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(54) **AUGMENTED REALITY TYPOGRAPHY PERSONALIZATION SYSTEM**

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(58) **Field of Classification Search**
CPC ... G06K 9/00671; G06K 2209/01; G06T 7/11
See application file for complete search history.

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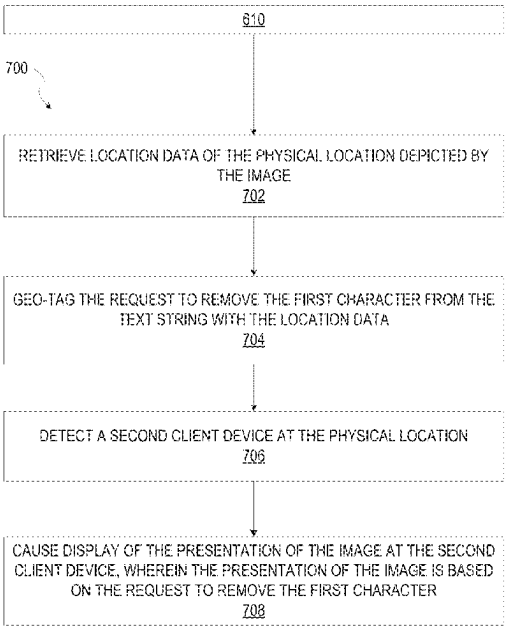
(57) **ABSTRACT**

Disclosed are augmented reality (AR) personalization systems to enable a user to edit and personalize presentations of real-world typography in real-time. The AR personalization system captures an image depicting a physical location via a camera coupled to a client device. For example, the client device may include a mobile device that includes a camera configured to record and display images (e.g., photos, videos) in real-time. The AR personalization system causes display of the image at the client device, and scans the image to detect occurrences of typography within the image (e.g., signs, billboards, posters, graffiti).

20 Claims, 11 Drawing Sheets



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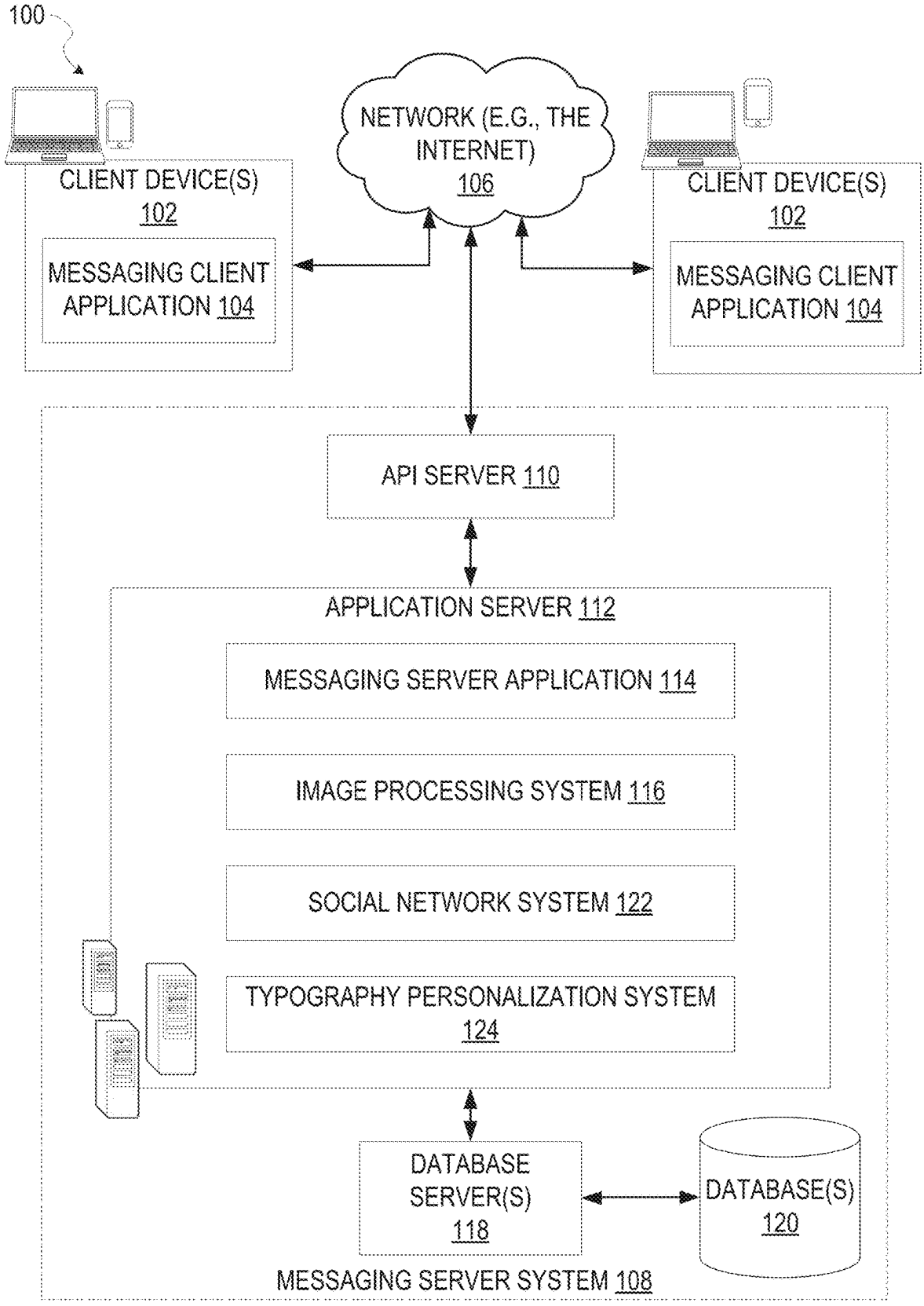
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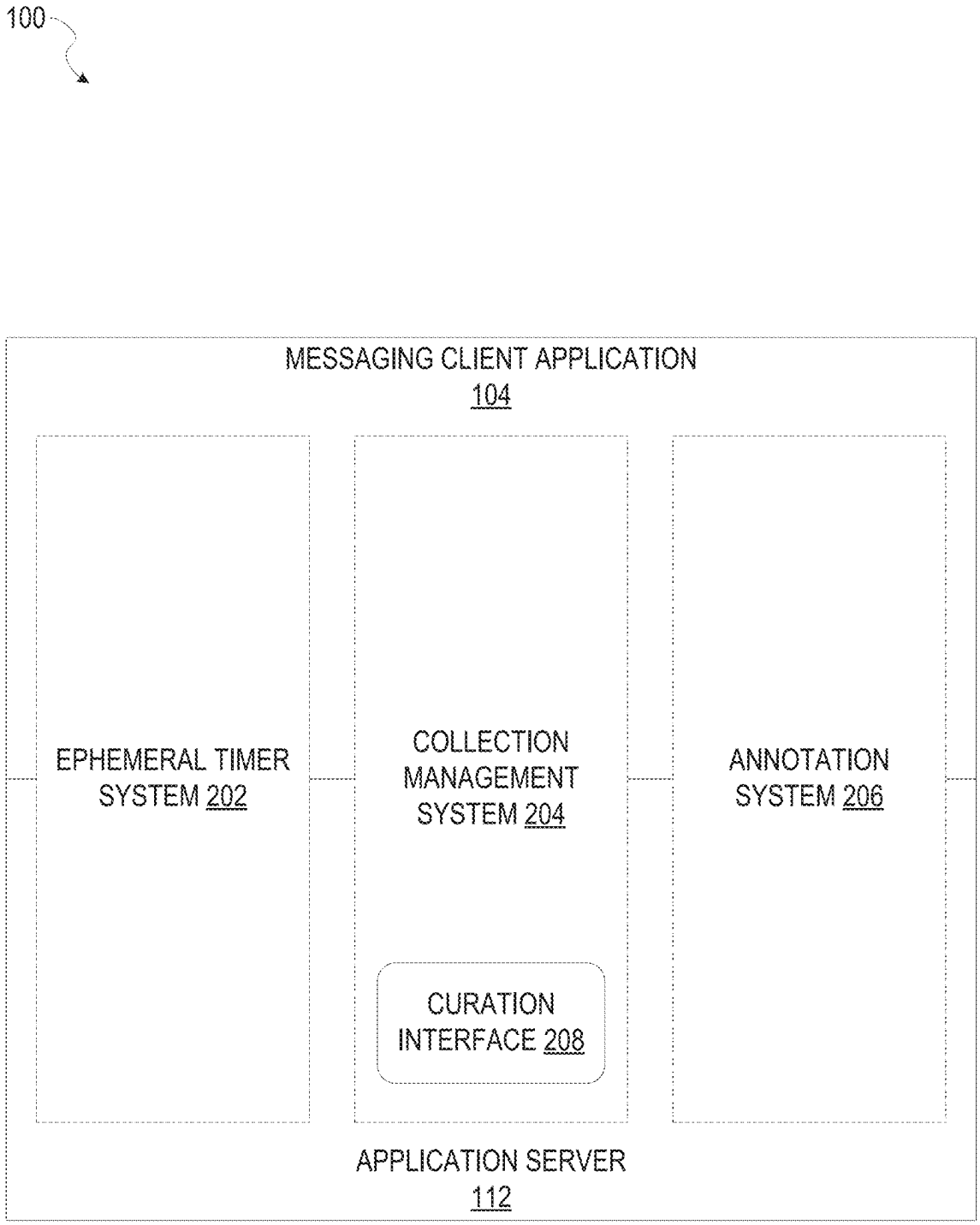
NETWORK (E.G., THE INTERNET) 106
CLIENT DEVICE(S) 102
MESSAGING CLIENT APPLICATION 104
CLIENT DEVICE(S) 102
MESSAGING CLIENT APPLICATION 104
API SERVER 110
APPLICATION SERVER 112
MESSAGING SERVER APPLICATION 114
IMAGE PROCESSING SYSTEM 116
SOCIAL NETWORK SYSTEM 122
TYPOGRAPHY PERSONALIZATION SYSTEM 124
DATABASE SERVER(S) 118
DATABASE(S) 120
MESSAGING SERVER SYSTEM 108

FIG. 1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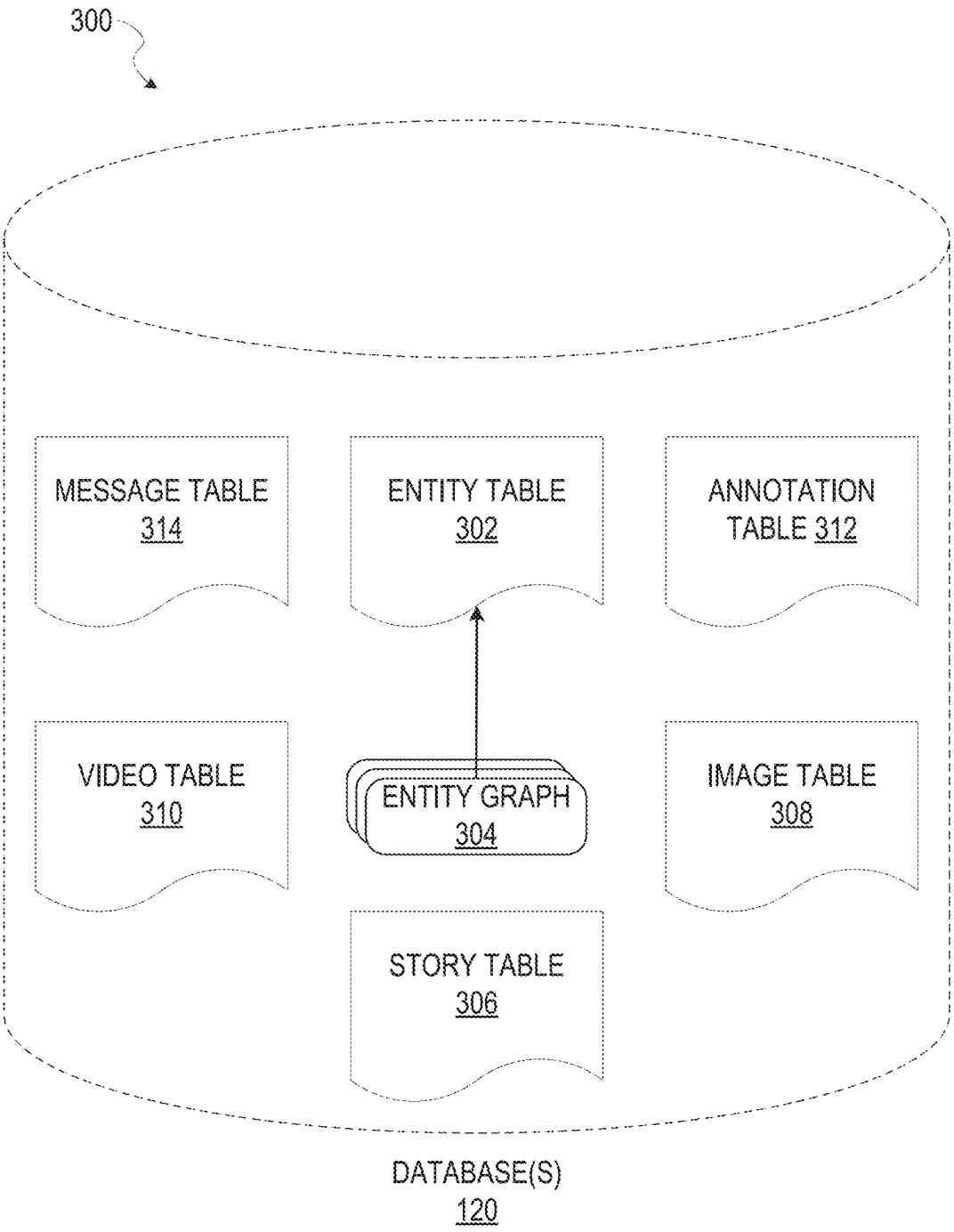
MESSAGING CLIENT APPLICATION
104
EPHEMERAL TIMER
SYSTEM 202
COLLECTION
MANAGEMENT
SYSTEM 204
CURATION
INTERFACE 208
ANNOTATION
SYSTEM 206
APPLICATION SERVER
112

