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Boyd et al.

(54) **CLIENT APPLICATION CONTENT CLASSIFICATION AND DISCOVERY**

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Publication Classification

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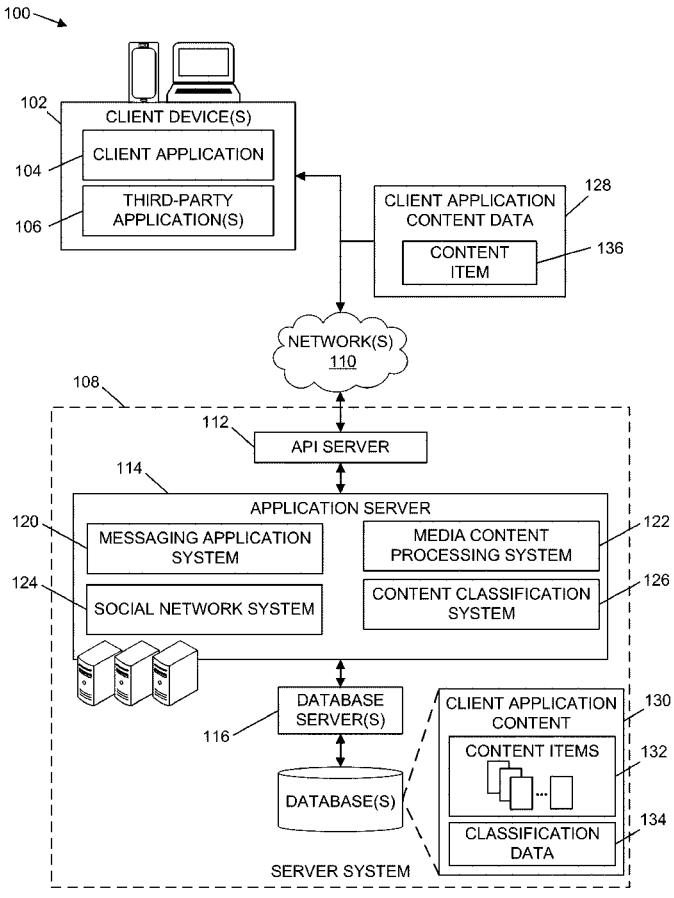
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G06V 20/20	(2006.01)
G06V 40/16	(2006.01)

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(57) **ABSTRACT**

In one or more implementations, content generated using a client application may be associated with a classification. The content may be accessed based on one or more classifications associated with the content. Content may be generated by a client application executed by a client device of a content creator and sent to a server system that may distribute the content to one or more additional client devices of recipients of the content. The server system may also aggregate content having a same classification.



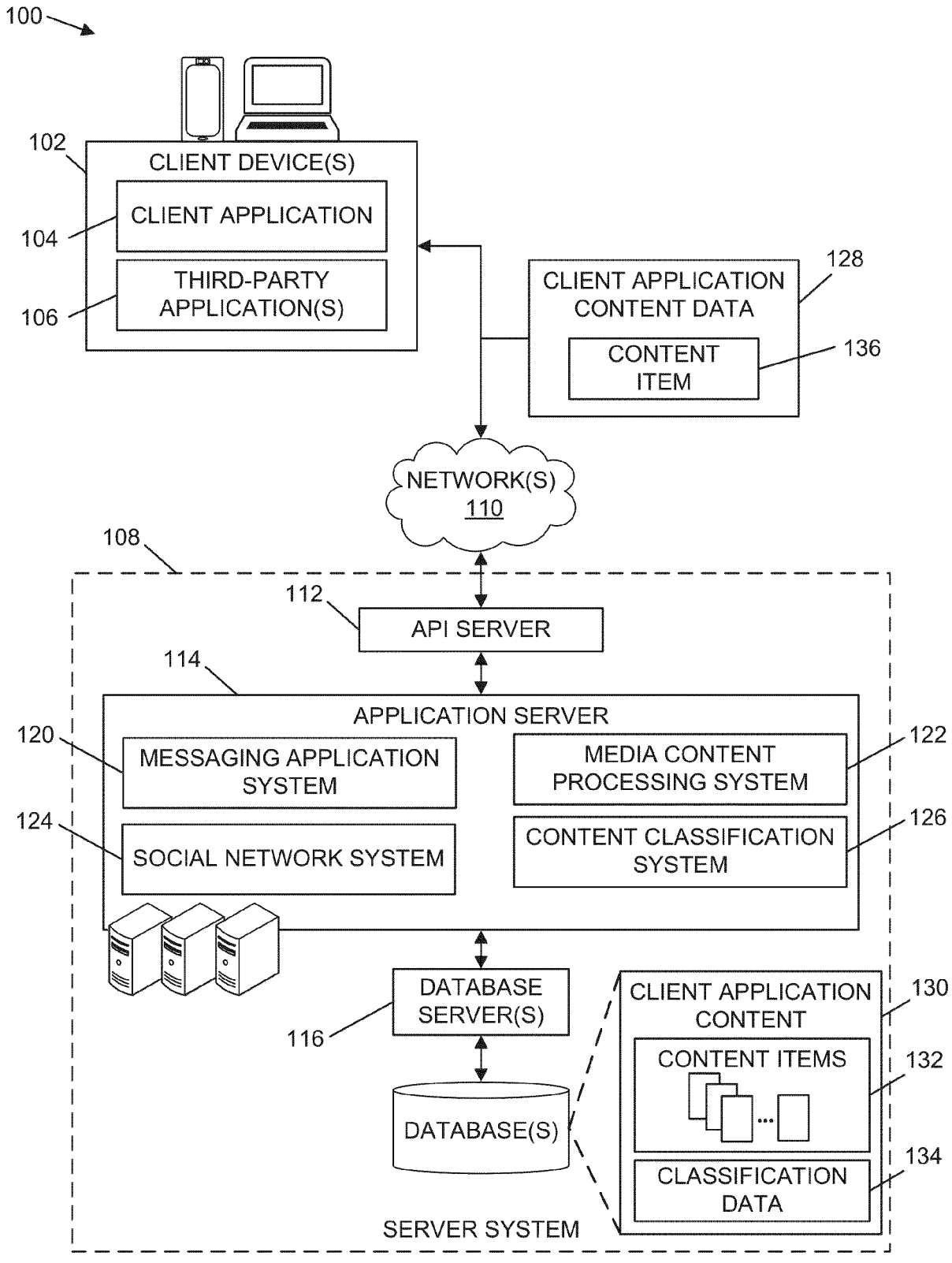

100
102
CLIENT DEVICE(S)
104
CLIENT APPLICATION
106
THIRD-PARTY APPLICATION(S)
128
CLIENT APPLICATION CONTENT DATA
136
CONTENT ITEM
NETWORK(S) 110
108
112
API SERVER
114
APPLICATION SERVER
120
MESSAGING APPLICATION SYSTEM
122
MEDIA CONTENT PROCESSING SYSTEM
124
SOCIAL NETWORK SYSTEM
126
CONTENT CLASSIFICATION SYSTEM
DATABASE SERVER(S)
116
130
CLIENT APPLICATION CONTENT
132
CONTENT ITEMS
DATABASE(S)
134
CLASSIFICATION DATA
SERVER SYSTEM

