular edges 206 with particular attributes connecting user nodes 202 and concept nodes 204, this disclosure contemplates any suitable edges 206 with any suitable attributes connecting user nodes 202 and concept nodes 204. Moreover, although this disclosure describes edges between a user node 202 and a concept node 204 representing a single relationship, this disclosure contemplates edges between a user node 202 and a concept node 204 representing one or more relationships. As an example and not by way of limitation, an edge 206 may represent both that a user likes and has used at a particular concept. Alternatively, another edge 206 may represent each type of relationship (or multiples of a single relationship) between a user node 202 and a concept node 204 (as illustrated in FIGURE 4 between user node 202 for user "E" and concept node 204 for "SPOTIFY").

[46] In particular embodiments, social-networking system 160 may create an edge 206 between a user node 202 and a concept node 204 in social graph 200. As an example and not by way of limitation, a user viewing a concept-profile page (such as, for example, by using a web browser or a special-purpose application hosted by the user's client system 130) may indicate

that he or she likes the concept represented by the concept node 204 by clicking or selecting a "Like" icon, which may cause the user's client system 130 to transmit to social-networking system 160 a message indicating the user's liking of the concept associated with the concept-profile page. In response to the message, social-networking system 160 may create an edge 206 between user node 202 associated with the user and concept node 204, as illustrated by "like" edge 206 between the user and concept node 204. In particular embodiments, social-networking system 160 may store an edge 206 in one or more data stores. In particular embodiments, an edge 206 may be automatically formed by social-networking system 160 in response to a particular user action. As an example and not by way of limitation, if a first user uploads a picture, watches a movie, or listens to a song, an edge 206 may be formed between user node 202 corresponding to the first user and concept nodes 204 corresponding to those concepts. Although this disclosure describes forming particular edges 206 in particular manners, this disclosure contemplates forming any suitable edges 206 in any suitable manner.

[47] In particular embodiments, social-networking system 160 may determine the social-graph affinity (which may be referred to herein as "affinity") of various social-graph entities for each other. Affinity may represent the strength of a relationship or level of interest between particular objects associated with the online social network, such as users, concepts, content, actions, advertisements, other objects associated with the online social network, or any suitable combination thereof. Affinity may also be determined with respect to objects associated with third-party systems 170 or other suitable systems. An overall affinity for a social-graph entity for each user, subject matter, or type of content may be established. The overall affinity may change based on continued monitoring of the actions or relationships associated with the social-graph entity. Although this disclosure describes determining particular affinities in a particular manner, this disclosure contemplates determining any suitable affinities in any suitable manner.

[48] In particular embodiments, social-networking system 160 may measure or quantify social-graph affinity using an affinity coefficient (which may be referred to herein as "coefficient"). The coefficient may represent or quantify the strength of a relationship between

particular objects associated with the online social network. The coefficient may also represent a probability or function that measures a predicted probability that a user will perform a particular action based on the user's interest in the action. In this way, a user's future actions may be predicted based on the user's prior actions, where the coefficient may be calculated at least in part a the history of the user's actions. Coefficients may be used to predict any number of actions, which may be within or outside of the online social network. As an example and not by way of limitation, these actions may include various types of communications, such as sending messages, posting content, or commenting on content; various types of a observation actions, such as accessing or viewing profile pages, media, or other suitable content; various types of coincidence information about two or more social-graph entities, such as being in the same group, tagged in the same photograph, checked-in at the same location, or attending the same event; or other suitable actions. Although this disclosure describes measuring affinity in a particular manner, this disclosure contemplates measuring affinity in any suitable manner.

[49] In particular embodiments, social-networking system 160 may use a variety of factors to calculate a coefficient. These factors may include, for example, user actions, types of relationships between objects, location information, other suitable factors, or any combination thereof. In particular embodiments, different factors may be weighted differently when calculating the coefficient. The weights for each factor may be static or the weights may change according to, for example, the user, the type of relationship, the type of action, the user's location, and so forth. Ratings for the factors may be combined according to their weights to determine an overall coefficient for the user. As an example and not by way of limitation, particular user actions may be assigned both a rating and a weight while a relationship associated with the particular user action is assigned a rating and a correlating weight (e.g., so the weights total 100%). To calculate the coefficient of a user towards a particular object, the rating assigned to the user's actions may comprise, for example, 60% of the overall coefficient, while the relationship between the user and the object may comprise 40% of the overall coefficient. In particular embodiments, the social-networking system 160 may consider a variety of variables when determining weights for various factors used to calculate a coefficient, such as, for

example, the time since information was accessed, decay factors, frequency of access, relationship to information or relationship to the object about which information was accessed, relationship to social-graph entities connected to the object, short- or long-term averages of user actions, user feedback, other suitable variables, or any combination thereof. As an example and not by way of limitation, a coefficient may include a decay factor that causes the strength of the signal provided by particular actions to decay with time, such that more recent actions are more relevant when calculating the coefficient. The ratings and weights may be continuously updated based on continued tracking of the actions upon which the coefficient is based. Any type of process or algorithm may be employed for assigning, combining, averaging, and so forth the ratings for each factor and the weights assigned to the factors. In particular embodiments, social-networking system 160 may determine coefficients using machine-learning algorithms trained on historical actions and past user responses, or data farmed from users by exposing them to various options and measuring responses. Although this disclosure describes calculating coefficients in a particular manner, this disclosure contemplates calculating coefficients in any suitable manner.