FIG. 2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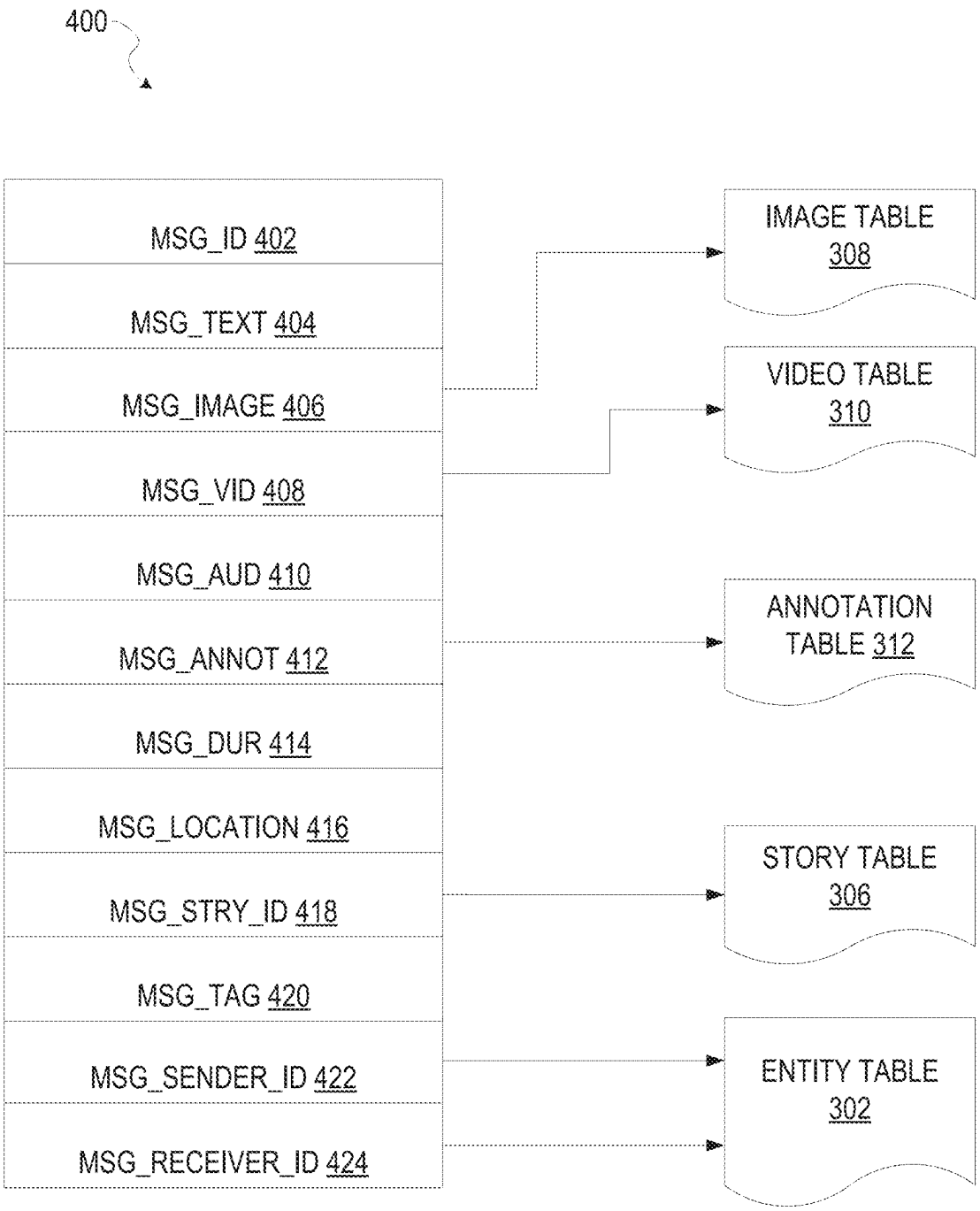
MESSAGE TABLE 314
ENTITY TABLE 302
ANNOTATION TABLE 312
VIDEO TABLE 310
ENTITY GRAPH 304
IMAGE TABLE 308
STORY TABLE 306
DATABASE(S) 120

FIG. 3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MSG_IMAGE 406
MSG_VID 408
MSG_AUD 410
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MSG_DUR 414
MSG_LOCATION 416
MSG_STRY_ID 418
MSG_TAG 420
MSG_SENDER_ID 422
MSG_RECEIVER_ID 424
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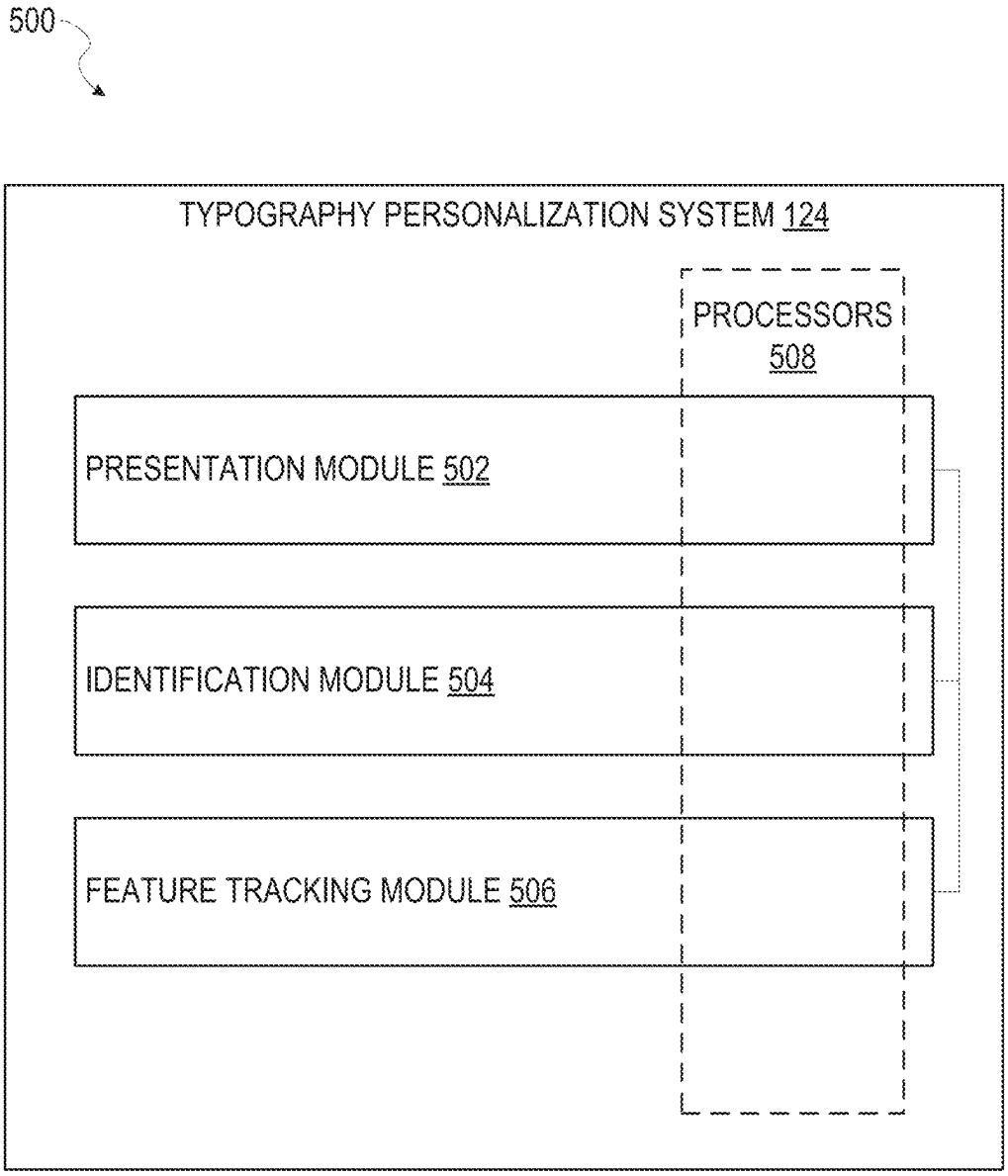
VIDEO TABLE 310
ANNOTATION TABLE 312
STORY TABLE 306
ENTITY TABLE 302

FIG. 4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PROCESSORS 508
PRESENTATION MODULE 502
IDENTIFICATION MODULE 504
FEATURE TRACKING MODULE 506

FIG. 5

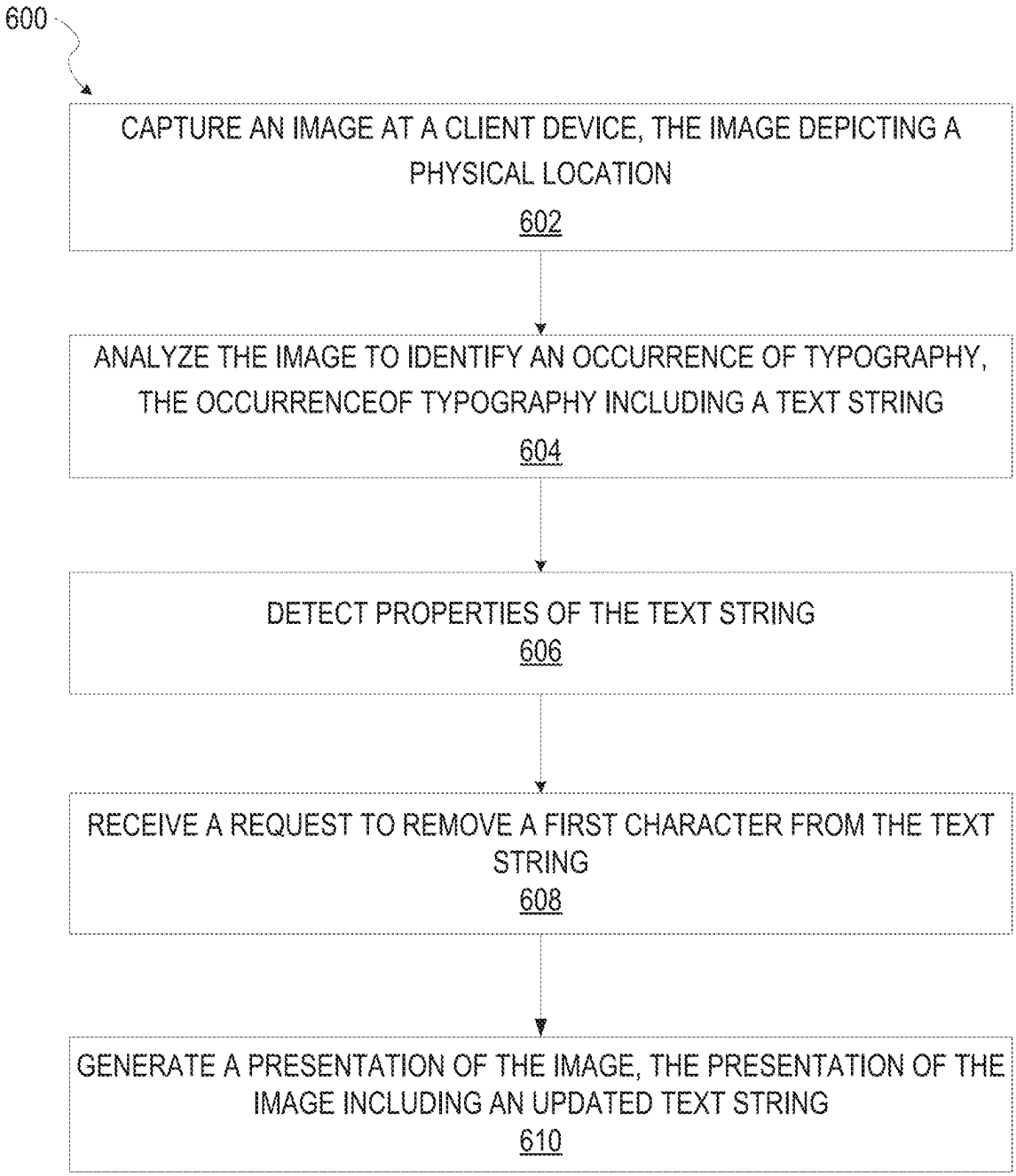
600
CAPTURE AN IMAGE AT A CLIENT DEVICE, THE IMAGE DEPICTING A PHYSICAL LOCATION
602
ANALYZE THE IMAGE TO IDENTIFY AN OCCURRENCE OF TYPOGRAPHY, THE OCCURRENCEOF TYPOGRAPHY INCLUDING A TEXT STRING
604
DETECT PROPERTIES OF THE TEXT STRING
606
RECEIVE A REQUEST TO REMOVE A FIRST CHARACTER FROM THE TEXT STRING
608
GENERATE A PRESENTATION OF THE IMAGE, THE PRESENTATION OF THE IMAGE INCLUDING AN UPDATED TEXT STRING
610