Figure 1

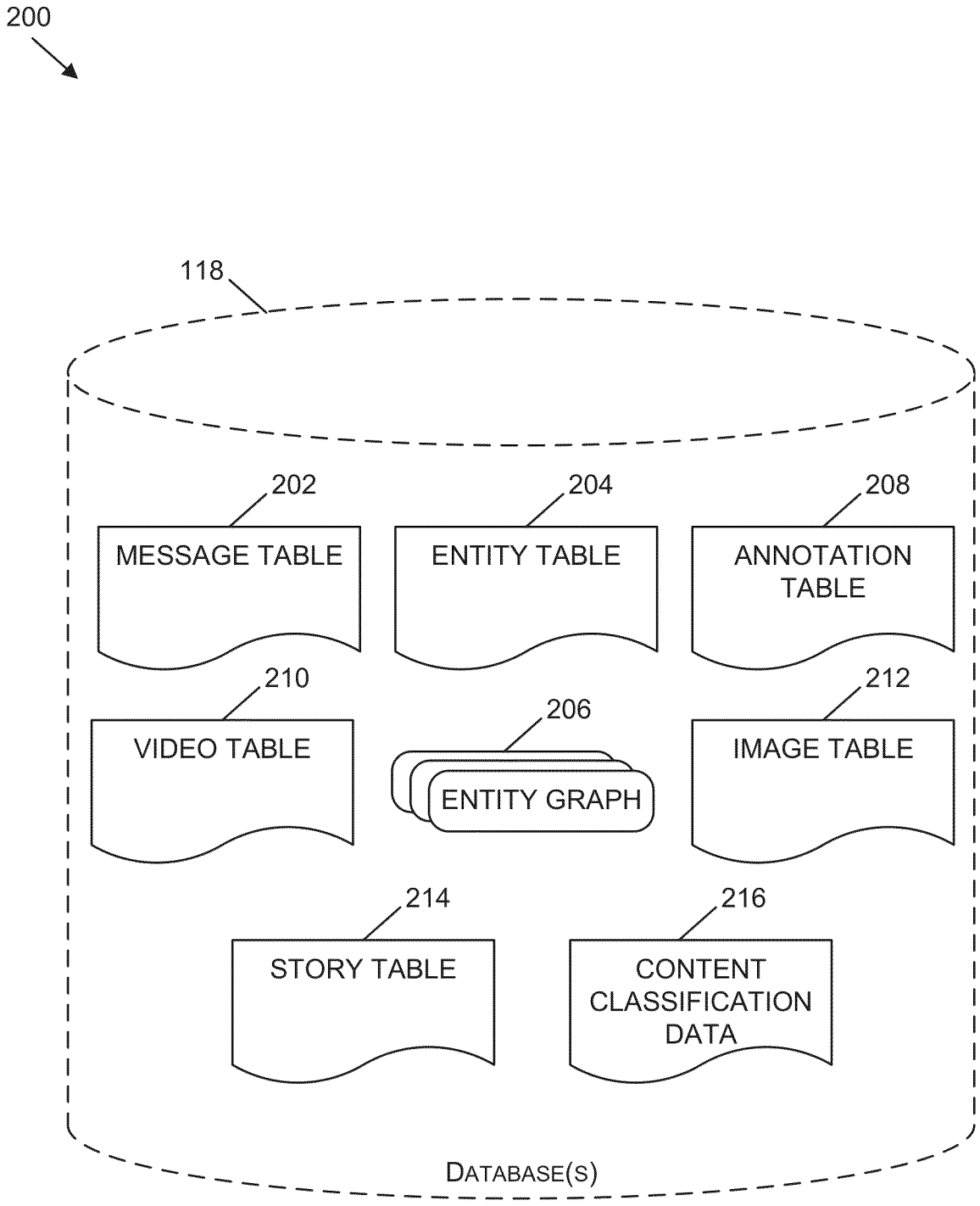

200
118
202
MESSAGE TABLE
204
ENTITY TABLE
208
ANNOTATION TABLE
210
VIDEO TABLE
206
ENTITY GRAPH
212
IMAGE TABLE
214
STORY TABLE
216
CONTENT CLASSIFICATION DATA
DATABASE(S)