[50] In particular embodiments, social-networking system 160 may calculate a coefficient based on a user's actions. Social-networking system 160 may monitor such actions on the online social network, on a third-party system 170, on other suitable systems, or any combination thereof. Any suitable type of user actions may be tracked or monitored. Typical user actions include viewing profile pages, creating or posting content, interacting with content, tagging or being tagged in images, joining groups, listing and confirming attendance at events, checking-in at locations, liking particular pages, creating pages, and performing other tasks that facilitate social action. In particular embodiments, social-networking system 160 may calculate a coefficient based on the user's actions with particular types of content. The content may be associated with the online social network, a third-party system 170, or another suitable system. The content may include users, profile pages, posts, news stories, headlines, instant messages, chat room conversations, emails, advertisements, pictures, video, music, other suitable objects, or any combination thereof. Social-networking system 160 may analyze a user's actions to determine whether one or more of the actions indicate an affinity for subject matter, content,

other users, and so forth. As an example and not by way of limitation, if a user may make frequently posts content related to "coffee" or variants thereof, social-networking system 160 may determine the user has a high coefficient with respect to the concept "coffee". Particular actions or types of actions may be assigned a higher weight and/or rating than other actions, which may affect the overall calculated coefficient. As an example and not by way of limitation, if a first user emails a second user, the weight or the rating for the action may be higher than if the first user simply views the user-profile page for the second user.

[51] In particular embodiments, social-networking system 160 may calculate a coefficient based on the type of relationship between particular objects. Referencing the social graph 200, social-networking system 160 may analyze the number and/or type of edges 206 connecting particular user nodes 202 and concept nodes 204 when calculating a coefficient. As an example and not by way of limitation, user nodes 202 that are connected by a spouse-type edge (representing that the two users are married) may be assigned a higher coefficient than a user nodes 202 that are connected by a friend-type edge. In other words, depending upon the weights assigned to the actions and relationships for the particular user, the overall affinity may be determined to be higher for content about the user's spouse than for content about the user's friend. In particular embodiments, the relationships a user has with another object may affect the weights and/or the ratings of the user's actions with respect to calculating the coefficient for that object. As an example and not by way of limitation, if a user is tagged in first photo, but merely likes a second photo, social-networking system 160 may determine that the user has a higher coefficient with respect to the first photo than the second photo because having a tagged-in-type relationship with content may be assigned a higher weight and/or rating than having a like-type relationship with content. In particular embodiments, social-networking system 160 may calculate a coefficient for a first user based on the relationship one or more second users have with a particular object. In other words, the connections and coefficients other users have with an object may affect the first user's coefficient for the object. As an example and not by way of limitation, if a first user is connected to or has a high coefficient for one or more second users, and those second users are connected to or have a high coefficient for a particular object, social-

networking system 160 may determine that the first user should also have a relatively high coefficient for the particular object. In particular embodiments, the coefficient may be based on the degree of separation between particular objects. The lower coefficient may represent the decreasing likelihood that the first user will share an interest in content objects of the user that is indirectly connected to the first user in the social graph #00. As an example and not by way of limitation, social-graph entities that are closer in the social graph #00 (i.e., fewer degrees of separation) may have a higher coefficient than entities that are further apart in the social graph #00.

[52] In particular embodiments, social-networking system 160 may calculate a coefficient based on location information. Objects that are geographically closer to each other may be considered to be more related or of more interest to each other than more distant objects. In particular embodiments, the coefficient of a user towards a particular object may be based on the proximity of the object's location to a current location associated with the user (or the location of a client system 130 of the user). A first user may be more interested in other users or concepts that are closer to the first user. As an example and not by way of limitation, if a user is one mile from an airport and two miles from a gas station, social-networking system 160 may determine that the user has a higher coefficient for the airport than the gas station based on the proximity of the airport to the user.

[53] In particular embodiments, social-networking system 160 may perform particular actions with respect to a user based on coefficient information. Coefficients may be used to predict whether a user will perform a particular action based on the user's interest in the action. A coefficient may be used when generating or presenting any type of objects to a user, such as advertisements, search results, news stories, media, messages, notifications, or other suitable objects. The coefficient may also be utilized to rank and order such objects, as appropriate. In this way, social-networking system 160 may provide information that is relevant to user's interests and current circumstances, increasing the likelihood that they will find such information of interest. In particular embodiments, social-networking system 160 may generate content based on coefficient information. Content objects may be provided or selected based on coefficients

specific to a user. As an example and not by way of limitation, the coefficient may be used to generate media for the user, where the user may be presented with media for which the user has a high overall coefficient with respect to the media object. As another example and not by way of limitation, the coefficient may be used to generate advertisements for the user, where the user may be presented with advertisements for which the user has a high overall coefficient with respect to the advertised object. In particular embodiments, social-networking system 160 may generate search results based on coefficient information. Search results for a particular user may be scored or ranked based on the coefficient associated with the search results with respect to the querying user. As an example and not by way of limitation, search results corresponding to objects with higher coefficients may be ranked higher on a search-results page than results corresponding to objects having lower coefficients.

[54] In particular embodiments, social-networking system 160 may calculate a coefficient in response to a request for a coefficient from a particular system or process. To predict the likely actions a user may take (or may be the subject of) in a given situation, any process may request a calculated coefficient for a user. The request may also include a set of weights to use for various factors used to calculate the coefficient. This request may come from a process running on the online social network, from a third-party system 170 (e.g., via an API or other communication channel), or from another suitable system. In response to the request, social-networking system 160 may calculate the coefficient (or access the coefficient information if it has previously been calculated and stored). In particular embodiments, social-networking system 160 may measure an affinity with respect to a particular process. Different processes (both internal and external to the online social network) may request a coefficient for a particular object or set of objects. Social-networking system 160 may provide a measure of affinity that is relevant to the particular process that requested the measure of affinity. In this way, each process receives a measure of affinity that is tailored for the different context in which the process will use the measure of affinity.