FIG. 6

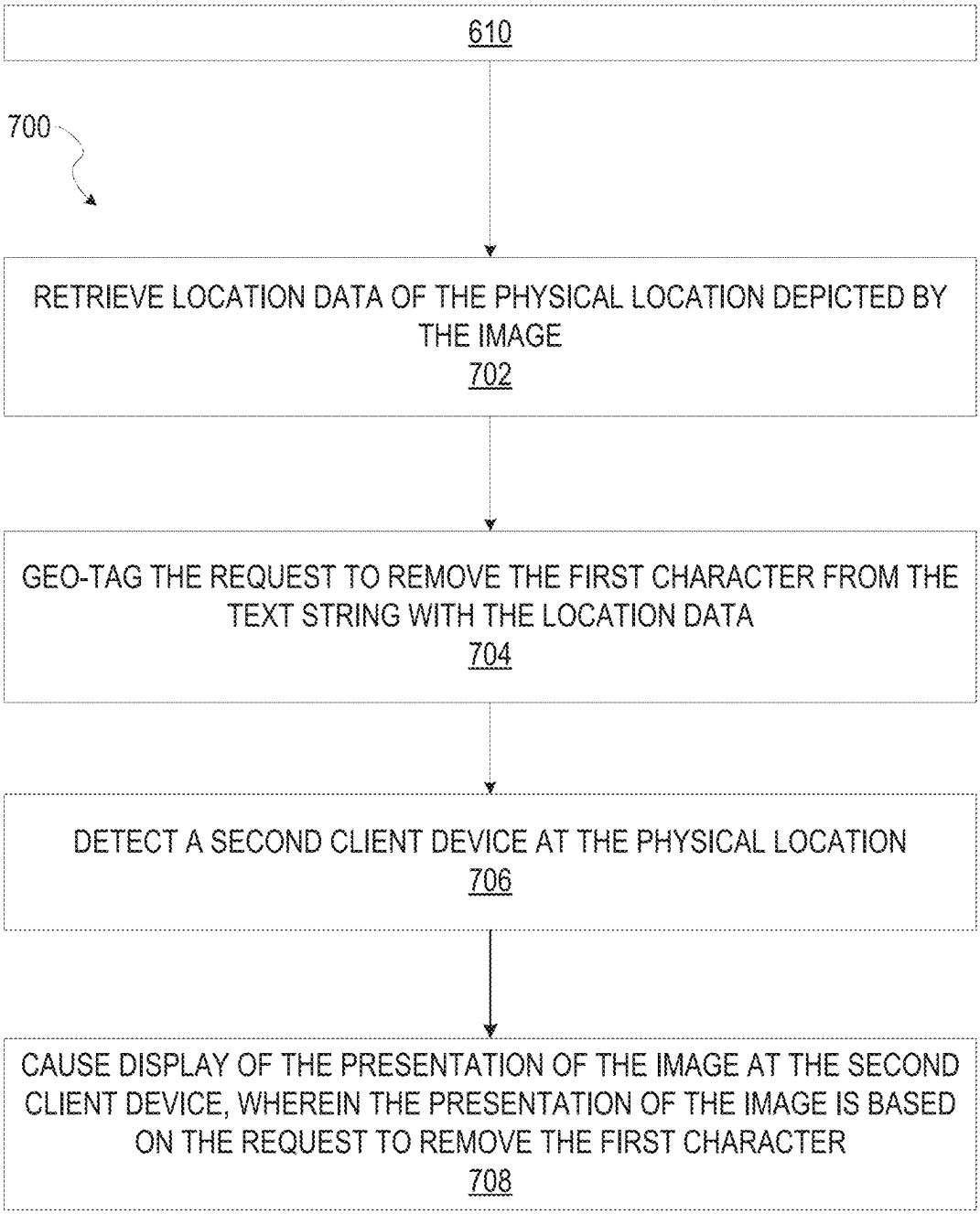
610
700
RETRIEVE LOCATION DATA OF THE PHYSICAL LOCATION DEPICTED BY THE IMAGE
702
GEO-TAG THE REQUEST TO REMOVE THE FIRST CHARACTER FROM THE TEXT STRING WITH THE LOCATION DATA
704
DETECT A SECOND CLIENT DEVICE AT THE PHYSICAL LOCATION
706
CAUSE DISPLAY OF THE PRESENTATION OF THE IMAGE AT THE SECOND CLIENT DEVICE, WHEREIN THE PRESENTATION OF THE IMAGE IS BASED ON THE REQUEST TO REMOVE THE FIRST CHARACTER
708

FIG. 7

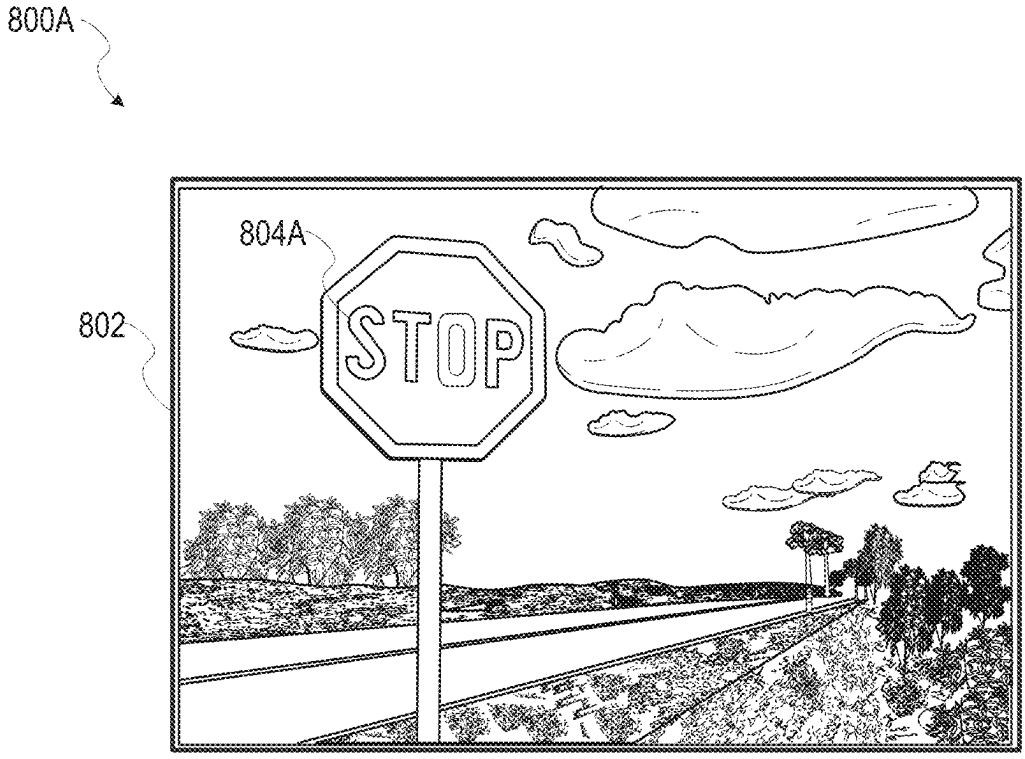

FIG. 8A

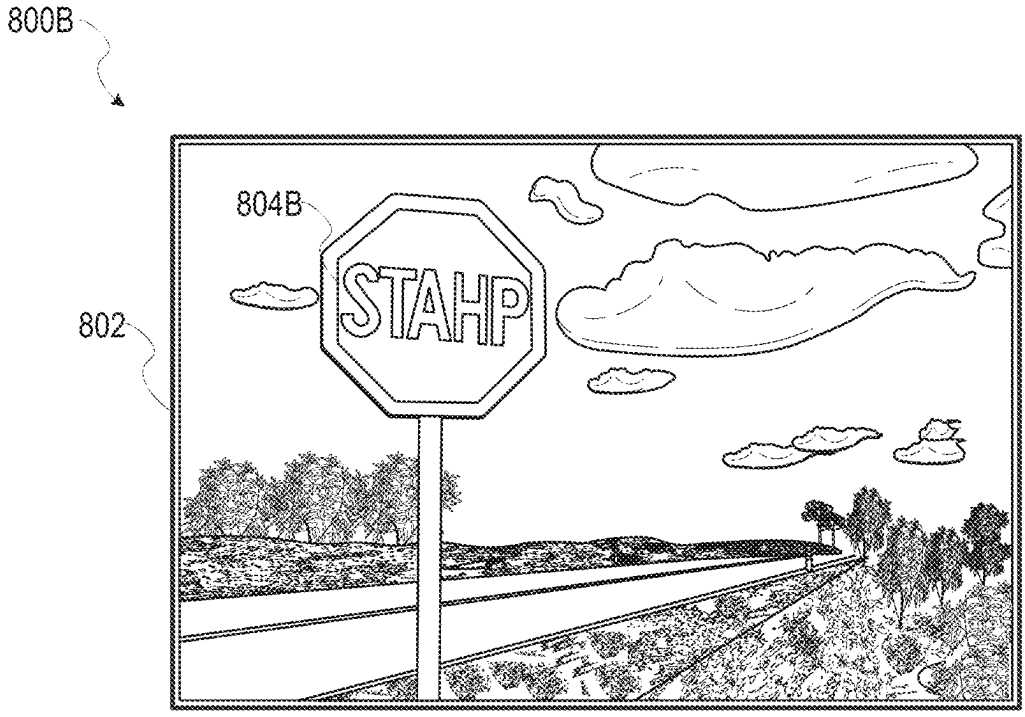

FIG. 8B

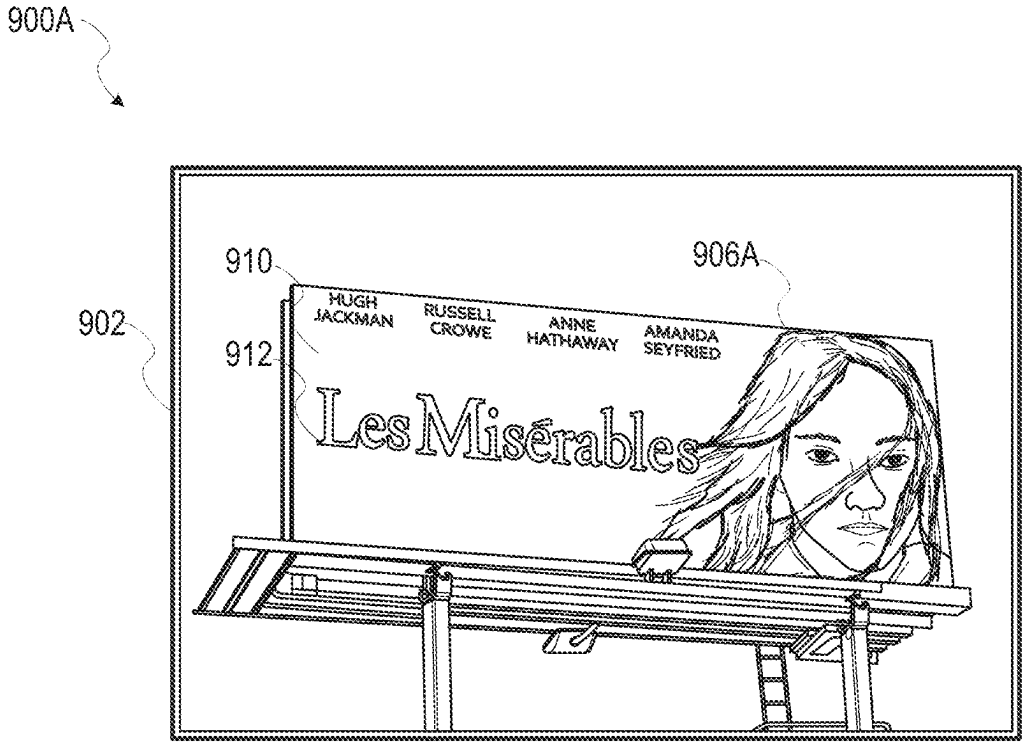
900A
910
906A
902
912
HUGH JACKMAN
RUSSELL CROWE
ANNE HATHAWAY
AMANDA SEYFRIED
Les Misérables