Figure 2

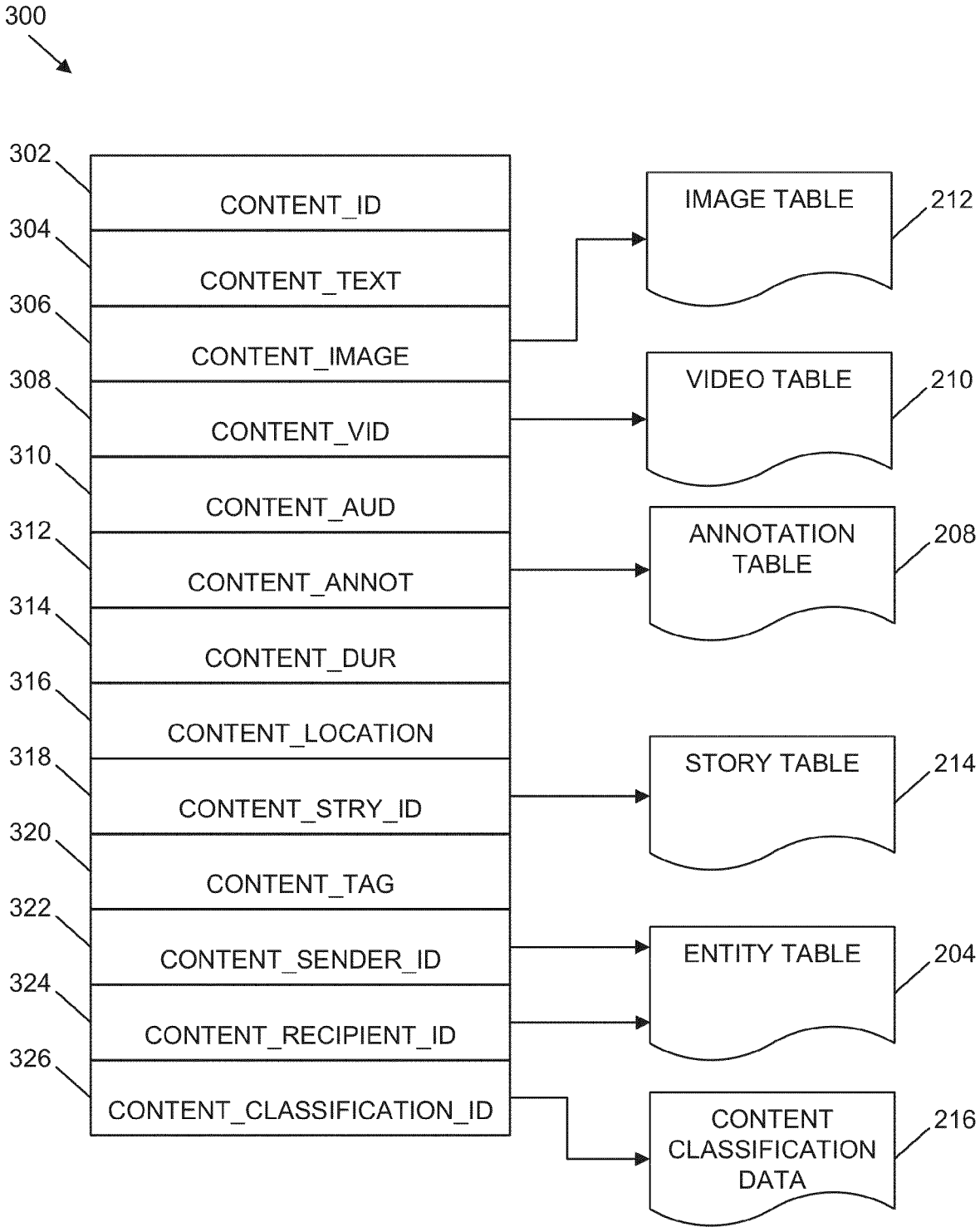

300
302
CONTENT_ID
304
CONTENT_TEXT
306
CONTENT_IMAGE
308
CONTENT_VID
310
CONTENT_AUD
312
CONTENT_ANNOT
314
CONTENT_DUR
316
CONTENT_LOCATION
318
CONTENT_STRY_ID
320
CONTENT_TAG
322
CONTENT_SENDER_ID
324
CONTENT_RECIPIENT_ID
326
CONTENT_CLASSIFICATION_ID
IMAGE TABLE
212
VIDEO TABLE
210
ANNOTATION TABLE
208
STORY TABLE
214
ENTITY TABLE
204
CONTENT CLASSIFICATION DATA
216

Figure 3

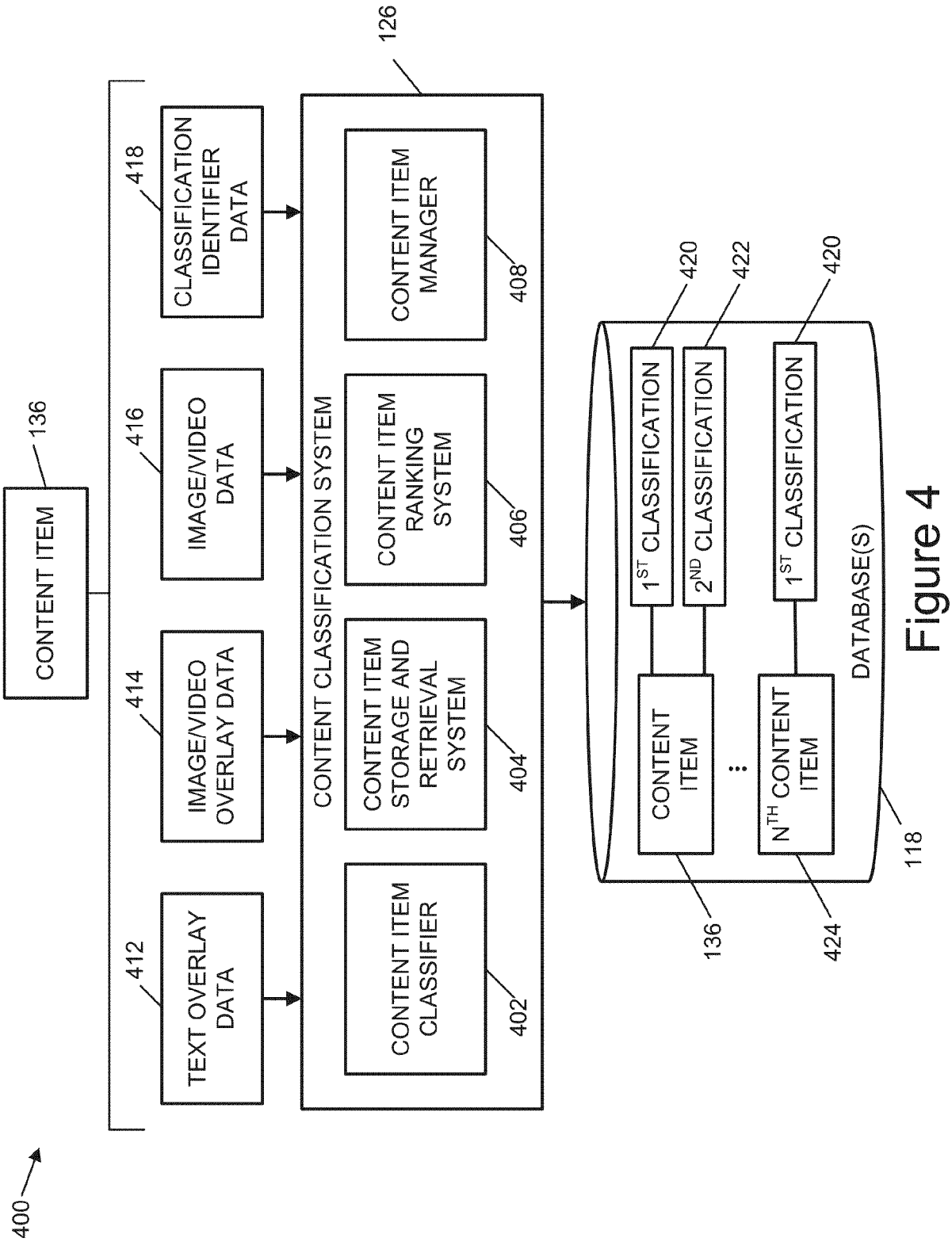

400
CONTENT ITEM
136
TEXT OVERLAY DATA
412
IMAGE/VIDEO OVERLAY DATA
414
IMAGE/VIDEO DATA
416
CLASSIFICATION IDENTIFIER DATA
418
CONTENT CLASSIFICATION SYSTEM
126
CONTENT ITEM CLASSIFIER
402
CONTENT ITEM STORAGE AND RETRIEVAL SYSTEM
404
CONTENT ITEM RANKING SYSTEM
406
CONTENT ITEM MANAGER
408
DATABASE(S)
118
1ST CLASSIFICATION
420
2ND CLASSIFICATION
422
1ST CLASSIFICATION
420
CONTENT ITEM
136
...
NTH CONTENT ITEM
424