[55] In connection with social-graph affinity and affinity coefficients, particular embodiments may utilize one or more systems, components, elements, functions, methods,

operations, or steps disclosed in U.S. Patent Application No. 11/503093, filed 11 August 2006, U.S. Patent Application No. 12/977027, filed 22 December 2010, U.S. Patent Application No. 12/978265, filed 23 December 2010, and U.S. Patent Application No. 13/632869, field 01 October 2012, each of which is incorporated by reference.

[56] FIGURE 5 illustrates example computing system. In particular embodiments, one or more computer systems 60 perform one or more steps of one or more methods described or illustrated herein. In particular embodiments, one or more computer systems 60 provide functionality described or illustrated herein. In particular embodiments, software running on one or more computer systems 60 performs one or more steps of one or more methods described or illustrated herein or provides functionality described or illustrated herein. Particular embodiments include one or more portions of one or more computer systems 60. Herein, reference to a computer system may encompass a computing device, where appropriate. Moreover, reference to a computer system may encompass one or more computer systems, where appropriate.

[57] This disclosure contemplates any suitable number of computer systems 60. This disclosure contemplates computer system 60 taking any suitable physical form. As example and not by way of limitation, computer system 60 may be an embedded computer system, a system-on-chip (SOC), a single-board computer system (SBC) (such as, for example, a computer-on-module (COM) or system-on-module (SOM)), a desktop computer system, a laptop or notebook computer system, an interactive kiosk, a mainframe, a mesh of computer systems, a mobile telephone, a personal digital assistant (PDA), a server, a tablet computer system, or a combination of two or more of these. Where appropriate, computer system 60 may include one or more computer systems 60; be unitary or distributed; span multiple locations; span multiple machines; span multiple data centers; or reside in a cloud, which may include one or more cloud components in one or more networks. Where appropriate, one or more computer systems 60 may perform without substantial spatial or temporal limitation one or more steps of one or more methods described or illustrated herein. As an example and not by way of limitation, one or more computer systems 60 may perform in real time or in batch mode one or more steps of one or

more methods described or illustrated herein. One or more computer systems 60 may perform at different times or at different locations one or more steps of one or more methods described or illustrated herein, where appropriate.

[58] In particular embodiments, computer system 60 includes a processor 62, memory 64, storage 66, an input/output (I/O) interface 68, a communication interface 70, and a bus 72. Although this disclosure describes and illustrates a particular computer system having a particular number of particular components in a particular arrangement, this disclosure contemplates any suitable computer system having any suitable number of any suitable components in any suitable arrangement.

[59] In particular embodiments, processor 62 includes hardware for executing instructions, such as those making up a computer program. As an example and not by way of limitation, to execute instructions, processor 62 may retrieve (or fetch) the instructions from an internal register, an internal cache, memory 64, or storage 66; decode and execute them; and then write one or more results to an internal register, an internal cache, memory 64, or storage 66. In particular embodiments, processor 62 may include one or more internal caches for data, instructions, or addresses. This disclosure contemplates processor 62 including any suitable number of any suitable internal caches, where appropriate. As an example and not by way of limitation, processor 62 may include one or more instruction caches, one or more data caches, and one or more translation lookaside buffers (TLBs). Instructions in the instruction caches may be copies of instructions in memory 64 or storage 66, and the instruction caches may speed up retrieval of those instructions by processor 62. Data in the data caches may be copies of data in memory 64 or storage 66 for instructions executing at processor 62 to operate on; the results of previous instructions executed at processor 62 for access by subsequent instructions executing at processor 62 or for writing to memory 64 or storage 66; or other suitable data. The data caches may speed up read or write operations by processor 62. The TLBs may speed up virtual-address translation for processor 62. In particular embodiments, processor 62 may include one or more internal registers for data, instructions, or addresses. This disclosure contemplates processor 62 including any suitable number of any suitable internal registers, where appropriate. Where

appropriate, processor 62 may include one or more arithmetic logic units (ALUs); be a multi-core processor; or include one or more processors 62. Although this disclosure describes and illustrates a particular processor, this disclosure contemplates any suitable processor.

[60] In particular embodiments, memory 64 includes main memory for storing instructions for processor 62 to execute or data for processor 62 to operate on. As an example and not by way of limitation, computer system 60 may load instructions from storage 66 or another source (such as, for example, another computer system 60) to memory 64. Processor 62 may then load the instructions from memory 64 to an internal register or internal cache. To execute the instructions, processor 62 may retrieve the instructions from the internal register or internal cache and decode them. During or after execution of the instructions, processor 62 may write one or more results (which may be intermediate or final results) to the internal register or internal cache. Processor 62 may then write one or more of those results to memory 64. In particular embodiments, processor 62 executes only instructions in one or more internal registers or internal caches or in memory 64 (as opposed to storage 66 or elsewhere) and operates only on data in one or more internal registers or internal caches or in memory 64 (as opposed to storage 66 or elsewhere). One or more memory buses (which may each include an address bus and a data bus) may couple processor 62 to memory 64. Bus 72 may include one or more memory buses, as described below. In particular embodiments, one or more memory management units (MMUs) reside between processor 62 and memory 64 and facilitate accesses to memory 64 requested by processor 62. In particular embodiments, memory 64 includes random access memory (RAM). This RAM may be volatile memory, where appropriate Where appropriate, this RAM may be dynamic RAM (DRAM) or static RAM (SRAM). Moreover, where appropriate, this RAM may be single-ported or multi-ported RAM. This disclosure contemplates any suitable RAM. Memory 64 may include one or more memories 64, where appropriate. Although this disclosure describes and illustrates particular memory, this disclosure contemplates any suitable memory.