FIG. 9A

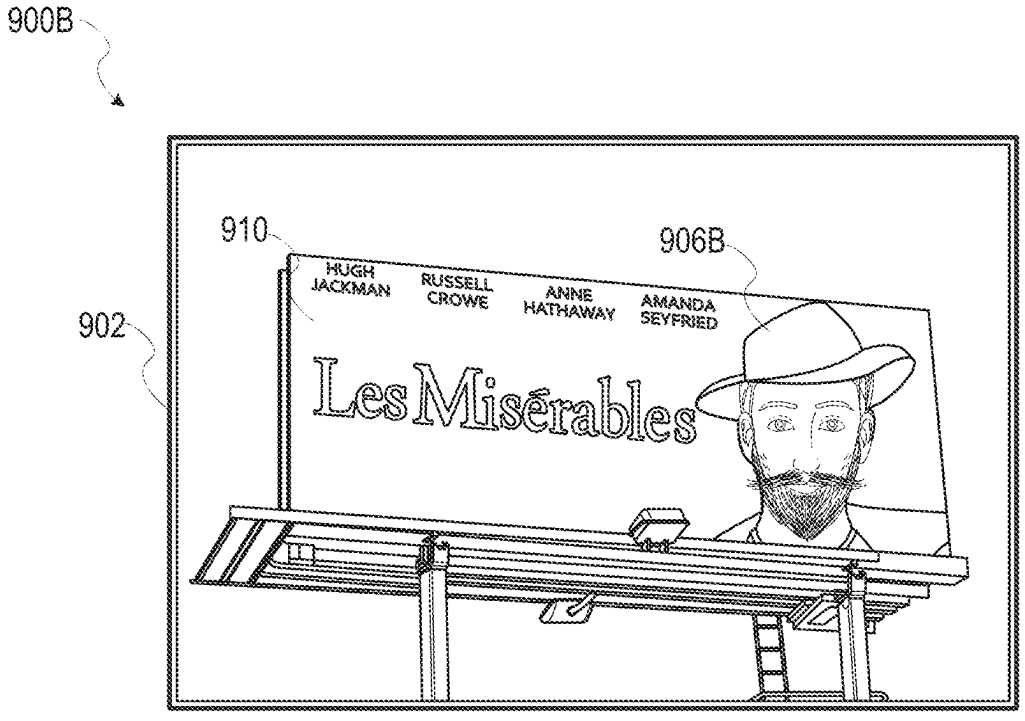
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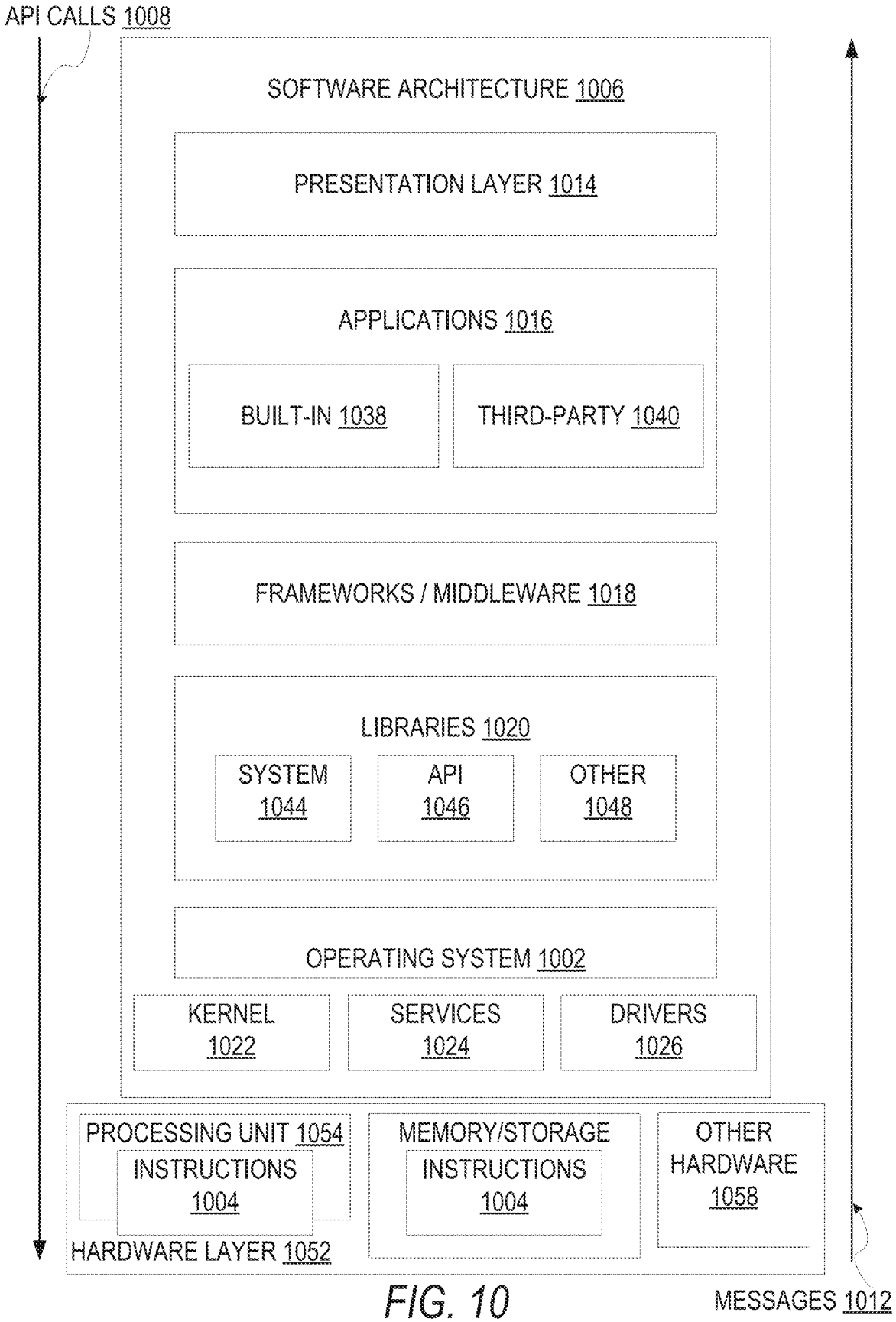
FIG. 9B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SOFTWARE ARCHITECTURE 1006
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APPLICATIONS 1016
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THIRD-PARTY 1040
FRAMEWORKS / MIDDLEWARE 1018
LIBRARIES 1020
SYSTEM 1044
API 1046
OTHER 1048
OPERATING SYSTEM 1002
KERNEL 1022
SERVICES 1024
DRIVERS 1026
PROCESSING UNIT 1054
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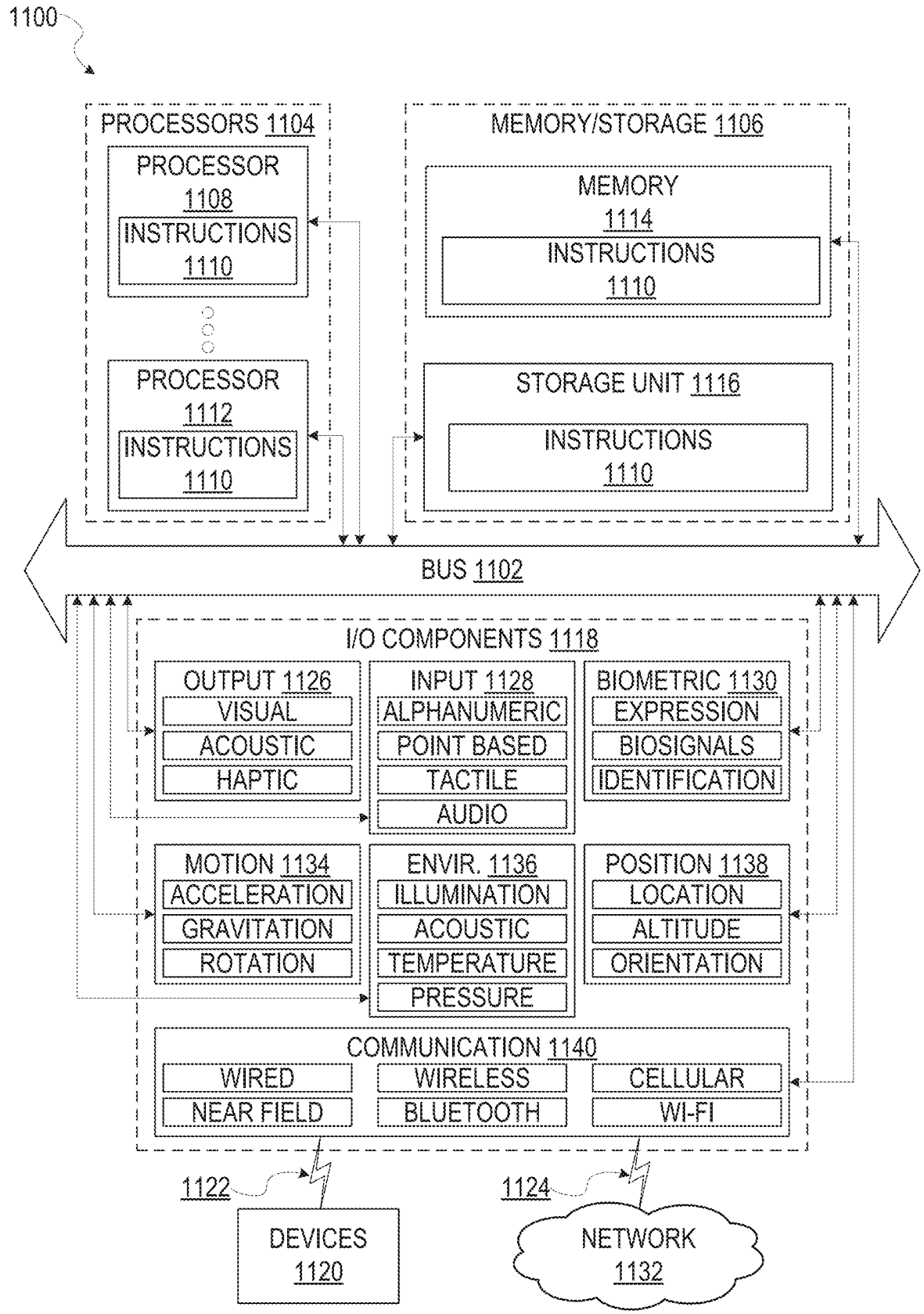
OTHER HARDWARE 1058
HARDWARE LAYER 1052
MESSAGES 1012

FIG. 10


1100
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INSTRUCTIONS 1110
PROCESSOR 1112
INSTRUCTIONS 1110
MEMORY/STORAGE 1106
MEMORY 1114
INSTRUCTIONS 1110
STORAGE UNIT 1116
INSTRUCTIONS 1110
BUS 1102
I/O COMPONENTS 1118
OUTPUT 1126
VISUAL
ACOUSTIC
HAPTIC
INPUT 1128
ALPHANUMERIC
POINT BASED
TACTILE
AUDIO
BIOMETRIC 1130
EXPRESSION
BIOSIGNALS
IDENTIFICATION
MOTION 1134
ACCELERATION
GRAVITATION
ROTATION
ENVIR. 1136
ILLUMINATION
ACOUSTIC
TEMPERATURE
PRESSURE
POSITION 1138
LOCATION
ALTITUDE
ORIENTATION
COMMUNICATION 1140
WIRED
NEAR FIELD
WIRELESS
BLUETOOTH
CELLULAR
WI-FI
1122
DEVICES 1120
1124
NETWORK 1132

FIG. 11

AUGMENTED REALITY TYPOGRAPHY PERSONALIZATION SYSTEM

PRIORITY CLAIM

This application is a continuation of U.S. patent application Ser. No. 17/528,981, filed Nov. 17, 2021, which application is a continuation of U.S. patent application Ser. No. 16/433,793, filed Jun. 6, 2019, now issued as U.S. Pat. No. 11,195,018, which application is a continuation of U.S. patent application Ser. No. 15/492,089, filed Apr. 20, 2017, now issued as U.S. Pat. No. 10,387,730, which applications and publications are incorporated herein by reference in their entirety.

TECHNICAL FIELD

Embodiments of the present disclosure relate generally to mobile computing technology and, more particularly, but not by way of limitation, to the presentation of augmented and virtual reality displays.

BACKGROUND

Augmented reality (AR) is a live direct or indirect view of a physical, real-world environment whose elements are supplemented, or "augmented," by a computer-generated sensory input such as sound, video, graphics, or the like. As a result, the technology functions to enhance a user's perception of reality.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

To easily identify the discussion of any particular element or act, the most significant digit or digits in a reference number refer to the figure number in which that element is first introduced.

FIG. **1** is a block diagram showing an example messaging system for exchanging data (e.g., messages and associated content) over a network in accordance with some embodiments, wherein the messaging system includes an augmented reality anamorphosis system.

FIG. **2** is block diagram illustrating further details regarding a messaging system, according to example embodiments.

FIG. **3** is a schematic diagram illustrating data that may be stored in the database of the messaging server system, according to certain example embodiments.

FIG. **4** is a schematic diagram illustrating a structure of a message, according to some embodiments, generated by a messaging client application for communication.

FIG. **5** is a block diagram illustrating various modules of a typography personalization system, according to certain example embodiments.

FIG. **6** is a flowchart illustrating various operations of the typography personalization system in personalizing an occurrence of typography within a presentation of an image, according to certain example embodiments.

FIG. **7** is a flowchart illustrating various operations of the typography personalization system in performing a method of altering a presentation of an occurrence of typography at a client device based on a personalization request, according to certain example embodiments.

FIGS. **8**A/B are representations of images depicting an occurrence of typography, with and without personalization, according to certain example embodiments.

FIGS. **9**A/B are representations of images depicting an occurrence of typography, with and without personalization, according to certain example embodiments.

FIG. **10** is a block diagram illustrating a representative software architecture, which may be used in conjunction with various hardware architectures herein described and used to implement various embodiments.

FIG. **11** is a block diagram illustrating components of a machine, according to some example embodiments, able to read instructions from a machine-readable medium (e.g., a machine-readable storage medium) and perform any one or more of the methodologies discussed herein.

DETAILED DESCRIPTION

Reference will now be made in detail to specific example embodiments for carrying out the inventive subject matter of the present disclosure. In the following description, specific details are set forth in order to provide a thorough understanding of the subject matter. It shall be appreciated that embodiments may be practiced without some or all of these specific details.

Disclosed are augmented reality (AR) personalization systems to enable a user to edit and personalize presentations of real-world typography in real-time. In other words, various embodiments allow text in a picture or video captured by a phone to be automatically analyzed to allow simple user editing of the text. The analysis and editing features allow the edited picture or video to maintain the look and feel of the original. In some embodiments, networked features allow one user to edit text on a sign at a particular location on first device and share those edits. A second user capturing an image of the sign using the AR personalized system will see the text edits from the first user displayed on the screen of the second device. Users viewing a sign at the same time through AR displays can see real-time updates and text edits as they are made by other users.

The AR personalization system captures an image depicting a physical location via a camera coupled to a client device. For example, the client device may be a mobile device that includes a camera configured to record and display images (e.g., photos, videos) in real-time. The AR personalization system causes display of the image at the client device, and scans the image to detect occurrences of typography within the image (e.g., signs, billboards, posters, graffiti). For example, the image may include a stop-sign. The AR personalization system may detect the text string displayed on the stop-sign that reads "STOP."

In some example embodiments, in response to detection of typography within an image, the AR personalization system identifies properties of the typography. The AR personalization system may employ Natural Feature Tracking (NFT) techniques to identify locations of the occurrences of typography. The properties of the typography may for example include a set of characters, a height of the text, a length of the text, and a number of characters in the text, as well as a location of the text in the image, a color of the text, an opacity of the text, and in some embodiments a typeface, a font (e.g., a size, weight, and style of the typeface), or that the typeface is serif or sans serif. Using the stop-sign example above, the AR personalization system may determine features such as: a relative size of the typography in the image based on properties of the image that the character-set of the text string includes the letters "S," "T," "O," and "P,"; that the characters of the text string

are white; and that the characters of the text string are sans serif (or that they are "Ariel Narrow").

In further embodiments, the AR typography personalization system identifies background patterns in which the typography may be overlaid or displayed upon. Background patterns may include solid colors (e.g., red, blue, orange), textile patterns (e.g., check, tartan, gingham), as well as features of an environment depicted in the image (e.g., bricks on a brick wall, trees, bushes, concrete, asphalt, clouds, etc.). Continuing with the stop-sign example discussed above, the AR personalization system may determine that the background of the typography is a solid red color.

The AR personalization system may receive a request to alter, modify, or personalize the occurrences of typography detected in the image. The request may include a user input selecting an occurrence of typography in the image, received from a client device. For example, a user viewing a presentation of the image at the client device may select the occurrence of typography in the image, and in response the AR personalization system may overlay a text field at a position on the occurrence of typography to receive text inputs over the occurrence of typography in the image. For example, the AR personalization system identifies tracking indicia that include features of an environment or active light sources in proximity to annotated objects within the environment (e.g., the ground's plane, or the horizon). Based on the positions of three or more known features in the environment, the AR personalization system generates and causes display of the text field over the occurrence of typography. Thus, as the user moves to different perspectives, the text field (and ultimately the altered typography) may remain in a consistent position.

The user may provide user inputs into the text field to delete or otherwise alter characters in the text string. Continuing with the stop-sign example discussed above, the AR personalization may receive a user input selecting the typography of the stop-sign. In response to receiving the selection of the typography of the stop-sign, the AR personalization system causes display of a text field over the typography of the stop-sign.

The user may provide a user input into the text field to delete, change, or add to the one or more characters of the text string. For example, the user may alter the text string in the presentation of the image by deleting the "O" from the character-set and replacing it with an "A" and an "H." The AR personalization system generates characters to display in the presentation of the image based on the properties of the text string, such as the size, color, and typeface. In response to receiving the user inputs modifying the text string, the AR personalization system updates the presentation of the image such that the text string displays as "STAHP" at the client device.

In some example embodiments, the AR personalization system provides functionality to tag the personalization requests to a particular occurrence of typography at one or more locations based factors including on geo-location coordinates, as well as properties of the typography. For example, a user may tag a personalization request to alter/personalize all occurrences of a text string that includes certain properties (e.g., a character-set, a location, a background, etc.) detected by the AR personalization system, or alter/personalize a presentation of a specific occurrence of typography based on location data at multiple client devices.