Figure 4

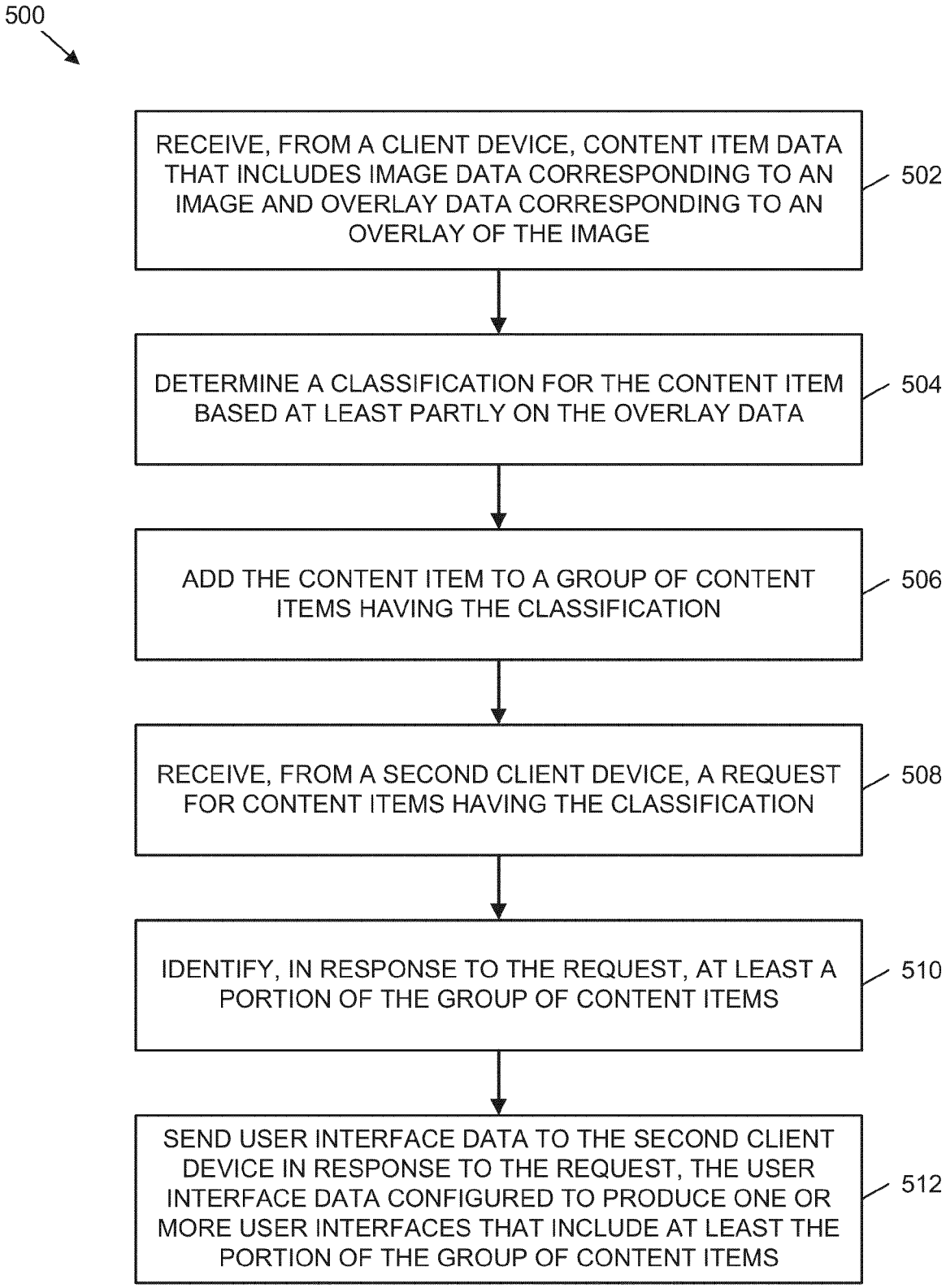

500
RECEIVE, FROM A CLIENT DEVICE, CONTENT ITEM DATA THAT INCLUDES IMAGE DATA CORRESPONDING TO AN IMAGE AND OVERLAY DATA CORRESPONDING TO AN OVERLAY OF THE IMAGE
502
DETERMINE A CLASSIFICATION FOR THE CONTENT ITEM BASED AT LEAST PARTLY ON THE OVERLAY DATA
504
ADD THE CONTENT ITEM TO A GROUP OF CONTENT ITEMS HAVING THE CLASSIFICATION
506
RECEIVE, FROM A SECOND CLIENT DEVICE, A REQUEST FOR CONTENT ITEMS HAVING THE CLASSIFICATION
508
IDENTIFY, IN RESPONSE TO THE REQUEST, AT LEAST A PORTION OF THE GROUP OF CONTENT ITEMS
510
SEND USER INTERFACE DATA TO THE SECOND CLIENT DEVICE IN RESPONSE TO THE REQUEST, THE USER INTERFACE DATA CONFIGURED TO PRODUCE ONE OR MORE USER INTERFACES THAT INCLUDE AT LEAST THE PORTION OF THE GROUP OF CONTENT ITEMS
512