[61] In particular embodiments, storage 66 includes mass storage for data or instructions. As an example and not by way of limitation, storage 66 may include a hard disk drive (HDD), a floppy disk drive, flash memory, an optical disc, a magneto-optical disc,

magnetic tape, or a Universal Serial Bus (USB) drive or a combination of two or more of these. Storage 66 may include removable or non-removable (or fixed) media, where appropriate. Storage 66 may be internal or external to computer system 60, where appropriate. In particular embodiments, storage 66 is non-volatile, solid-state memory. In particular embodiments, storage 66 includes read-only memory (ROM). Where appropriate, this ROM may be mask-programmed ROM, programmable ROM (PROM), erasable PROM (EPROM), electrically erasable PROM (EEPROM), electrically alterable ROM (EAROM), or flash memory or a combination of two or more of these. This disclosure contemplates mass storage 66 taking any suitable physical form. Storage 66 may include one or more storage control units facilitating communication between processor 62 and storage 66, where appropriate. Where appropriate, storage 66 may include one or more storages 66. Although this disclosure describes and illustrates particular storage, this disclosure contemplates any suitable storage.

[62] In particular embodiments, I/O interface 68 includes hardware, software, or both providing one or more interfaces for communication between computer system 60 and one or more I/O devices. Computer system 60 may include one or more of these I/O devices, where appropriate. One or more of these I/O devices may enable communication between a person and computer system 60. As an example and not by way of limitation, an I/O device may include a keyboard, keypad, microphone, monitor, mouse, printer, scanner, speaker, still camera, stylus, tablet, touch screen, trackball, video camera, another suitable I/O device or a combination of two or more of these. An I/O device may include one or more sensors. This disclosure contemplates any suitable I/O devices and any suitable I/O interfaces 68 for them. Where appropriate, I/O interface 68 may include one or more device or software drivers enabling processor 62 to drive one or more of these I/O devices. I/O interface 68 may include one or more I/O interfaces 68, where appropriate. Although this disclosure describes and illustrates a particular I/O interface, this disclosure contemplates any suitable I/O interface.

[63] In particular embodiments, communication interface 70 includes hardware, software, or both providing one or more interfaces for communication (such as for example, packet-based communication) between computer system 60 and one or more other computer

systems 60 or one or more networks. As an example and not by way of limitation, communication interface 70 may include a network interface controller (NIC) or network adapter for communicating with an Ethernet or other wire-based network or a wireless NIC (WNIC) or wireless adapter for communicating with a wireless network, such as a WI-FI network. This disclosure contemplates any suitable network and any suitable communication interface 70 for it. As an example and not by way of limitation, computer system 60 may communicate with an ad hoc network, a personal area network (PAN), a local area network (LAN), a wide area network (WAN), a metropolitan area network (MAN), or one or more portions of the Internet or a combination of two or more of these. One or more portions of one or more of these networks may be wired or wireless. As an example, computer system 60 may communicate with a wireless PAN (WPAN) (such as for example, a BLUETOOTH WPAN), a WI-FI network, a WI-MAX network, a cellular telephone network (such as, for example, a Global System for Mobile Communications (GSM) network), or other suitable wireless network or a combination of two or more of these. Computer system 60 may include any suitable communication interface 70 for any of these networks, where appropriate. Communication interface 70 may include one or more communication interfaces 70, where appropriate. Although this disclosure describes and illustrates a particular communication interface, this disclosure contemplates any suitable communication interface.

[64] In particular embodiments, bus 72 includes hardware, software, or both coupling components of computer system 60 to each other. As an example and not by way of limitation, bus 72 may include an Accelerated Graphics Port (AGP) or other graphics bus, an Enhanced Industry Standard Architecture (EISA) bus, a front-side bus (FSB), a HYPERTRANSPORT (HT) interconnect, an Industry Standard Architecture (ISA) bus, an INFINIBAND interconnect, a low-pin-count (LPC) bus, a memory bus, a Micro Channel Architecture (MCA) bus, a Peripheral Component Interconnect (PCI) bus, a PCI-Express (PCIe) bus, a serial advanced technology attachment (SATA) bus, a Video Electronics Standards Association local (VLB) bus, or another suitable bus or a combination of two or more of these. Bus 72 may include one or

more buses 72, where appropriate. Although this disclosure describes and illustrates a particular bus, this disclosure contemplates any suitable bus or interconnect.

[65] Herein, a computer-readable non-transitory storage medium or media may include one or more semiconductor-based or other integrated circuits (ICs) (such, as for example, field-programmable gate arrays (FPGAs) or application-specific ICs (ASICs)), hard disk drives (HDDs), hybrid hard drives (HHDs), optical discs, optical disc drives (ODDs), magneto-optical discs, magneto-optical drives, floppy diskettes, floppy disk drives (FDDs), magnetic tapes, solid-state drives (SSDs), RAM-drives, SECURE DIGITAL cards or drives, any other suitable computer-readable non-transitory storage media, or any suitable combination of two or more of these, where appropriate. A computer-readable non-transitory storage medium may be volatile, non-volatile, or a combination of volatile and non-volatile, where appropriate.

[66] Herein, "or" is inclusive and not exclusive, unless expressly indicated otherwise or indicated otherwise by context. Therefore, herein, "A or B" means "A, B, or both," unless expressly indicated otherwise or indicated otherwise by context. Moreover, "and" is both joint and several, unless expressly indicated otherwise or indicated otherwise by context. Therefore, herein, "A and B" means "A and B, jointly or severally," unless expressly indicated otherwise or indicated otherwise by context.

[67] The scope of this disclosure encompasses all changes, substitutions, variations, alterations, and modifications to the example embodiments described or illustrated herein that a person having ordinary skill in the art would comprehend. The scope of this disclosure is not limited to the example embodiments described or illustrated herein. Moreover, although this disclosure describes and illustrates respective embodiments herein as including particular components, elements, functions, operations, or steps, any of these embodiments may include any combination or permutation of any of the components, elements, functions, operations, or steps described or illustrated anywhere herein that a person having ordinary skill in the art would comprehend. Furthermore, reference in the appended claims to an apparatus or system or a component of an apparatus or system being adapted to, arranged to, capable of, configured to, enabled to, operable to, or operative to perform a particular function encompasses that apparatus,

system, component, whether or not it or that particular function is activated, turned on, or unlocked, as long as that apparatus, system, or component is so adapted, arranged, capable, configured, enabled, operable, or operative.