For example, a user may create a personalization request for a specific word or phrase (e.g., "STAR WARS," "STOP," "CAUTION"), wherein the specific word or phrase may appear at multiple different locations. Upon detecting an occurrence of the specific word or phrase, based on properties of the specific word or phrase (e.g., characters, positions of the characters), the AR personalization system may apply the personalization request to alter a presentation of the word or phrase, in real-time.

The personalization request may include geolocation coordinates, as well as user identifiers of a set of users authorized to view the personalized typography. For example, a user may generate a personalization request that includes personalized typography, geolocation coordinates, an indication of an occurrence of typography to alter in a presentation, and a set of user identifiers. Upon detecting users identified by the user identifiers at the location specified by the geolocation coordinates, the AR personalization system alters a presentation of the occurrence of typography displayed at their corresponding user devices to include the personalization request. For example, a user may generate a personalization request to alter a presentation of an occurrence of typography (e.g., a movie poster). The personalization request includes an indication of the occurrence of typography, changes to be made to the occurrence of typography (e.g., a character or string of characters to add), geolocation coordinates, as well as a list of user identifiers that includes user identifier X. For example, a user may select the occurrence of typography within the presentation, and in response, the AR personalization system may apply NFT systems to identify features within the presentation to identify and mark the occurrence of typography. The user may provide the AR personalization system with a set of changes that include new characters to add to the occurrence of typography, as well as an indication of a position in which to place the changes in the presentation. The user identified by user identifier X may display a presentation of the occurrence of the text string at a corresponding client device. In response, the AR personalization system identifies the user and alters the presentation based on the personalization request.

FIG. **1** is a block diagram showing an example messaging system **100** for exchanging data (e.g., messages and associated content) over a network. The messaging system **100** includes multiple client devices **102**, each of which hosts a number of applications including a messaging client application **104**. Each messaging client application **104** is communicatively coupled to other instances of the messaging client application **104** and a messaging server system **108** via a network **106** (e.g., the Internet).

Accordingly, each messaging client application **104** is able to communicate and exchange data with another messaging client application **104** and with the messaging server system **108** via the network **106**. The data exchanged between messaging client applications **104**, and between a messaging client application **104** and the messaging server system **108**, includes functions (e.g., commands to invoke functions) as well as payload data (e.g., text, audio, video or other multimedia data which may include or be used as anamorphic media).

The messaging server system **108** provides server-side functionality via the network **106** to a particular messaging client application **104**. While certain functions of the messaging system **100** are described herein as being performed by either a messaging client application **104** or by the messaging server system **108**, it will be appreciated that the location of certain functionality either within the messaging client application **104** or the messaging server system **108** is a design choice. For example, it may be technically preferable to initially deploy certain technology and functionality within the messaging server system **108**, but to later migrate

this technology and functionality to the messaging client application **104** where a client device **102** has a sufficient processing capacity.

The messaging server system **108** supports various services and operations that are provided to the messaging client application **104**. Such operations include transmitting data to, receiving data from, and processing data generated by the messaging client application **104**. In some embodiments, this data includes, message content, client device information, geolocation information, media annotation and overlays, message content persistence conditions, social network information, and live event information, as examples. In other embodiments, other data is used. Any such data may be used as part of or to generate anamorphic media in accordance with different embodiments described herein. Data exchanges within the messaging system **100** are invoked and controlled through functions available via user interfaces (UIs) of the messaging client application **104**.

Turning now specifically to the messaging server system **108**, an Application Program Interface (API) server **110** is coupled to, and provides a programmatic interface to, an application server **112**. The application server **112** is communicatively coupled to a database server(s) **118**, which facilitates access to a database(s) **120** in which is stored data associated with messages processed by the application server **112**.

Dealing specifically with the Application Program Interface (API) server **110**, this server receives and transmits message data (e.g., commands and message payloads) between the client device **102** and the application server **112**. Specifically, the Application Program Interface (API) server **110** provides a set of interfaces (e.g., routines and protocols) that can be called or queried by the messaging client application **104** in order to invoke functionality of the application server **112**. The Application Program Interface (API) server **110** exposes various functions supported by the application server **112**, including account registration, login functionality, the sending of messages, via the application server **112**, from a particular messaging client application **104** to another messaging client application **104**, the sending of media files (e.g., images or video) from a messaging client application **104** to the messaging server application **114**, and for possible access by another messaging client application **104**, the setting of a collection of media data (e.g., story), the retrieval of a list of friends of a user of a client device **102**, the retrieval of such collections, the retrieval of messages and content, the adding and deletion of friends to a social graph, the location of friends within a social graph, opening and application event (e.g., relating to the messaging client application **104**).

The application server **112** hosts a number of applications and subsystems, including a messaging server application **114**, an image processing system **116**, a social network system **122**, and an typography personalization system **124**. The messaging server application **114** implements a number of message processing technologies and functions, particularly related to the aggregation and other processing of content (e.g., textual and multimedia content) included in messages received from multiple instances of the messaging client application **104**. As will be described in further detail, the text and media content from multiple sources may be aggregated into collections of content (e.g., called stories or galleries). These collections are then made available, by the messaging server application **114**, to the messaging client application **104**. Other processor and memory intensive processing of data may also be performed server-side by the messaging server application **114**, in view of the hardware requirements for such processing.

The application server **112** also includes an image processing system **116** that is dedicated to performing various image processing operations, typically with respect to images or video received within the payload of a message at the messaging server application **114**.

The social network system **122** supports various social networking functions services, and makes these functions and services available to the messaging server application **114**. To this end, the social network system **122** maintains and accesses an entity graph **304** within the database(s) **120**. Examples of functions and services supported by the social network system **122** include the identification of other users of the messaging system **100** with which a particular user has relationships or is "following," and also the identification of other entities and interests of a particular user. The typography personalization system **124** provides functionality to identify and enable personalization of occurrences of typography identified in a presentation of an image at a client device (e.g., client device **102**).

The application server **112** is communicatively coupled to one or more database server(s) **118**, which facilitates access to a database(s) **120** in which is stored data associated with messages processed by the messaging server application **114**.

FIG. **2** is block diagram illustrating further details regarding the messaging system **100**, according to example embodiments. Specifically, the messaging system **100** is shown to comprise the messaging client application **104** and the application server **112**, which in turn embody a number of some subsystems, namely an ephemeral timer system **202**, a collection management system **204** and an annotation system **206**.

The ephemeral timer system **202** is responsible for enforcing the temporary access to content permitted by the messaging client application **104** and the messaging server application **114**. To this end, the ephemeral timer system **202** incorporates a number of timers that, based on duration and display parameters associated with a message, or collection of messages (e.g., a SNAPCHAT story), selectively display and enable access to messages and associated content such as anamorphic media via the messaging client application **104**. Further details regarding the operation of the ephemeral timer system **202** are provided below.

The collection management system **204** is responsible for managing collections of media (e.g., collections of text, image video and audio data). In some examples, a collection of content (e.g., messages, including personalized typography, images, video, text and audio) may be organized into an "event gallery" or an "event story." Such a collection may be made available for a specified time period, such as the duration of an event to which the content relates. For example, content such as personalized augmented reality typography displayed at specific locations based on geolocation coordinates and features of an environment may be made available as a "story" for the duration of a time period. The collection management system **204** may also be responsible for publishing an icon that provides notification of the existence of a particular collection to the user interface of the messaging client application **104**.

The collection management system **204** furthermore includes a curation interface **208** that allows a collection manager to manage and curate a particular collection of content. For example, the curation interface **208** enables an event organizer to curate a collection of content relating to a specific event (e.g., delete inappropriate content or redun-

dant messages). Additionally, the collection management system **204** employs machine vision (or image recognition technology) and content rules to automatically curate a content collection. In certain embodiments, compensation may be paid to a user for inclusion of user generated content into a collection. In such cases, the curation interface **208** operates to automatically make payments to such users for the use of their content.

The annotation system **206** provides various functions that enable a user to annotate or otherwise modify or edit media content associated with a message. For example, the annotation system **206** provides functions related to the generation and publishing of media overlays for messages processed by the messaging system **100**. The annotation system **206** operatively supplies a media overlay (e.g., a SNAPCHAT filter) to the messaging client application **104** based on a geolocation of the client device **102**. In another example, the annotation system **206** operatively supplies a media overlay to the messaging client application **104** based on other information, such as, social network information of the user of the client device **102**. A media overlay may include audio and visual content and visual effects. Examples of audio and visual content include anamorphic media, pictures, texts, logos, animations, and sound effects. An example of a visual effect includes color overlaying, or projecting an anamorphic media item over a presentation depicting a space. The audio and visual content or the visual effects can be applied to a media content item (e.g., a photo) at the client device **102**. For example, the media overlay including text that can be overlaid on top of a photograph or video stream generated taken by the client device **102**. In another example, the media overlay includes an identification of a location overlay (e.g., Venice beach), a name of a live event, or a name of a merchant overlay (e.g., Beach Coffee House). In another example, the annotation system **206** uses the geolocation of the client device **102** to identify a media overlay that includes the name of a merchant at the geolocation of the client device **102**. The media overlay may include other indicia associated with the merchant. The media overlays may be stored in the database(s) **120** and accessed through the database server(s) **118**.

In one example embodiment, the annotation system **206** provides a user-based publication platform that enables users to select a geolocation on a map, and upload content associated with the selected geolocation. The user may also specify circumstances under which a particular media overlay should be offered to other users. The annotation system **206** generates a media overlay that includes the uploaded content and associates the uploaded content with the selected geolocation.

In another example embodiment, the annotation system **206** provides a merchant-based publication platform that enables merchants to select a particular media overlay associated with a geolocation via a bidding process. For example, the annotation system **206** associates the media overlay of a highest bidding merchant with a corresponding geolocation for a predefined amount of time

FIG. **3** is a schematic diagram **300** illustrating data which may be stored in the database(s) **120** of the messaging server system **108**, according to certain example embodiments. While the content of the database(s) **120** is shown to comprise a number of tables, it will be appreciated that the data could be stored in other types of data structures (e.g., as an object-oriented database).

The database(s) **120** includes message data stored within a message table **314**. The entity table **302** stores entity data, including an entity graph **304**. Entities for which records are maintained within the entity table **302** may include individuals, corporate entities, organizations, objects, places, events etc. Regardless of type, any entity regarding which the messaging server system **108** stores data may be a recognized entity. Each entity is provided with a unique identifier, as well as an entity type identifier (not shown).

The entity graph **304** furthermore stores information regarding relationships and associations between entities. Such relationships may be social, professional (e.g., work at a common corporation or organization) interested-based or activity-based, merely for example.

The database(s) **120** also stores annotation data, in the example form of filters, in an annotation table **312**. Filters for which data is stored within the annotation table **312** are associated with and applied to videos (for which data is stored in a video table **310**) and/or images (for which data is stored in an image table **308**). Filters, in one example, are overlays (e.g., anamorphic media items) that are displayed as overlaid on an image or video during presentation to a recipient user. For example, the overlay may include an anamorphic media item displayed within a presentation of a space, such that the anamorphic media item appears to be projected over a set of three dimensional surfaces of a space, following the contours of the surfaces of the space. Filters may be of varies types, including a user-selected filters from a gallery of filters presented to a sending user by the messaging client application **104** when the sending user is composing a message. Other types of filers include geolocation filters (also known as geo-filters) which may be presented to a sending user based on geographic location. For example, geolocation filters specific to a neighborhood or special location may be presented within a user interface by the messaging client application **104**, based on geolocation information determined by a GPS unit of the client device **102**. Another type of filer is a data filer, which may be selectively presented to a sending user by the messaging client application **104**, based on other inputs or information gathered by the client device **102** during the message creation process. Example of data filters include current temperature at a specific location, a current speed at which a sending user is traveling, battery life for a client device **102** or the current time.

Other annotation data that may be stored within the image table **308** is so-called "lens" data. A "lens" may be a real-time special effect and sound that may be added to an image or a video.

As mentioned above, the video table **310** stores video data which, in one embodiment, is associated with messages for which records are maintained within the message table **314**. Similarly, the image table **308** stores image data associated with messages for which message data is stored in the entity table **302**. The entity table **302** may associate various annotations from the annotation table **312** with various images and videos stored in the image table **308** and the video table **310**.

A story table **306** stores data regarding collections of messages and associated image, video or audio data, which are compiled into a collection (e.g., a SNAPCHAT story or a gallery). The creation of a particular collection may be initiated by a particular user (e.g., each user for which a record is maintained in the entity table **302**) A user may create a "personal story" in the form of a collection of content that has been created and sent/broadcast by that user. To this end, the user interface of the messaging client application **104** may include an icon that is user selectable to enable a sending user to add specific content to his or her personal story.

A collection may also constitute a "live story," which is a collection of content from multiple users that is created manually, automatically or using a combination of manual and automatic techniques. For example, a "live story" may constitute a curated stream of user-submitted content from varies locations and events. Users, whose client devices have location services enabled and are at a common location event at a particular time may, for example, be presented with an option, via a user interface of the messaging client application **104**, to contribute content to a particular live story. The live story may be identified to the user by the messaging client application **104**, based on his or her location. The end result is a "live story" told from a community perspective.

A further type of content collection is known as a "location story," which enables a user whose client device **102** is located within a specific geographic location (e.g., on a college or university campus) to contribute to a particular collection. In some embodiments, a contribution to a location story may require a second degree of authentication to verify that the end user belongs to a specific organization or other entity (e.g., is a student on the university campus).