Figure 5

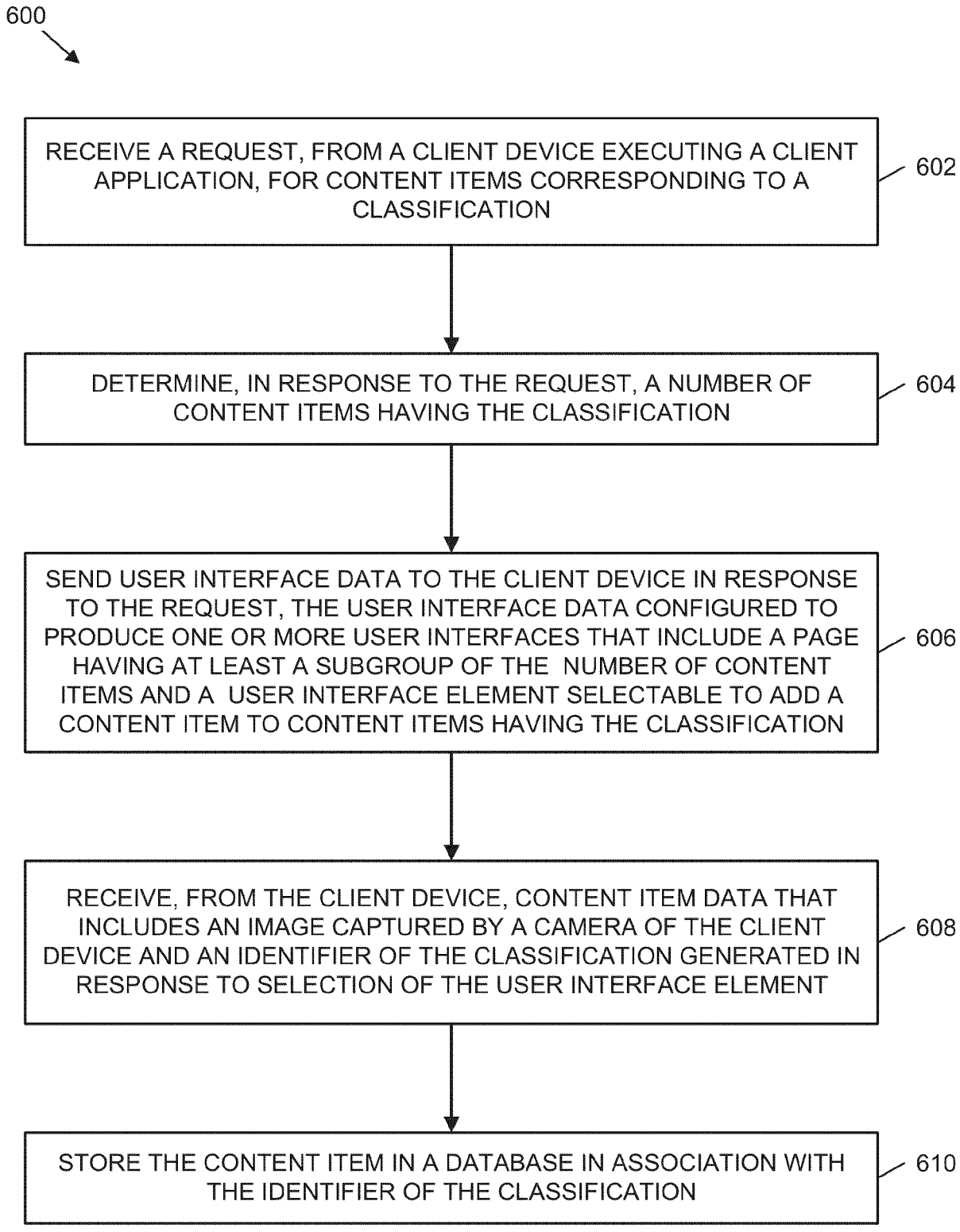

600
RECEIVE A REQUEST, FROM A CLIENT DEVICE EXECUTING A CLIENT APPLICATION, FOR CONTENT ITEMS CORRESPONDING TO A CLASSIFICATION
602
DETERMINE, IN RESPONSE TO THE REQUEST, A NUMBER OF CONTENT ITEMS HAVING THE CLASSIFICATION
604
SEND USER INTERFACE DATA TO THE CLIENT DEVICE IN RESPONSE TO THE REQUEST, THE USER INTERFACE DATA CONFIGURED TO PRODUCE ONE OR MORE USER INTERFACES THAT INCLUDE A PAGE HAVING AT LEAST A SUBGROUP OF THE NUMBER OF CONTENT ITEMS AND A USER INTERFACE ELEMENT SELECTABLE TO ADD A CONTENT ITEM TO CONTENT ITEMS HAVING THE CLASSIFICATION
606
RECEIVE, FROM THE CLIENT DEVICE, CONTENT ITEM DATA THAT INCLUDES AN IMAGE CAPTURED BY A CAMERA OF THE CLIENT DEVICE AND AN IDENTIFIER OF THE CLASSIFICATION GENERATED IN RESPONSE TO SELECTION OF THE USER INTERFACE ELEMENT
608
STORE THE CONTENT ITEM IN A DATABASE IN ASSOCIATION WITH THE IDENTIFIER OF THE CLASSIFICATION
610