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The claims defining the invention are as follows:

1. A method comprising:

by a computing device, accessing a base user experience (UX) of a social-networking system comprising a user interface (UI) corresponding to one or more features of the social-networking system;

by the computing device, computationally determining one or more user categories based at least in part on information associated with previous interactions by a plurality of users with the social-networking system;

by the computing device, classifying a particular user into one or more of the user categories based at least in part on the interactions of the particular user with the social-networking system, wherein the classification comprises applying a machine-learning algorithm to the interactions of the particular user, and wherein the machine-learning algorithm is trained using the previous interactions by the plurality of users;

by the computing device, determining, relative to the base UX, one or more modifications comprising an addition of one or more graphical elements of the UI for display to the particular user, one or more of the graphical elements comprising a guided tour illustrating one or more of the features of the UI, the modifications being configured to personalize the UI individually to the particular user based at least in part on the computational determination of one or more of the user categories applicable to the particular user;

by the computing device, assigning a value to a particular functionality based at least in part on an objective of a computing system comprising the computing device;

by the computing device, selecting one or more of the graphical elements corresponding to the particular functionality with a highest value relative to the objective;

by the computing device, applying the modifications to the UI; and

by the computing device, providing the UI as modified for display to the particular user.

2. The method of Claim 1, wherein the computational determination is further based at least in part on information of a client device associated with the particular user used to interact with the social-networking system.

3. The method of either one of Claim 1 and Claim 2, wherein the user categories are further based on information associated with the plurality of users comprising a location, age, affinities, or number of friends.

4. The method of Claim 3, wherein the information associated with the plurality of users is stored on a social graph of a social-networking system, the social graph comprising a plurality of nodes and edges connecting the nodes, at least one node in the social graph corresponding to the particular user.

5. The method of any one of Claims 1 to 4, further comprising accessing a log storing the interactions of the plurality of users with the social-networking system.

6. One or more computer-readable non-transitory storage media embodying software configured when executed to:

access a base user experience (UX) of a social-networking system comprising a user interface (UI) corresponding to one or more features of the social-networking system;

computationally determine one or more user categories based at least in part on information associated with previous interactions by a plurality of users with the social-networking system;

classify a particular user into one or more of the user categories based at least in part on the interactions of the particular user with the social-networking system, wherein the classification comprises applying a machine-learning algorithm to the interactions of the particular user, and wherein the machine-learning algorithm is trained using the previous interactions by the plurality of users;

determine, relative to the base UX, one or more modifications comprising an addition of one or more graphical elements of the UI for display to the particular user, one or more of the graphical elements comprising a guided tour illustrating one or more of the features of the UI, the modifications being configured to personalize the UI individually to the particular user based at least in part on the computational determination of one or more of the user categories applicable to the particular user;

assign a value to a particular functionality based at least in part on an objective of a computing system;

select one or more of the graphical elements corresponding to the particular functionality with a highest value relative to the objective;

apply the modifications to the UI; and

provide the UI as modified for display to the particular user.

7. The media of Claim 6, wherein the computational determination is further based at least in part on information of a client device associated with the particular user used to interact with the social-networking system.

8. The media of either one of Claim 6 and Claim 7, wherein the user categories are further based on information associated with the plurality of users comprising a location, age, affinities, or number of friends.

9. The media of Claim 8, wherein the information associated with the plurality of users is stored on a social graph of a social-networking system, the social graph comprising a plurality of nodes and edges connecting the nodes, at least one node in the social graph corresponding to the particular user.

10. The media of any one of Claims 6 to 9, wherein the software is configured to access a log storing the interactions of the plurality of users with the social-networking system.

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11. A device comprising:

a processor; and

one or more computer-readable non-transitory storage media coupled to the processor and embodying software that:

access a base user experience (UX) of a social-networking system comprising a user interface (UI) corresponding to one or more features of the social-networking system;

computationally determine one or more user categories based at least in part on information associated with previous interactions by a plurality of users with the social-networking system;

classify a particular user into one or more of the user categories based at least in part on the interactions of the particular user with the social-networking system, wherein the classification comprises applying a machine-learning algorithm to the interactions of the particular user, and wherein the machine-learning algorithm is trained using the previous interactions by the plurality of users;

determine, relative to a base UX, one or more modifications comprising an addition of one or more graphical elements of the UI for display to the particular user, one or more of the graphical elements comprising a guided tour illustrating one or more of the features of the UI, the modifications being configured to personalize the UI individually to the particular user being based at least in part on the computational determination of one or more of the user categories applicable to the particular user;

assign a value to a particular functionality based at least in part on an objective of a computing system;

select one or more of the graphical elements corresponding to the particular functionality with a highest value relative to the objective;

apply the modifications to the UI; and

provide the UI as modified for display to the particular user.

12. The device of Claim 11, wherein the computational determination is further based at least in part on information of a client device associated with the particular user used to interact with the social-networking system.

13. The device of Claim 11, wherein the user categories are further based on information associated with the plurality of users comprising a location, age, affinities, or number of friends.

14. The device of Claim 13, wherein the information associated with the plurality of users is stored on a social graph of a social-networking system, the social graph comprising a plurality of nodes and edges connecting the nodes, at least one node in the social graph corresponding to the particular user.

15. The device of any one of Claims 11 to 14, wherein the software is further configured to access a log storing the interactions of the plurality of users with the social-networking system.