FIG. **4** is a schematic diagram illustrating a structure of a message **400**, according to some in some embodiments, generated by a messaging client application **104** for communication to a further messaging client application **104** or the messaging server application **114**. The content of a particular message **400** is used to populate the message table **314** stored within the database(s) **120**, accessible by the messaging server application **114**. Similarly, the content of a message **400** is stored in memory as "in-transit" or "in-flight" data of the client device **102** or the application server **112**. The message **400** is shown to include the following components:

- A message identifier **402**: a unique identifier that identifies the message **400**.
- A message text payload **404**: text, to be generated by a user via a user interface of the client device **102** and that is included in the message **400**.
- A message image payload **406**: image data, captured by a camera component of a client device **102** or retrieved from memory of a client device **102**, and that is included in the message **400**.
- A message video payload **408**: video data, captured by a camera component or retrieved from a memory component of the client device **102** and that is included in the message **400**.
- A message audio payload **410**: audio data, captured by a microphone or retrieved from the memory component of the client device **102**, and that is included in the message **400**.
- A message annotations **412**: annotation data (e.g., filters, stickers or other enhancements) that represents annotations to be applied to message image payload **406**, message video payload **408**, or message audio payload **410** of the message **400**.
- A message duration parameter **414**: parameter value indicating, in seconds, the amount of time for which content of the message (e.g., the message image payload **406**, message video payload **408**, message audio payload **410**) is to be presented or made accessible to a user via the messaging client application **104**.
- A message geolocation parameter **416**: geolocation data (e.g., latitudinal and longitudinal coordinates) associated with the content payload of the message. Multiple message geolocation parameter **416** values may be included in the payload, each of these parameter values being associated with respect to content items included in the content (e.g., a specific image into within the message image payload **406**, or a specific video in the message video payload **408**).
- A message story identifier **418**: identifier values identifying one or more content collections (e.g., "stories") with which a particular content item in the message image payload **406** of the message **400** is associated. For example, multiple images within the message image payload **406** may each be associated with multiple content collections using identifier values.
- A message tag **420**: each message **400** may be tagged with multiple tags, each of which is indicative of the subject matter of content included in the message payload. For example, where a particular image included in the message image payload **406** depicts an animal (e.g., a lion), a tag value may be included within the message tag **420** that is indicative of the relevant animal. Tag values may be generated manually, based on user input, or may be automatically generated using, for example, image recognition.
- A message sender identifier **422**: an identifier (e.g., a messaging system identifier, email address or device identifier) indicative of a user of the client device **102** on which the message **400** was generated and from which the message **400** was sent
- A message receiver identifier **424**: an identifier (e.g., a messaging system identifier, email address or device identifier) indicative of a user of the client device **102** to which the message **400** is addressed.

The contents (e.g. values) of the various components of message **400** may be pointers to locations in tables within which content data values are stored. For example, an image value in the message image payload **406** may be a pointer to (or address of) a location within an image table **308**. Similarly, values within the message video payload **408** may point to data stored within a video table **310**, values stored within the message annotations **412** may point to data stored in an annotation table **312**, values stored within the message story identifier **418** may point to data stored in a story table **306**, and values stored within the message sender identifier **422** and the message receiver identifier **424** may point to user records stored within an entity table **302**.

FIG. **5** is a block diagram **500** illustrating components of the typography personalization system **124**, that configure the typography personalization system **124** to identify occurrences of typography in a presentation of an image, and enable personalization of the typography, according to various example embodiments. The typography personalization system **124** is shown as including a presentation module **502**, an identification module **504**, and a feature tracking module **506**, all, or some, configured to communicate with each other (e.g., via a bus, shared memory, or a switch). Any one or more of these modules may be implemented using one or more processors **508** (e.g., by configuring such one or more processors to perform functions described for that module) and hence may include one or more of the processors **508**.

Any one or more of the modules described may be implemented using hardware alone (e.g., one or more of the processors **508** of a machine) or a combination of hardware and software. For example, any module described of the typography personalization system **124** may physically include an arrangement of one or more of the processors **508** (e.g., a subset of or among the one or more processors of the machine) configured to perform the operations described herein for that module. As another example, any module of

the typography personalization **124** may include software, hardware, or both, that configure an arrangement of one or more processors **508** (e.g., among the one or more processors of the machine) to perform the operations described herein for that module. Accordingly, different modules of the typography personalization system **124** may include and configure different arrangements of such processors **508** or a single arrangement of such processors **508** at different points in time. Moreover, any two or more modules of the typography personalization system **124** may be combined into a single module, and the functions described herein for a single module may be subdivided among multiple modules. Furthermore, according to various example embodiments, modules described herein as being implemented within a single machine, database, or device may be distributed across multiple machines, databases, or devices.

FIG. **6** is a flowchart illustrating various operations of the typography personalization system **124** in performing a method **600** for personalizing an occurrence of typography within a presentation of an image, according to certain example embodiments. Operations of the method **600** may be performed by the modules described above with respect to FIG. **5**. As shown in FIG. **6**, the method **600** includes one or more operations **602**, **604**, **606**, **608**, and **610**.

Operations **602** and **604** may be performed by the presentation module **502**. At operation **602**, the presentation module **502** captures an image depicting a physical location. For example, the client device **102** may include a camera element configured to record images of a physical location. The presentation module **502** may access the camera element of the client device **102** and generate an image based on the recorded images. For example, the image captured by the presentation module **502** may include video or still images.

At operation **604**, the presentation module **502** analyzes the image to identify one or more occurrences of typography within the image. As discussed above, the image may depict a physical location, wherein the physical location includes one or more occurrences of typography. For example, the image may depict a street intersection that includes street signs, stop signs, billboards, as well as cars with license plates, that all include occurrences of typography. The occurrences of typography therefore could include text strings such as the word "STOP" on a stop sign, the letters and numbers of a license plate, as well as a word or phrase presented on a billboard. The occurrences of typography may also include corresponding background patterns. For example, in the case of a stop sign, the typography of the stop sign "STOP" is presented over a red background, while a logo painted on a brick wall would have a brick background.

Operation **606** may be performed by the identification module **504**. At operation **606**, the identification module **504** identifies properties of the occurrences of typography within the presentation of the images. The properties of the typography may for example include size (e.g., height, length, number of characters), location (i.e., where it is in the image), color, opacity, a character-set (i.e., the letters and numbers that make up the typography) and in some embodiments a typeface (or that the typeface is serif or sans serif).

In some example embodiments, the identification module **504** identifies positions of the occurrences of typography in the presentation of the image based on NFT techniques. For example, the identification module **504** may identify one or more features within the presentation and determines a relative position of the occurrences of typography relative to one another and in relation to the features.

In some example embodiments, the identification module **504** identifies a typeface and a font of the typeface, of an occurrence of typography. Having determined the front and the typeface of the occurrence of typography, the identification module **504** compares the font and the typeface against a catalogue of fronto-parallel views of fonts and typefaces to determine deformities of the occurrence of typography. Based on the deformities of the occurrence of typography, the identification module **504** may identify a position and geometry of a surface in which the occurrence of typography appears, in order to identify a shape of the surface.

For example, the identification module **504** identifies a typeface of the occurrence of typography based on properties of the text string. In response to identifying the typeface, the identification module **504** compares the text string against a set of characters from a catalogue of characters, based on the typeface (e.g., Times New Roman, Ariel, Wingdings, etc.), to identify evidence of distortion and deformities in the text string. Based on the distortion and deformities, the identifications module **504** determines a shape of a surface in which the text string appears.

Operations **608** and **610** may be performed by the presentation module **502**. At operation **608**, the presentation module **502** receives a personalization request to alter or edit one or more of the occurrences of typography identified in the presentation of the image. For example, the personalization request may include a request to remove one or more characters from a text string (e.g., the typography). In some example embodiments, the feature tracking module **506** generates and causes display of a text field to receive changes (e.g., deletions and additions) to the typography at positions overlaid upon the occurrences of typography. For example, the feature tracking module **506** may identify one or more features within the presentation, and generate and cause display of the text fields at positions within the presentation such that as the user moves, the text fields remain in their relative positions. The user may select one or more of the occurrences of typography and provide changes (e.g., additions, deletions) directly into the text field.

In some example embodiments, the personalization request may include a request to alter or change other feature of the occurrence of typography, beyond the typography itself. For example, a user may provide inputs specifying that a background color or pattern within the presentation be changed (e.g., change a red sign to a green sign). In further embodiments, the personalization request may include a request to add an image retrieved from a database to the presentation. For example, a user may access a database or repository of images that includes an image of a face, and specify a location within the presentation in which to add the image of the face. In this way, a user may alter or otherwise change elements within the presentation beyond simply the typography itself. For example, the personalization request may specify that all occurrences of the word "apple" identified within an image be replaced with a picture selected by the user (e.g., an image of an apple).

At operation **610**, the presentation module **502** generates a presentation of the image, wherein the presentation of the image includes an updated text string based on the personalization request. In some example embodiments, the updated txt string may be presented based on the form of the surface identified by the identification module **504**, based on deformities of the typeface. For example, one or more characters of the text string may be changed or removed from the image, and replaced with new characters, or simply filled in with the background pattern.

As an illustrative example, the occurrence of typography identified by the identification module **504** may include a billboard that includes an advertisement with a text string that reads "WINCHESTER MYSTERY HOUSE." The identification module **504** identifies the text string, and a position of the text string in the presentation, and generates and causes display of a text field at the location of the text string (overlaid on top of the text string in the presentation of the image).

A user selects the text string and provides inputs directly into the text field to personalize the typography. The inputs may for example include: adding or deleting characters, changing colors of the typography, changing a typeface of the typography, translating the typography into a different language (e.g., English to Chinese), and changing a size of the typography. For example, the user may change or delete one or more characters of the text string ("WINCHESTER MYSTERY HOUSE") such that the presentation displays the text string as "WINCHESTER MYSTERY MOUSE," or anything else.

In some example embodiments, the typography personalization system **124** may identify and alter a presentation that includes the occurrence of typography, in response to the identification module **504** detecting the occurrence of typography based on attributes of the typography (e.g., a set of characters, a typeface, a color, an image among the characters, a logo, etc.). For example, a user may generate a personalization request that alters all occurrences of the word "EXIT" detected by the identification module **504**, in real-time.

In further embodiments, the user may attach the personalization request to a message, wherein the message is deliverable to one or more client devices (e.g., a recipient), and the recipients of the message may similarly alter presentations of images that include the occurrence of typography of the personalization request. For example, the personalization request may be tagged to a specific word or phrase, such that when the identification module **504** detects the word or phrase, the presentation module **502** alters the presentation based on the personalization request.

In further embodiments, the personalization may be tied to a specific occurrence of typograph (e.g., a word or phrase), and a creator of the personalization request may alter the personalization request, such that presentations of the occurrence of typography displayed at recipient devices are altered in real time. For example, a creating user may create a personalization request for occurrences of the word "STOP," and transmit the personalization request to a recipient. As the creating user alter the personalization request, displays of the word "STOP" at the recipient device may be altered by the presentation module **502**, in real-time.

FIG. **7** is a diagram illustrating various operations of the typography personalization system **124** in performing a method **700** for altering a presentation of an occurrence of typography at a client device based on a personalization request, according to certain example embodiments. Operations of the method **700** may be performed by the modules described above with respect to FIG. **5**. As shown in FIG. **7**, the method **700** includes one or more operations **702**, **704**, **706**, and **708** that may be performed as part (e.g., a precursor task, a subroutine, or a portion) of the method **600**, according to some example embodiments.

Operation **702** may be performed by the identification module **504**. At operation **702**, the identification module **504** retrieves location data of the physical location depicted by the image. For example, the identification module **504** may retrieve geolocation coordinates from the client device **102** in response to causing display of the image within the presentation at the client device **102**. In some example embodiments, the identification module **504** may parse image data of the image to retrieve image metadata indicating a location in which the image was captured.

Operations **704** may be performed by the presentation module **502**. At operation **704**, the presentation module **502** geo-tags the personalization request received at operation **608** of FIG. **6** with the geolocation coordinates of the location depicted in the image. For example, by geo-tagging the personalization request, the typography personalization system **124** may apply the personalization request received from the client device **102** (e.g., a first client device) to presentations of images that include the occurrence of typography and location data indicating the location at other client devices (e.g., a second client device).

At operation **706**, the identification module **504** detects a second client device at the physical location. For example, the typography personalization system **124** may generate and maintain a geofence that encompasses the location identified by the location data of the image, in response to geotagging the image with the personalization request. A geofence is a virtual geographic boundary, defined by Global Positioning Systems (GPS), WiFi, Radio-Frequency Identification (RFID), or Cellular systems, that enables systems to trigger a response when a device is detecting in proximity with, or transgressing a boundary of the geofence. A second client device may transgress a boundary of a geofence that encompasses the location and in response the identification module **504** may identify the second client device. In further embodiments, the presentation module **502** may receive an indication that the second client device has captured an image depicting the location to generate and cause display of a presentation of the image at the second client device.

In some example embodiments, the identification module **504** accesses a user profile associated with a user of the second client device to retrieve user profile data, in response to detecting the second client device at the physical location. For example, the user profile of the user may include user profile information including a name and username, as well as demographics details and other associated user profile information (e.g., "likes," purchase behavior, a friend list, etc.).

Operation **708** may be performed by the presentation module **502**. At operation **708**, the presentation module **502** personalizes the presentation of the image captured by the second client device in response to detecting the second client device at the location. For example, the image may include the occurrence of typography referenced by the personalization request. In response to detecting the second client device at the location, and causing display of the presentation of the image, the presentation module **502** may personalize the occurrence of typography within the presentation based on the personalization request.

In some example embodiments, the presentation module **502** may personalize the presentation of the image based on the user profile data of the user associated with the client device. For example, the presentation module **502** may replace a text string in the image with a new text string based on user profile data of the user, such as a name of the user.

In some example embodiments, the personalization request may include access or viewing credentials that include user authorization criteria. For example, the personalization request may include a set of user identifiers, such that the typography personalization system **124** only personalizes presentation of an occurrence of typography based

on the personalization request of users identified by the user identifiers in the personalization request.

FIG. **8**A is a representation **800**A of an image **802** that includes a depiction of an occurrence of typography **804**A, according to certain example embodiments. As discussed in FIG. **6**, a user of a client device **102** may capture the image **802**, and the identification module **504** identifies the occurrence of typography **804**A. The image **802** may include metadata such as geolocation coordinates, temporal components (e.g., a timestamp), as well as an identifier of a source of the image (e.g., client device **102**).

As discussed in operation **604** of FIG. **6**, the presentation module **502** causes display of a presentation of the image **802**. The presentation of the image **802** may be displayed within a graphical user interface presented at the client device **102**. The image **802** may depict a physical location (e.g., a road with a sign), wherein the physical location includes one or more occurrences of typography (e.g., the occurrence of typography **804**A).