Figure 6

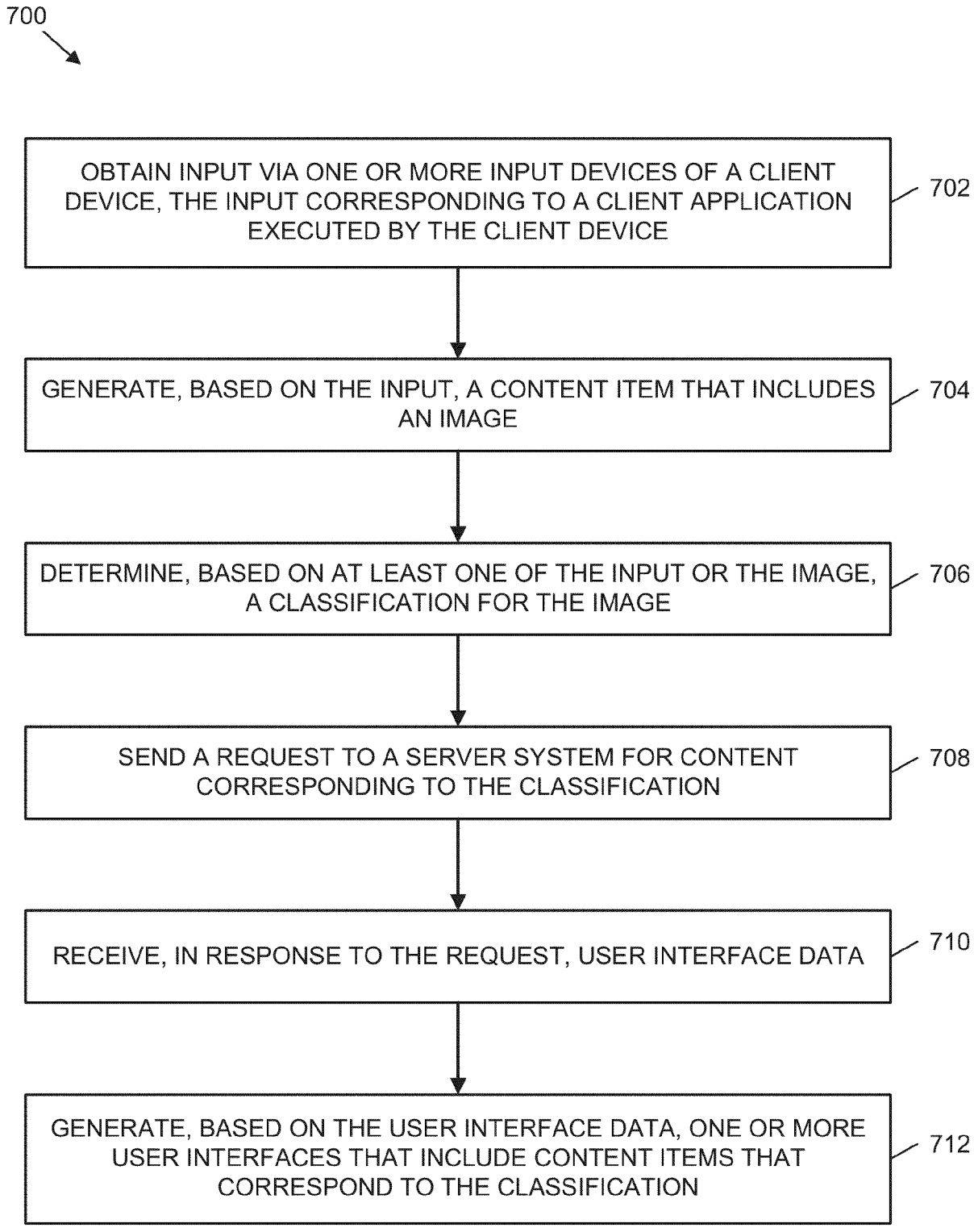

700
OBTAIN INPUT VIA ONE OR MORE INPUT DEVICES OF A CLIENT DEVICE, THE INPUT CORRESPONDING TO A CLIENT APPLICATION EXECUTED BY THE CLIENT DEVICE
702
GENERATE, BASED ON THE INPUT, A CONTENT ITEM THAT INCLUDES AN IMAGE
704
DETERMINE, BASED ON AT LEAST ONE OF THE INPUT OR THE IMAGE, A CLASSIFICATION FOR THE IMAGE
706
SEND A REQUEST TO A SERVER SYSTEM FOR CONTENT CORRESPONDING TO THE CLASSIFICATION
708
RECEIVE, IN RESPONSE TO THE REQUEST, USER INTERFACE DATA
710
GENERATE, BASED ON THE USER INTERFACE DATA, ONE OR MORE USER INTERFACES THAT INCLUDE CONTENT ITEMS THAT CORRESPOND TO THE CLASSIFICATION
712

Figure 7

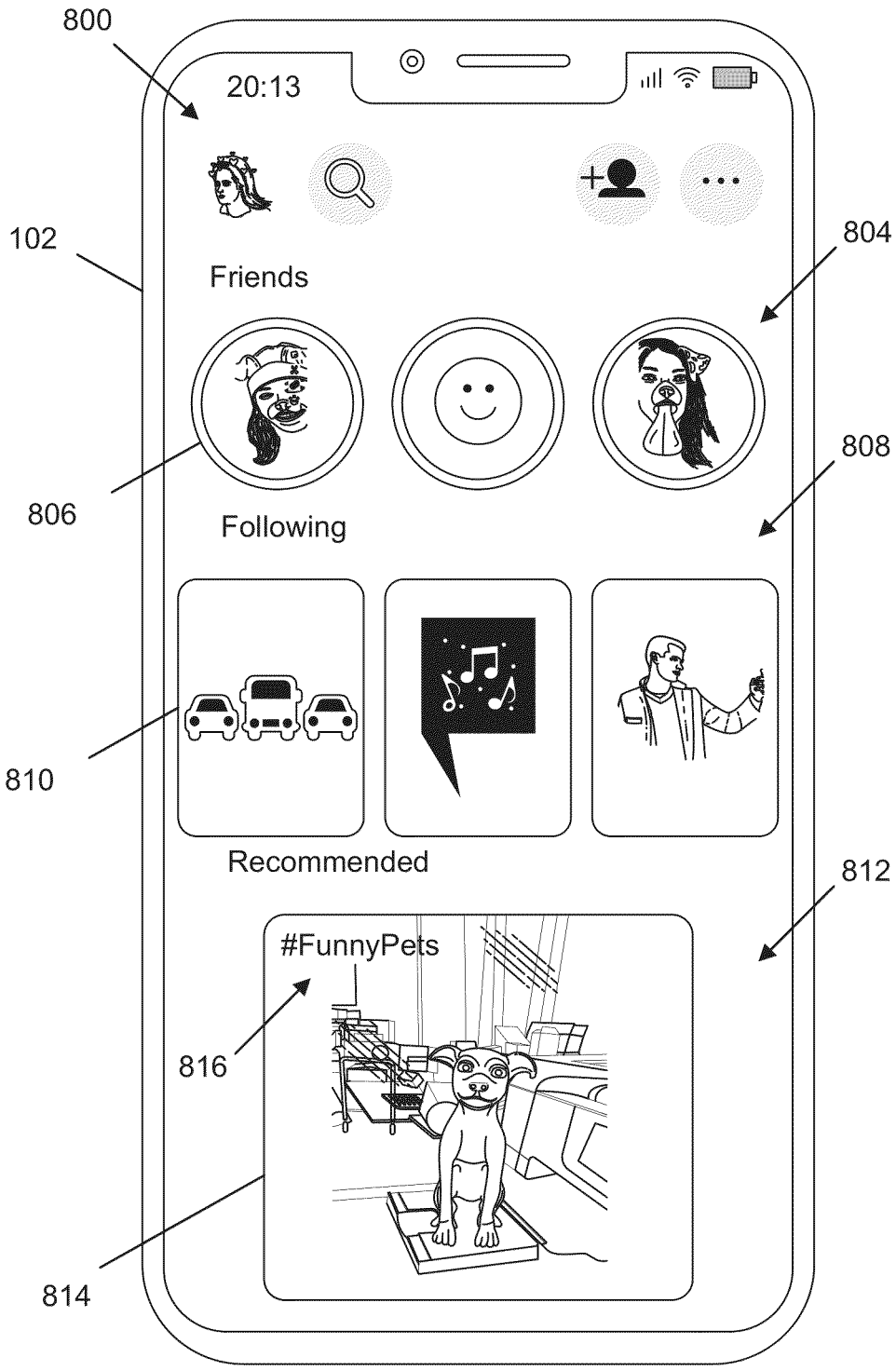

800
20:13
102
804
Friends
806
808
Following
810
Recommended
812
#FunnyPets
816
814