Facebook, Inc.
By Patent Attorneys for the Applicant
COTTERS
Patent & Trade Mark Attorneys

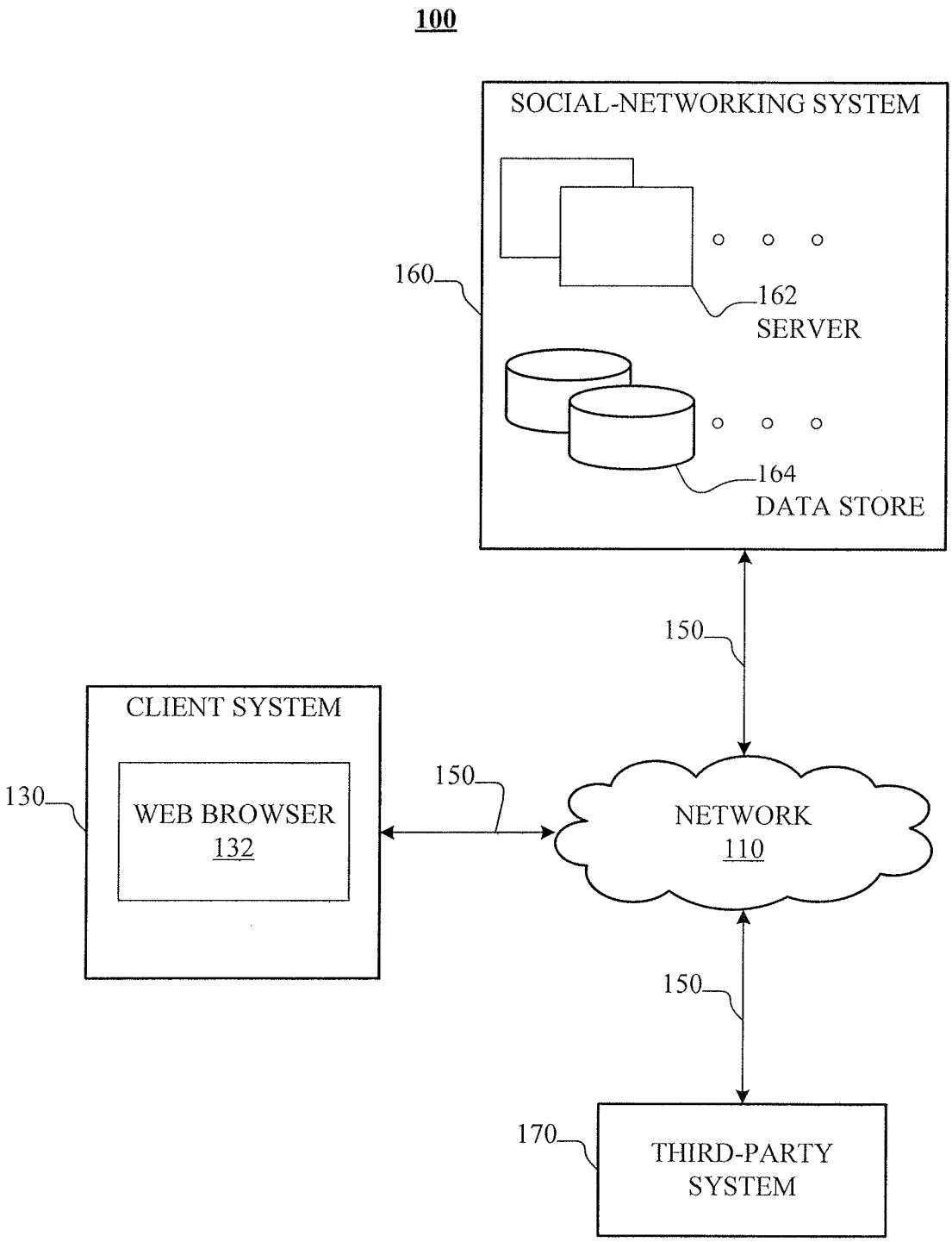
100
SOCIAL-NETWORKING SYSTEM
160
162
SERVER
164
DATA STORE
150
CLIENT SYSTEM
130
WEB BROWSER
132
150
NETWORK
110
150
170
THIRD-PARTY
SYSTEM