FIG. **8**B is a representation **800**B of the image **802**, that includes a personalized occurrence of typography **804**B, according to certain example embodiments. Operations **608** and **610** may be performed by the presentation module **502**. As discussed in FIG. **6**, the presentation module **502** receives a personalization request to alter or edit elements within the image **802** including the occurrence of typograph **804**A. For example, the personalization request may include a request to alter one or more characters in the occurrence of typography **804**A (e.g., change the "O" in stop to an "AH"). In response to receiving the request, the feature tracking module **506** generates and causes display of a text field to receive changes (e.g., deletions and additions) to the occurrence of typography **804**A, and the presentation module **502** updates the presentation of the occurrence of typography **804**A to display the personalized occurrence of typography **804**B, based on the personalization request. As the user of the client device **102** changes perspectives, the feature tracking module **506** maintains the relative position of the personalized occurrence of typography **804**B based on one or more features tracked by the feature tracking module **506**.

In some example embodiments, the personalization request from the user may include a request to change a color or pattern of the stop sign depicted in the image **802**. For example, the user may select the stop sign in the image **802**, and in response, the identification module **504** may identify boundaries of the stop sign based on features of the image **802** in response to receiving the selection of the stop sign. For example, the identification module **504** may apply feature identification techniques to determine boundaries of the stop sign based on contrasting colors, or changes in pattern or texture. Upon detecting the boundaries of the stop sign, the typography personalization system **124** may prompt the user to specify a color or pattern in which to add to the stop sign. The user may thereby specify a new color (e.g., green), or in some embodiments, may select an image or pattern from a data repository, which the presentation module **502** may thereby apply to the background of the stop sign of the image **802**.

FIG. **9**A is a representation **900**A of an image **902** that includes features such as an occurrence of typography **912**, a background **910**, and an image of a face **906**A, according to certain example embodiments. As discussed in FIG. **6**, a user of a client device **102** may capture the image **902**, and the identification module **504** identifies the one or more features of the image **902** based on image recognition techniques. The image **902** may additionally include metadata such as geolocation coordinates, temporal components (e.g., a timestamp), as well as an identifier of a source of the image (e.g., client device **102**).

As discussed in operation **604** of FIG. **6**, the presentation module **502** causes display of a presentation of the image **902** at a client device **102**. The presentation of the image **902** may be displayed within a graphical user interface presented at the client device **102**. The image **902** may depict a physical location (e.g., a billboard).

FIG. **9**B is a representation **900**B of the image **902**, personalized based on a personalization request received from a user of the client device **102**. As discussed in FIG. **6**, the presentation module **502** receives a personalization request to alter or edit elements within the image **902** including features such as the background **910**. For example, the personalization request may include a request to change the background **910** from a first color to a second color (e.g., from red to green), or to replace the background **910** with a pattern retrieved from a repository associated with the client device **102**. For example, in response to selecting the background **910** of the image **902**, the personalization system **124** may prompt the user to select a color or pattern to replace the background **910**. The user may thereby select a color or pattern from among a selection of colors and patterns, retrieved from a database (e.g., database **120**).

In some example embodiments, the personalization request may include a request to "face-swap" the face **906**A of FIG. **9**A to a face **906**B, as depicted in FIG. **9**B. For example, in response to receiving a selection of the face **906**A of FIG. **9**A, the identification module **504** may determine that **906**A is a depiction of a face, and in response prompt the user to select another face from among a selection of faces to face-swap. The selection of faces may be retrieved from a database **120**, wherein the database **120** may be populated with images captured by the user on the client device **102**, or in some example embodiments may include faces retrieved from a third party network. The user may select a face e.g., **906**B), and in response, the presentation module **502** may cause display of the face **906**B in the location of the face **906**A.

Software Architecture

FIG. **10** is a block diagram illustrating an example software architecture **1006**, which may be used in conjunction with various hardware architectures herein described. FIG. **10** is a non-limiting example of a software architecture and it will be appreciated that many other architectures may be implemented to facilitate the functionality described herein. The software architecture **1006** may execute on hardware such as machine **1000** of FIG. **10** that includes, among other things, processors **1004**, memory **1014**, and I/O components **1018**. A representative hardware layer **1052** is illustrated and can represent, for example, the machine **1000** of FIG. **10**. The representative hardware layer **1052** includes a processing unit **1054** having associated executable instructions **1004**. Executable instructions **1004** represent the executable instructions of the software architecture **1006**, including implementation of the methods, components and so forth described herein. The hardware layer **1052** also includes memory and/or storage modules memory/storage **1056**, which also have executable instructions **1004**. The hardware layer **1052** may also comprise other hardware **1058**.

In the example architecture of FIG. **10**, the software architecture **1006** may be conceptualized as a stack of layers where each layer provides particular functionality. For example, the software architecture **1006** may include layers such as an operating system **1002**, libraries **1020**, applications **1016** and a presentation layer **1014**. Operationally, the applications **1016** and/or other components within the layers

may invoke application programming interface (API) API calls **1008** through the software stack and receive a response as in response to the API calls **1008**. The layers illustrated are representative in nature and not all software architectures have all layers. For example, some mobile or special purpose operating systems may not provide a frameworks/middleware **1018**, while others may provide such a layer. Other software architectures may include additional or different layers.

The operating system **1002** may manage hardware resources and provide common services. The operating system **1002** may include, for example, a kernel **1022**, services **1024** and drivers **1026**. The kernel **1022** may act as an abstraction layer between the hardware and the other software layers. For example, the kernel **1022** may be responsible for memory management, processor management (e.g., scheduling), component management, networking, security settings, and so on. The services **1024** may provide other common services for the other software layers. The drivers **1026** are responsible for controlling or interfacing with the underlying hardware. For instance, the drivers **1026** include display drivers, camera drivers, Bluetooth® drivers, flash memory drivers, serial communication drivers (e.g., Universal Serial Bus (USB) drivers), Wi-Fi® drivers, audio drivers, power management drivers, and so forth depending on the hardware configuration.

The libraries **1020** provide a common infrastructure that is used by the applications **1016** and/or other components and/or layers. The libraries **1020** provide functionality that allows other software components to perform tasks in an easier fashion than to interface directly with the underlying operating system **1002** functionality (e.g., kernel **1022**, services **1024** and/or drivers **1026**). The libraries **1020** may include system libraries **1044** (e.g., C standard library) that may provide functions such as memory allocation functions, string manipulation functions, mathematical functions, and the like. In addition, the libraries **1020** may include API libraries **1046** such as media libraries (e.g., libraries to support presentation and manipulation of various media format such as MPREG4, H.264, MP3, AAC, AMR, JPG, PNG), graphics libraries (e.g., an OpenGL framework that may be used to render 2D and 3D in a graphic content on a display), database libraries (e.g., SQLite that may provide various relational database functions), web libraries (e.g., WebKit that may provide web browsing functionality), and the like. The libraries **1020** may also include a wide variety of other libraries **1048** to provide many other APIs to the applications **1016** and other software components/modules.

The frameworks/middleware **1018** (also sometimes referred to as middleware) provide a higher-level common infrastructure that may be used by the applications **1016** and/or other software components/modules. For example, the frameworks/middleware **1018** may provide various graphic user interface (GUI) functions, high-level resource management, high-level location services, and so forth. The frameworks/middleware **1018** may provide a broad spectrum of other APIs that may be utilized by the applications **1016** and/or other software components/modules, some of which may be specific to a particular operating system **1002** or platform.

The applications **1016** include built-in applications **1038** and/or third-party applications **1040**. Examples of representative built-in applications **1038** may include, but are not limited to, a contacts application, a browser application, a book reader application, a location application, a media application, a messaging application, and/or a game application. Third-party applications **1040** may include an application developed using the ANDROID™ or IOS™ software development kit (SDK) by an entity other than the vendor of the particular platform, and may be mobile software running on a mobile operating system such as IOS™, ANDROID™, WINDOWS® Phone, or other mobile operating systems. The third-party applications **1040** may invoke the API calls **1008** provided by the mobile operating system (such as operating system **1002**) to facilitate functionality described herein.

The applications **1016** may use built in operating system functions (e.g., kernel **1022**, services **1024** and/or drivers **1026**), libraries **1020**, and frameworks/middleware **1018** to create user interfaces to interact with users of the system. Alternatively, or additionally, in some systems interactions with a user may occur through a presentation layer, such as presentation layer **1014**. In these systems, the application/component "logic" can be separated from the aspects of the application/component that interact with a user.

FIG. **11** is a block diagram illustrating components of a machine **1100**, according to some example embodiments, able to read instructions from a machine-readable medium (e.g., a machine-readable storage medium) and perform any one or more of the methodologies discussed herein. Specifically, FIG. **11** shows a diagrammatic representation of the machine **1100** in the example form of a computer system, within which instructions **1110** (e.g., software, a program, an application, an applet, an app, or other executable code) for causing the machine **1100** to perform any one or more of the methodologies discussed herein may be executed. As such, the instructions **1110** may be used to implement modules or components described herein. The instructions **1110** transform the general, non-programmed machine **1100** into a particular machine **1100** programmed to carry out the described and illustrated functions in the manner described. In alternative embodiments, the machine **1100** operates as a standalone device or may be coupled (e.g., networked) to other machines. In a networked deployment, the machine **1100** may operate in the capacity of a server machine or a client machine in a server-client network environment, or as a peer machine in a peer-to-peer (or distributed) network environment. The machine **1100** may comprise, but not be limited to, a server computer, a client computer, a personal computer (PC), a tablet computer, a laptop computer, a netbook, a set-top box (STB), a personal digital assistant (PDA), an entertainment media system, a cellular telephone, a smart phone, a mobile device, a wearable device (e.g., a smart watch), a smart home device (e.g., a smart appliance), other smart devices, a web appliance, a network router, a network switch, a network bridge, or any machine capable of executing the instructions **1110**, sequentially or otherwise, that specify actions to be taken by machine **1100**. Further, while only a single machine **1100** is illustrated, the term "machine" shall also be taken to include a collection of machines that individually or jointly execute the instructions **1110** to perform any one or more of the methodologies discussed herein.

The machine **1100** may include processors **1104**, memory memory/storage **1106**, and I/O components **1118**, which may be configured to communicate with each other such as via a bus **1102**. The memory/storage **1106** may include a memory **1114**, such as a main memory, or other memory storage, and a storage unit **1116**, both accessible to the processors **1104** such as via the bus **1102**. The storage unit **1116** and memory **1114** store the instructions **1110** embodying any one or more of the methodologies or functions described herein. The instructions **1110** may also reside, completely or partially, within the memory **1114**, within the

storage unit **1116**, within at least one of the processors **1104** (e.g., within the processor's cache memory), or any suitable combination thereof, during execution thereof by the machine **1100**. Accordingly, the memory **1114**, the storage unit **1116**, and the memory of processors **1104** are examples of machine-readable media.

The I/O components **1118** may include a wide variety of components to receive input, provide output, produce output, transmit information, exchange information, capture measurements, and so on. The specific I/O components **1118** that are included in a particular machine **1100** will depend on the type of machine. For example, portable machines such as mobile phones will likely include a touch input device or other such input mechanisms, while a headless server machine will likely not include such a touch input device. It will be appreciated that the I/O components **1118** may include many other components that are not shown in FIG. **11**. The I/O components **1118** are grouped according to functionality merely for simplifying the following discussion and the grouping is in no way limiting. In various example embodiments, the I/O components **1118** may include output components **1126** and input components **1128**. The output components **1126** may include visual components (e.g., a display such as a plasma display panel (PDP), a light emitting diode (LED) display, a liquid crystal display (LCD), a projector, or a cathode ray tube (CRT)), acoustic components (e.g., speakers), haptic components (e.g., a vibratory motor, resistance mechanisms), other signal generators, and so forth. The input components **1128** may include alphanumeric input components (e.g., a keyboard, a touch screen configured to receive alphanumeric input, a photo-optical keyboard, or other alphanumeric input components), point based input components (e.g., a mouse, a touchpad, a trackball, a joystick, a motion sensor, or other pointing instrument), tactile input components (e.g., a physical button, a touch screen that provides location and/or force of touches or touch gestures, or other tactile input components), audio input components (e.g., a microphone), and the like.

In further example embodiments, the I/O components **1118** may include biometric components **1130**, motion components **1134**, environmental environment components **1136**, or position components **1138** among a wide array of other components. For example, the biometric components **1130** may include components to detect expressions (e.g., hand expressions, facial expressions, vocal expressions, body gestures, or eye tracking), measure biosignals (e.g., blood pressure, heart rate, body temperature, perspiration, or brain waves), identify a person (e.g., voice identification, retinal identification, facial identification, fingerprint identification, or electroencephalogram based identification), and the like. The motion components **1134** may include acceleration sensor components (e.g., accelerometer), gravitation sensor components, rotation sensor components (e.g., gyroscope), and so forth. The environment components **1136** may include, for example, illumination sensor components (e.g., photometer), temperature sensor components (e.g., one or more thermometer that detect ambient temperature), humidity sensor components, pressure sensor components (e.g., barometer), acoustic sensor components (e.g., one or more microphones that detect background noise), proximity sensor components (e.g., infrared sensors that detect nearby objects), gas sensors (e.g., gas detection sensors to detection concentrations of hazardous gases for safety or to measure pollutants in the atmosphere), or other components that may provide indications, measurements, or signals corresponding to a surrounding physical environment. The position components **1138** may include location sensor components (e.g., a Global Position system (GPS) receiver component), altitude sensor components (e.g., altimeters or barometers that detect air pressure from which altitude may be derived), orientation sensor components (e.g., magnetometers), and the like.

Communication may be implemented using a wide variety of technologies. The I/O components **1118** may include communication components **1140** operable to couple the machine **1100** to a network **1132** or devices **1120** via coupling **1122** and coupling **1124** respectively. For example, the communication components **1140** may include a network interface component or other suitable device to interface with the network **1132**. In further examples, communication components **1140** may include wired communication components, wireless communication components, cellular communication components, Near Field Communication (NFC) components, Bluetooth® components (e.g., Bluetooth® Low Energy), Wi-Fi® components, and other communication components to provide communication via other modalities. The devices **1120** may be another machine or any of a wide variety of peripheral devices (e.g., a peripheral device coupled via a Universal Serial Bus (USB)).