Figure 8

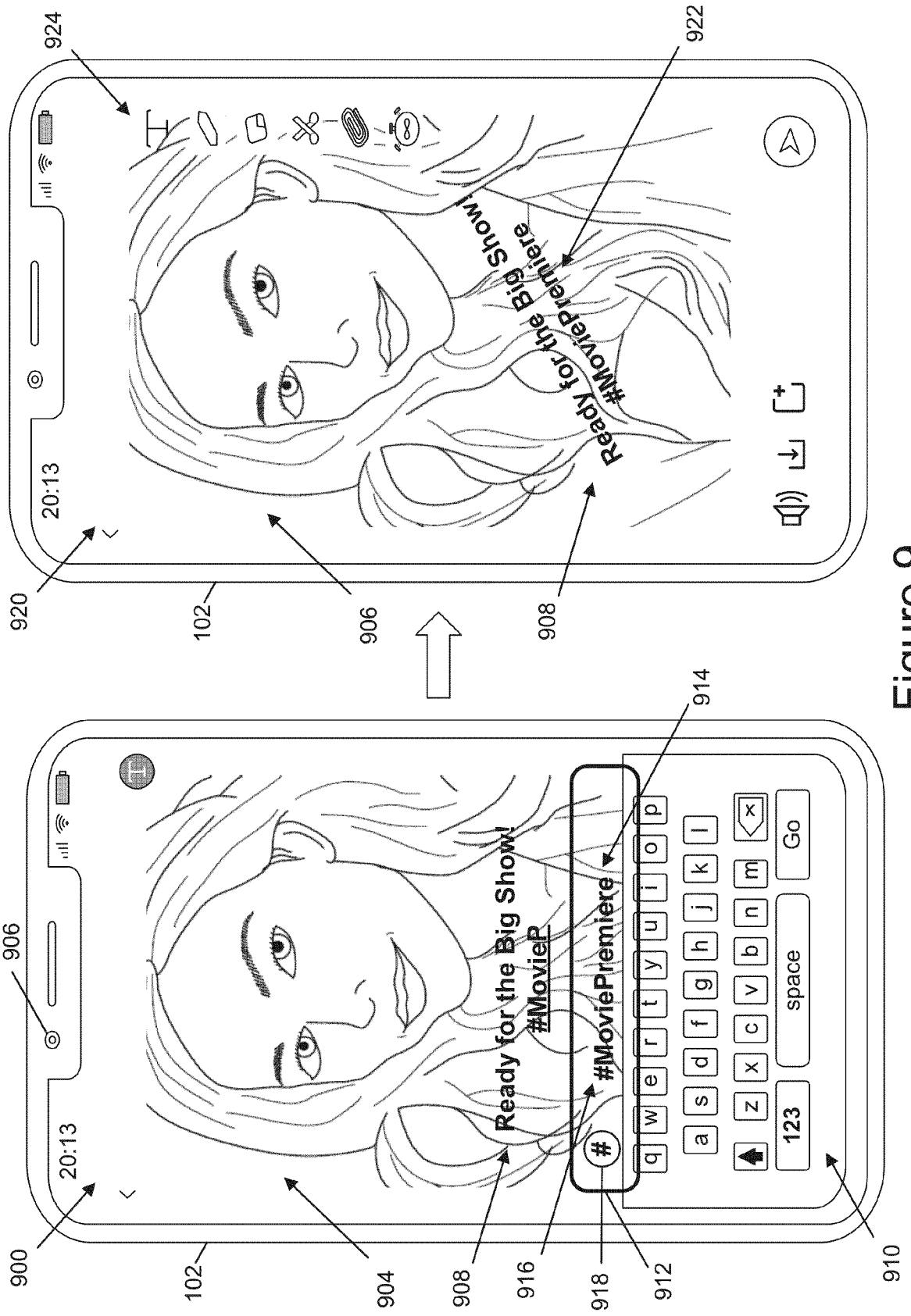

924
922
920
20:13
Ready for the Big Show!
#MoviePremiere
102
906
908
900
904
916
918
912
914
910
123
space
Go