Figure 1

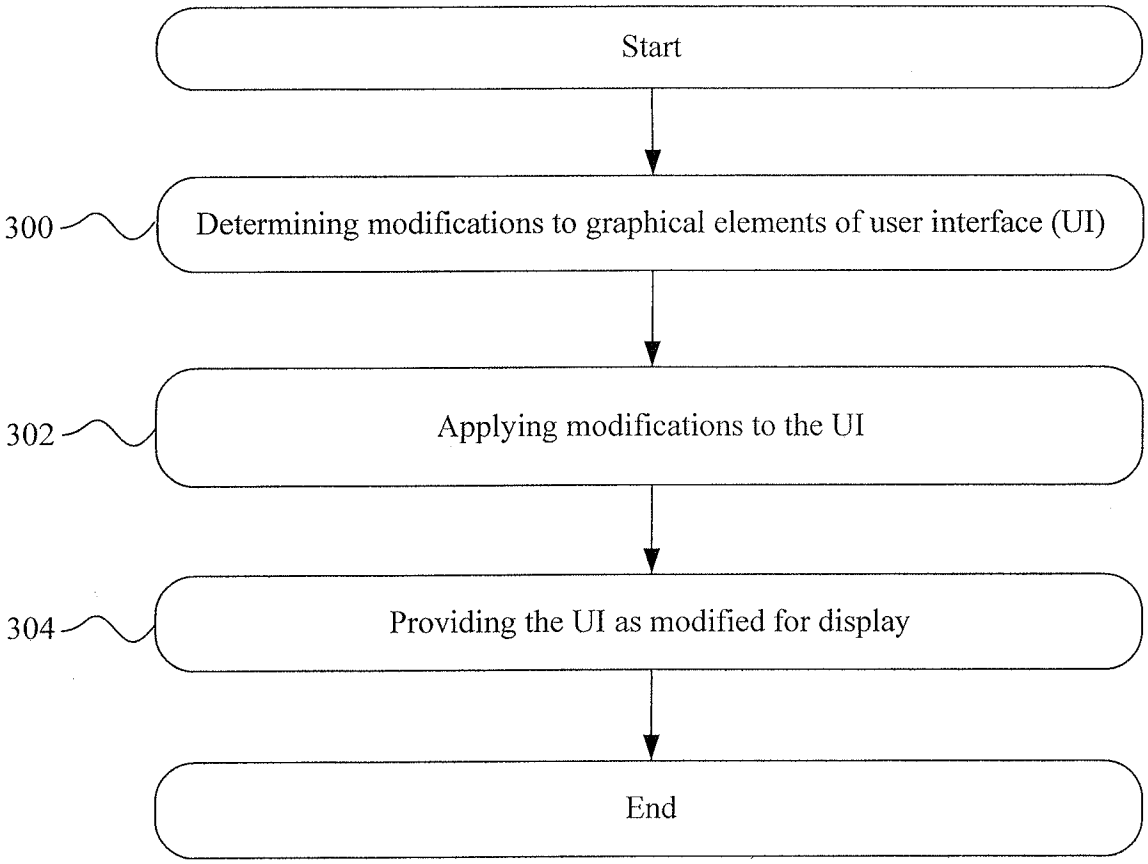
Start
300
Determining modifications to graphical elements of user interface (UI)
302
Applying modifications to the UI
304
Providing the UI as modified for display
End