Moreover, the communication components **1140** may detect identifiers or include components operable to detect identifiers. For example, the communication components **1140** may include Radio Frequency Identification (RFID) tag reader components, NFC smart tag detection components, optical reader components (e.g., an optical sensor to detect one-dimensional bar codes such as Universal Product Code (UPC) bar code, multi-dimensional bar codes such as Quick Response (QR) code, Aztec code, Data Matrix, Dataglyph, MaxiCode, PDF417, Ultra Code, UCC RSS-2D bar code, and other optical codes), or acoustic detection components (e.g., microphones to identify tagged audio signals). In addition, a variety of information may be derived via the communication components **1140**, such as, location via Internet Protocol (IP) geo-location, location via Wi-Fi® signal triangulation, location via detecting a NFC beacon signal that may indicate a particular location, and so forth.

Glossary

"ANAMORPHOSIS" in this context refers to distortions and transformations applied to a media items such as images and videos, such that the media items appear normal when viewed from a particular point or through a suitable viewing device, mirror, or lens.

"PERSPECTIVE" in this context refers to a viewing angle of a user at a particular location.

"CARRIER SIGNAL" in this context refers to any intangible medium that is capable of storing, encoding, or carrying instructions for execution by the machine, and includes digital or analog communications signals or other intangible medium to facilitate communication of such instructions. Instructions may be transmitted or received over the network using a transmission medium via a network interface device and using any one of a number of well-known transfer protocols.

"CLIENT DEVICE" in this context refers to any machine that interfaces to a communications network to obtain resources from one or more server systems or other client devices. A client device may be, but is not limited to, a mobile phone, desktop computer, laptop, portable digital assistants (PDAs), smart phones, tablets, ultra books, netbooks, laptops, multi-processor systems, microprocessor-

based or programmable consumer electronics, game consoles, set-top boxes, or any other communication device that a user may use to access a network.

"COMMUNICATIONS NETWORK" in this context refers to one or more portions of a network that may be 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), the Internet, a portion of the Internet, a portion of the Public Switched Telephone Network (PSTN), a plain old telephone service (POTS) network, a cellular telephone network, a wireless network, a Wi-Fi® network, another type of network, or a combination of two or more such networks. For example, a network or a portion of a network may include a wireless or cellular network and the coupling may be a Code Division Multiple Access (CDMA) connection, a Global System for Mobile communications (GSM) connection, or other type of cellular or wireless coupling. In this example, the coupling may implement any of a variety of types of data transfer technology, such as Single Carrier Radio Transmission Technology (1×RTT), Evolution-Data Optimized (EVDO) technology, General Packet Radio Service (GPRS) technology, Enhanced Data rates for GSM Evolution (EDGE) technology, third Generation Partnership Project (3GPP) including 3G, fourth generation wireless (4G) networks, Universal Mobile Telecommunications System (UMTS), High Speed Packet Access (HSPA), Worldwide Interoperability for Microwave Access (WiMAX), Long Term Evolution (LTE) standard, others defined by various standard setting organizations, other long range protocols, or other data transfer technology.

"EMPHEMERAL MESSAGE" in this context refers to a message that is accessible for a time-limited duration. An ephemeral message may be a text, an image, a video and the like. The access time for the ephemeral message may be set by the message sender. Alternatively, the access time may be a default setting or a setting specified by the recipient. Regardless of the setting technique, the message is transitory.

"MACHINE-READABLE MEDIUM" in this context refers to a component, device or other tangible media able to store instructions and data temporarily or permanently and may include, but is not be limited to, random-access memory (RAM), read-only memory (ROM), buffer memory, flash memory, optical media, magnetic media, cache memory, other types of storage (e.g., Erasable Programmable Read-Only Memory (EEPROM)) and/or any suitable combination thereof. The term "machine-readable medium" should be taken to include a single medium or multiple media (e.g., a centralized or distributed database, or associated caches and servers) able to store instructions. The term "machine-readable medium" shall also be taken to include any medium, or combination of multiple media, that is capable of storing instructions (e.g., code) for execution by a machine, such that the instructions, when executed by one or more processors of the machine, cause the machine to perform any one or more of the methodologies described herein. Accordingly, a "machine-readable medium" refers to a single storage apparatus or device, as well as "cloud-based" storage systems or storage networks that include multiple storage apparatus or devices. The term "machine-readable medium" excludes signals per se.

"COMPONENT" in this context refers to a device, physical entity or logic having boundaries defined by function or subroutine calls, branch points, application program interfaces (APIs), or other technologies that provide for the partitioning or modularization of particular processing or control functions. Components may be combined via their interfaces with other components to carry out a machine process. A component may be a packaged functional hardware unit designed for use with other components and a part of a program that usually performs a particular function of related functions. Components may constitute either software components (e.g., code embodied on a machine-readable medium) or hardware components. A "hardware component" is a tangible unit capable of performing certain operations and may be configured or arranged in a certain physical manner. In various example embodiments, one or more computer systems (e.g., a standalone computer system, a client computer system, or a server computer system) or one or more hardware components of a computer system (e.g., a processor or a group of processors) may be configured by software (e.g., an application or application portion) as a hardware component that operates to perform certain operations as described herein. A hardware component may also be implemented mechanically, electronically, or any suitable combination thereof. For example, a hardware component may include dedicated circuitry or logic that is permanently configured to perform certain operations. A hardware component may be a special-purpose processor, such as a Field-Programmable Gate Array (FPGA) or an Application Specific Integrated Circuit (ASIC). A hardware component may also include programmable logic or circuitry that is temporarily configured by software to perform certain operations. For example, a hardware component may include software executed by a general-purpose processor or other programmable processor. Once configured by such software, hardware components become specific machines (or specific components of a machine) uniquely tailored to perform the configured functions and are no longer general-purpose processors. It will be appreciated that the decision to implement a hardware component mechanically, in dedicated and permanently configured circuitry, or in temporarily configured circuitry (e.g., configured by software) may be driven by cost and time considerations. Accordingly, the phrase "hardware component" (or "hardware-implemented component") should be understood to encompass a tangible entity, be that an entity that is physically constructed, permanently configured (e.g., hardwired), or temporarily configured (e.g., programmed) to operate in a certain manner or to perform certain operations described herein. Considering embodiments in which hardware components are temporarily configured (e.g., programmed), each of the hardware components need not be configured or instantiated at any one instance in time. For example, where a hardware component comprises a general-purpose processor configured by software to become a special-purpose processor, the general-purpose processor may be configured as respectively different special-purpose processors (e.g., comprising different hardware components) at different times. Software accordingly configures a particular processor or processors, for example, to constitute a particular hardware component at one instance of time and to constitute a different hardware component at a different instance of time. Hardware components can provide information to, and receive information from, other hardware components. Accordingly, the described hardware components may be regarded as being communicatively coupled. Where multiple hardware components exist contemporaneously, communications may be achieved through signal transmission (e.g., over appropriate circuits and buses) between or among two or more of the hardware components. In embodiments in which multiple hardware components are configured or instantiated at dif-

ferent times, communications between such hardware components may be achieved, for example, through the storage and retrieval of information in memory structures to which the multiple hardware components have access. For example, one hardware component may perform an operation and store the output of that operation in a memory device to which it is communicatively coupled. A further hardware component may then, at a later time, access the memory device to retrieve and process the stored output. Hardware components may also initiate communications with input or output devices, and can operate on a resource (e.g., a collection of information). The various operations of example methods described herein may be performed, at least partially, by one or more processors that are temporarily configured (e.g., by software) or permanently configured to perform the relevant operations. Whether temporarily or permanently configured, such processors may constitute processor-implemented components that operate to perform one or more operations or functions described herein. As used herein, "processor-implemented component" refers to a hardware component implemented using one or more processors. Similarly, the methods described herein may be at least partially processor-implemented, with a particular processor or processors being an example of hardware. For example, at least some of the operations of a method may be performed by one or more processors or processor-implemented components. Moreover, the one or more processors may also operate to support performance of the relevant operations in a "cloud computing" environment or as a "software as a service" (SaaS). For example, at least some of the operations may be performed by a group of computers (as examples of machines including processors), with these operations being accessible via a network (e.g., the Internet) and via one or more appropriate interfaces (e.g., an Application Program Interface (API)). The performance of certain of the operations may be distributed among the processors, not only residing within a single machine, but deployed across a number of machines. In some example embodiments, the processors or processor-implemented components may be located in a single geographic location (e.g., within a home environment, an office environment, or a server farm). In other example embodiments, the processors or processor-implemented components may be distributed across a number of geographic locations.

"PROCESSOR" in this context refers to any circuit or virtual circuit (a physical circuit emulated by logic executing on an actual processor) that manipulates data values according to control signals (e.g., "commands", "op codes", "machine code", etc.) and which produces corresponding output signals that are applied to operate a machine. A processor may, for example, be a Central Processing Unit (CPU), a Reduced Instruction Set Computing (RISC) processor, a Complex Instruction Set Computing (CISC) processor, a Graphics Processing Unit (GPU), a Digital Signal Processor (DSP), an Application Specific Integrated Circuit (ASIC), a Radio-Frequency Integrated Circuit (RFIC) or any combination thereof. A processor may further be a multi-core processor having two or more independent processors (sometimes referred to as "cores") that may execute instructions contemporaneously.

"TIMESTAMP" in this context refers to a sequence of characters or encoded information identifying when a certain event occurred, for example giving date and time of day, sometimes accurate to a small fraction of a second.

What is claimed is:

1. A method comprising:

causing display of a presentation of a first image at a first client device, the first image comprising a display of typography upon a surface within the first image, the display of the typography comprising an initial string of characters;

receiving a user input from the first client device to modify the initial string of characters;

identifying a typeface and font of the initial string of characters;

detecting a deformity of the display of the typography that comprises the initial string of characters based on the typeface and the font;

determining a contour of the surface based on the deformity of the display of the typography;

generating a modified string of characters based on the user input and the initial string of characters;

accessing location data that identifies a physical location associated with the first client device;

associating the modified string of characters with the initial string of characters and the location data that identifies the physical location of the first client device;

detecting a second client device at the physical location; and

causing display of the modified string of characters within a graphical user interface (GUI) based on the contour of the surface at the second client device upon detecting the initial string of characters and the second client device at the physical location.

2. The method of claim **1**, wherein the generating of the modified string of characters comprises at least one of:

adding new characters to the initial string of characters to generate the modified string of characters; or

deleting existing characters from the initial string of characters to generate the modified string of characters.

3. The method of claim **1**, further comprising:

transmitting the associated modified string of characters, the initial string of characters, and the location data to the second client device via a messaging application.

4. The method of claim **1**, further comprising:

storing the associated modified string of characters, the initial string of characters, and the location data in a database; and

providing the second client device with access to the database.

5. The method of claim **1**, wherein the physical location associated with the first client device is determined by operations comprising:

determining a physical location depicted in the first image as the physical location associated with the first client device.

6. The method of claim **1**, wherein the physical location associated with the first client device is determined based on a Global Positioning System (GPS) mounted on the first client device.

7. The method of claim **1**, wherein the modified string of characters has a same typeface as the initial string of characters.

8. The method of claim **1**, wherein first client device and the second client device are associated such that a change made to the modified string of characters by the first client device is reflected on the display of the modified string of characters at the second client device in real-time.

9. The method of claim 1, wherein the causing of display of the modified string of characters at a second client device comprises:

generating an augmented reality overlay that displays the modified string of characters over the detected initial string of characters.

10. The method of claim 1, wherein the user input to modify the initial string of characters is received through an augmented reality interface that overlays over the initial string of characters on the presentation of the first image at the first client device.

11. A system comprising:

a processor; and

a memory having instructions stored thereon, when executed by the processor, causes the system to perform operations comprising:

causing display of a presentation of a first image at a first client device, the first image comprising a display of typography upon a surface within the first image, the display of the typography comprising an initial string of characters;

receiving a user input from the first client device to modify the initial string of characters;

identifying a typeface and font of the initial string of characters;

detecting a deformity of the display of the typography that comprises the initial string of characters based on the typeface and the font;

determining a contour of the surface based on the deformity of the display of the typography;

generating a modified string of characters based on the user input and the initial string of characters;

accessing location data that identifies a physical location associated with the first client device;

associating the modified string of characters with the initial string of characters and the location data that identifies the physical location of the first client device;

detecting a second client device at the physical location, and

causing display of the modified string of characters within a graphical user interface (GUI) based on the contour of the surface at the second client device upon detecting the initial string of characters and the second client device at the physical location.

12. The system of claim 11, wherein the generating of the modified string of characters comprises at least one of:

adding new characters to the initial string of characters to generate the modified string of characters; or

deleting existing characters from the initial string of characters to generate the modified string of characters.

13. The system of claim 11, wherein the operations further comprise:

transmitting the associated modified string of characters, the initial string of characters, and the location data to the second client device via a messaging application.

14. The system of claim 11, wherein the operations further comprise:

storing the associated modified string of characters, the initial string of characters, and the location data in a database; and

providing the second client device with access to the database.

15. The system of claim 11, wherein the physical location associated with the first client device is determined by operations comprising:

determining a physical location depicted in the first image as the physical location associated with the first client device.

16. The system of claim 11, wherein the modified string of characters has a same typeface as the initial string of characters.

17. The system of claim 11, wherein first client device and the second client device are associated such that a change made to the modified string of characters by the first client device is reflected on the display of the modified string of characters at the second client device in real-time.

18. The system of claim 11, wherein the causing of display of the modified string of characters at a second client device comprises:

generating an augmented reality overlay that displays the modified string of characters over the detected initial string of characters.

19. The system of claim 11, wherein the user input to modify the initial string of characters is received through an augmented reality interface that overlays over the initial string of characters on the presentation of the first image at the first client device.

20. A non-transitory computer-readable storage medium having stored thereon, instructions when executed by a processor, causes the processor to perform operations comprising:

causing display of a presentation of a first image at a first client device, the first image comprising a display of typography upon a surface within the first image, the display of the typography comprising an initial string of characters;

receiving a user input from the first client device to modify the initial string of characters;

identifying a typeface and font of the initial string of characters;

detecting a deformity of the display of the typography that comprises the initial string of characters based on the typeface and the font;

determining a contour of the surface based on the deformity of the display of the typography;

generating a modified string of characters based on the user input and the initial string of characters;

accessing location data that identifies a physical location associated with the first client device;

associating the modified string of characters with the initial string of characters and the location data that identifies the physical location of the first client device;

detecting a second client device at the physical location; and

causing display of the modified string of characters within a graphical user interface (GUI) based on the contour of the surface at the second client device upon detecting the initial string of characters and the location data at the second client device at the physical location.

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