Figure 2

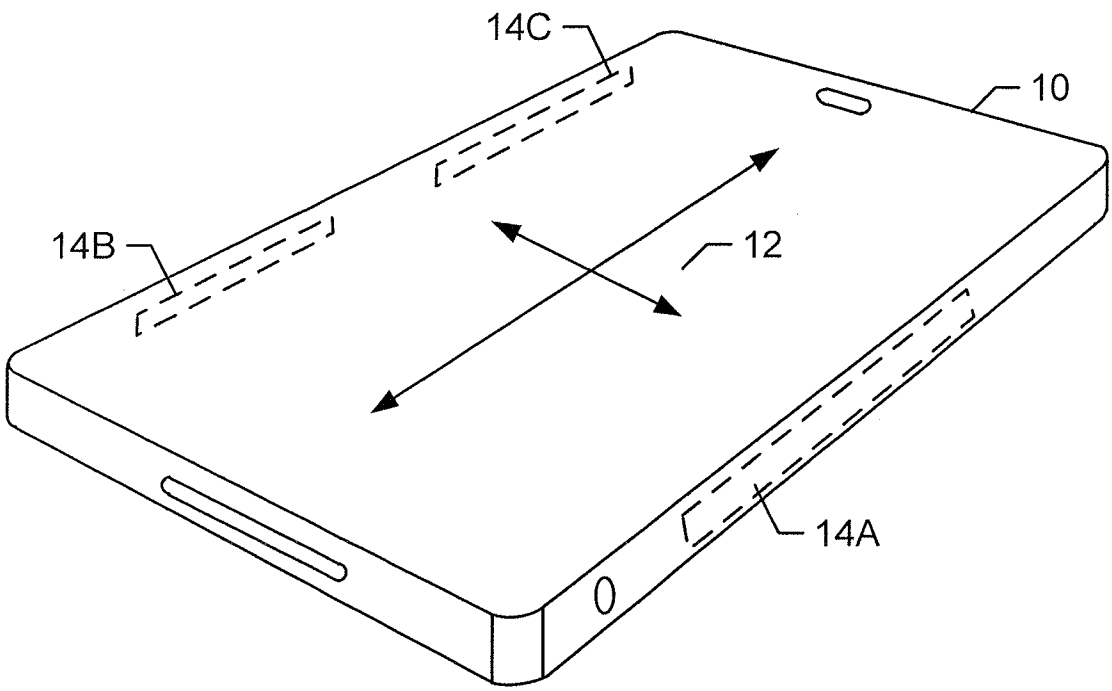

Figure 3

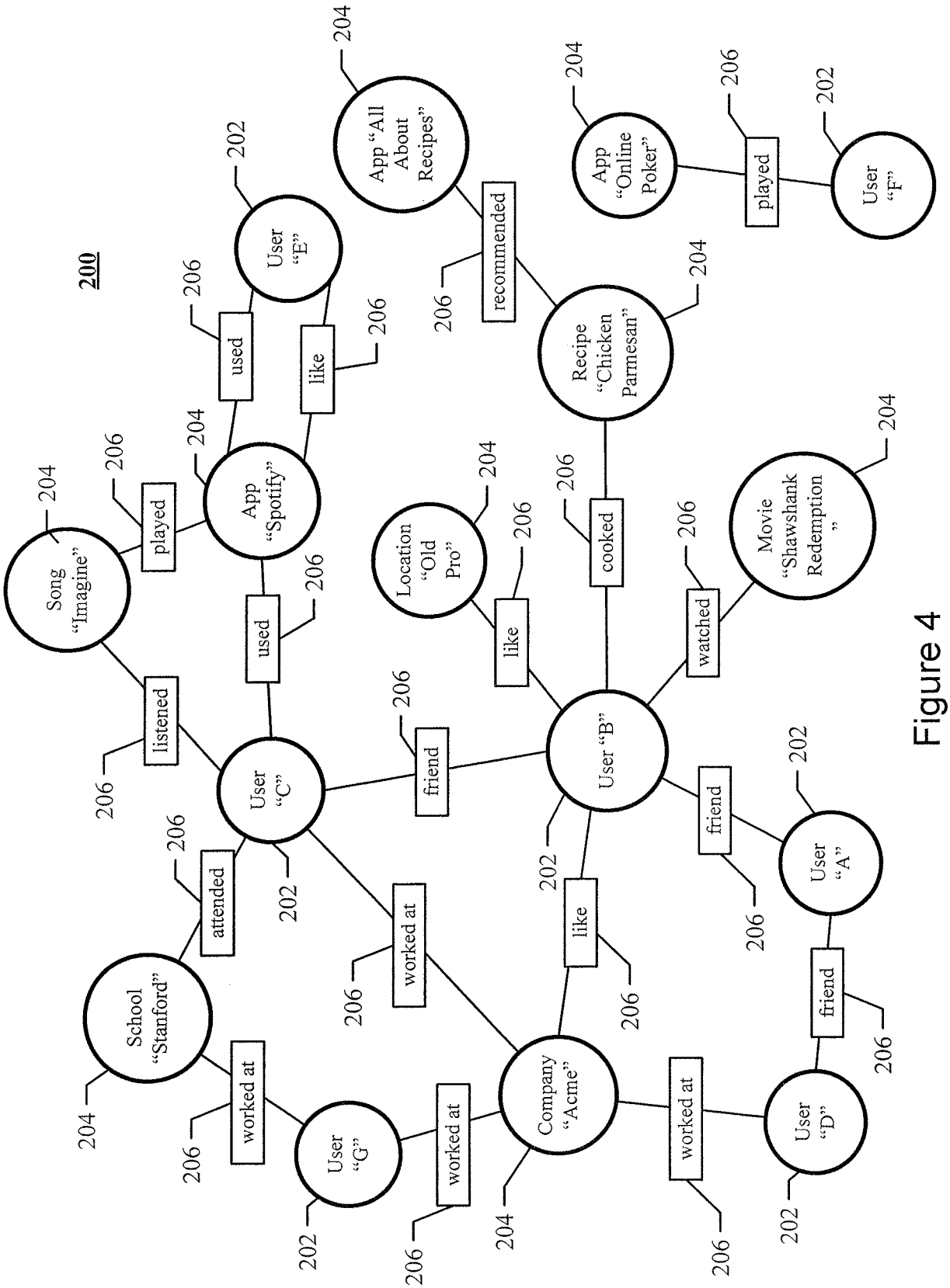
200
User "C"
User "B"
User "A"
User "D"
User "E"
User "F"
User "G"
App "Spotify"
App "All About Recipes"
App "Online Poker"
Song "Imagine"
Location "Old Pro"
Recipe "Chicken Parmesan"
Movie "Shawshank Redemption"
School "Stanford"
Company "Acme"
listened
played
used
like
recommended
played
cooked
watched
attended
worked at
friend
202
204
206

Figure 4

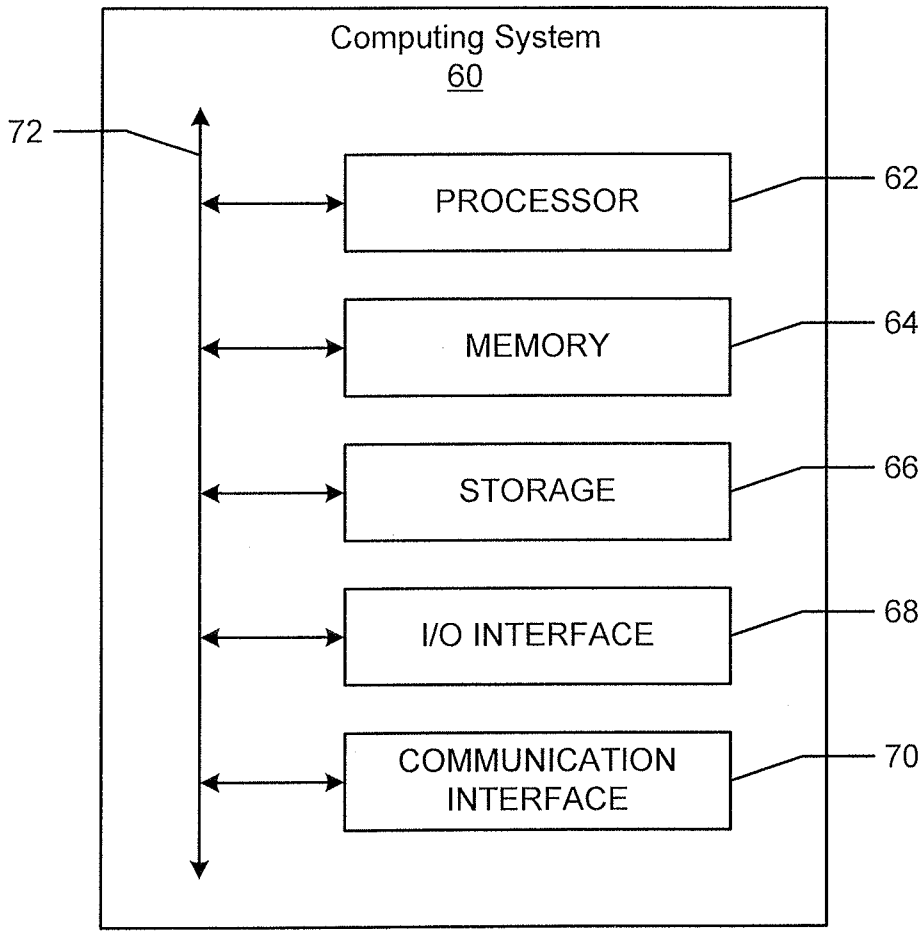
Computing System
60
72
PROCESSOR
62
MEMORY
64
STORAGE
66
I/O INTERFACE
68
COMMUNICATION INTERFACE
70

Figure 5