Figure 9

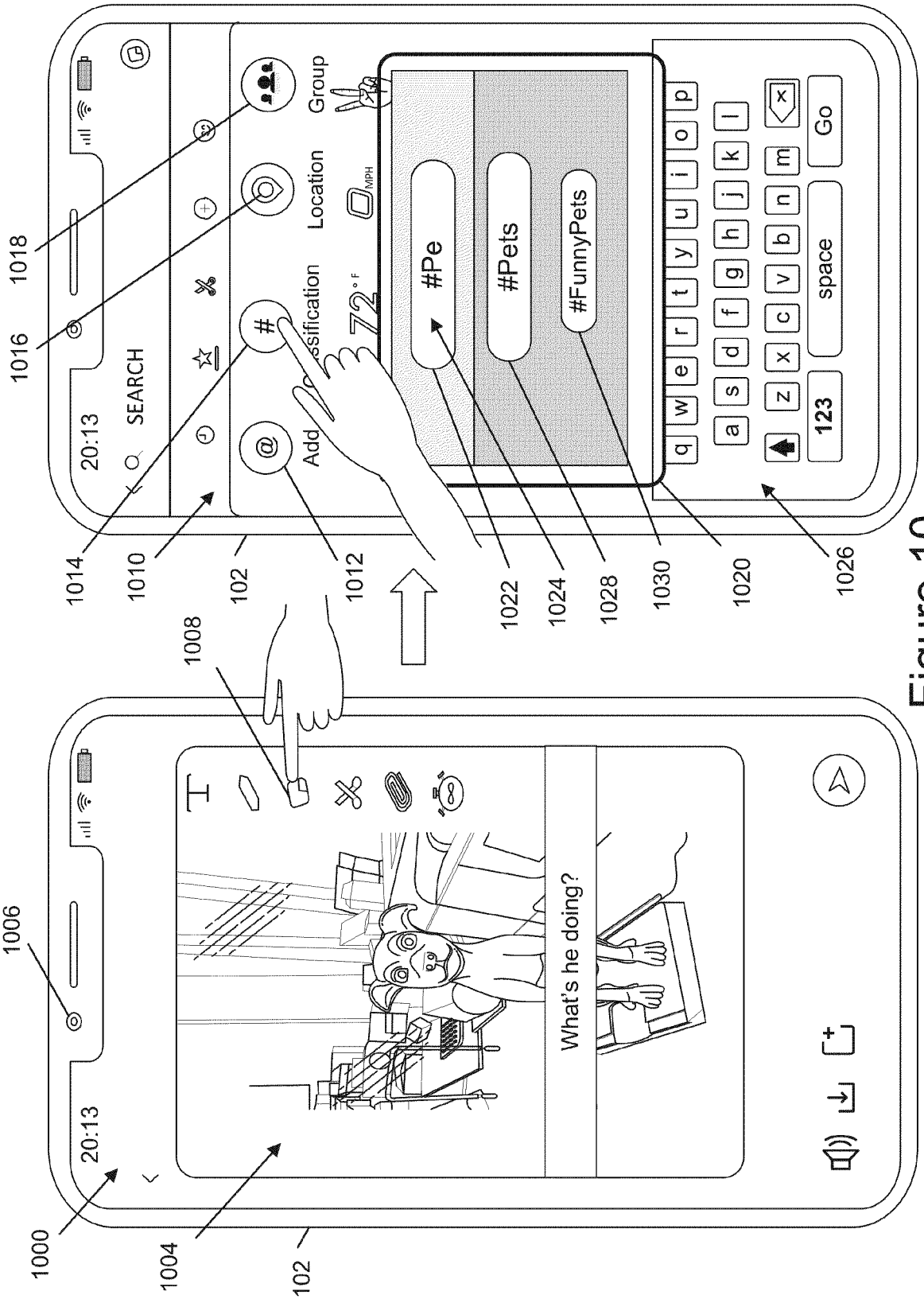

1000
1004
102
1006
20:13
What's he doing?
1008
1010
1012
1014
1016
1018
SEARCH
Add
Location
Group
#Pe
#Pets
#FunnyPets
1022
1024
1028
1030
1020
1026
space
Go
123

Figure 10

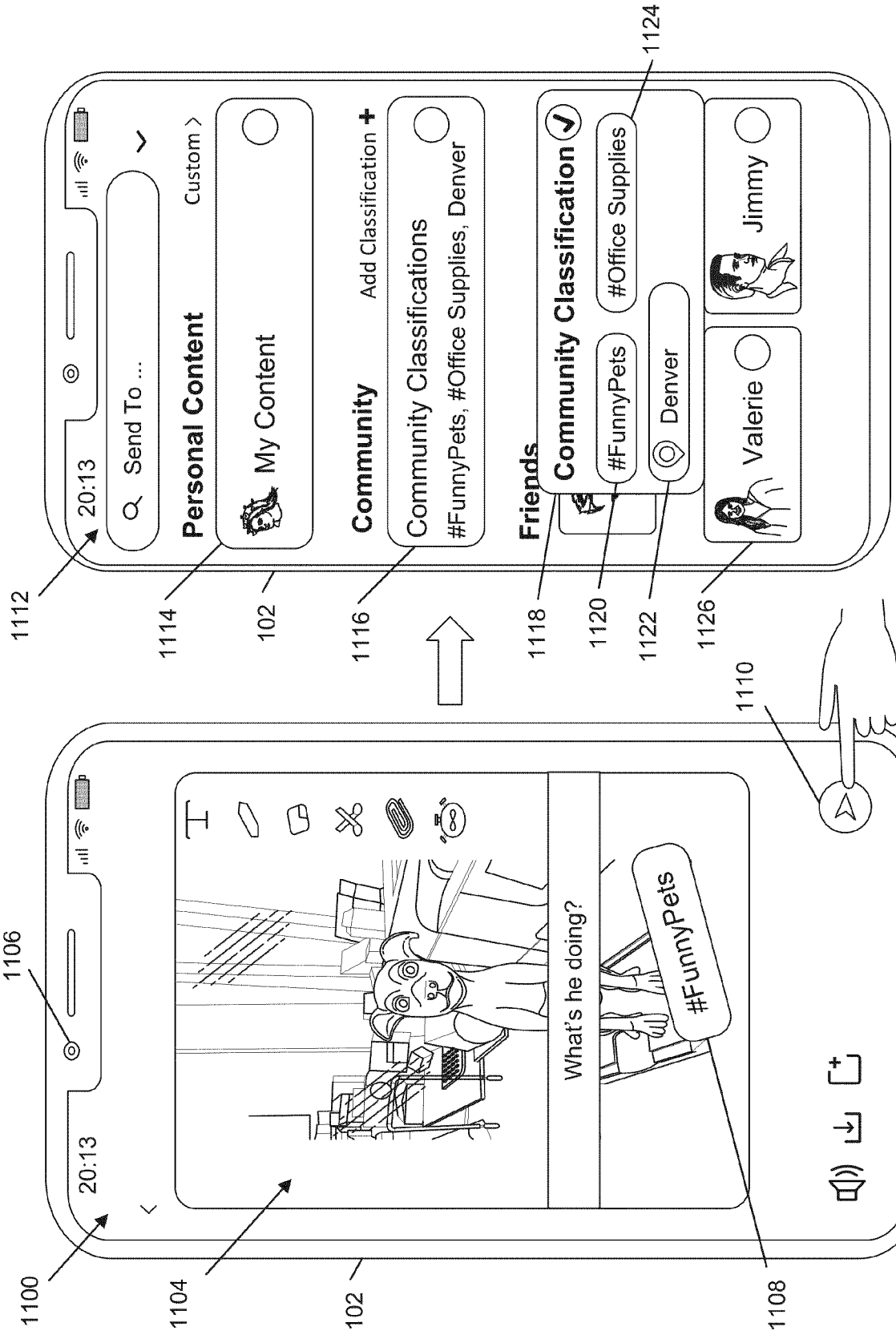

1100
1102
1104
1106
1108
1110
1112
1114
1116
1118
1120
1122
1124
1126
20:13
What's he doing?
#FunnyPets
Send To ...
Personal Content
Custom
My Content
Community
Add Classification
Community Classifications
#FunnyPets, #Office Supplies, Denver
Friends
Community Classification
#FunnyPets
#Office Supplies
Denver
Valerie
Jimmy

Figure 11

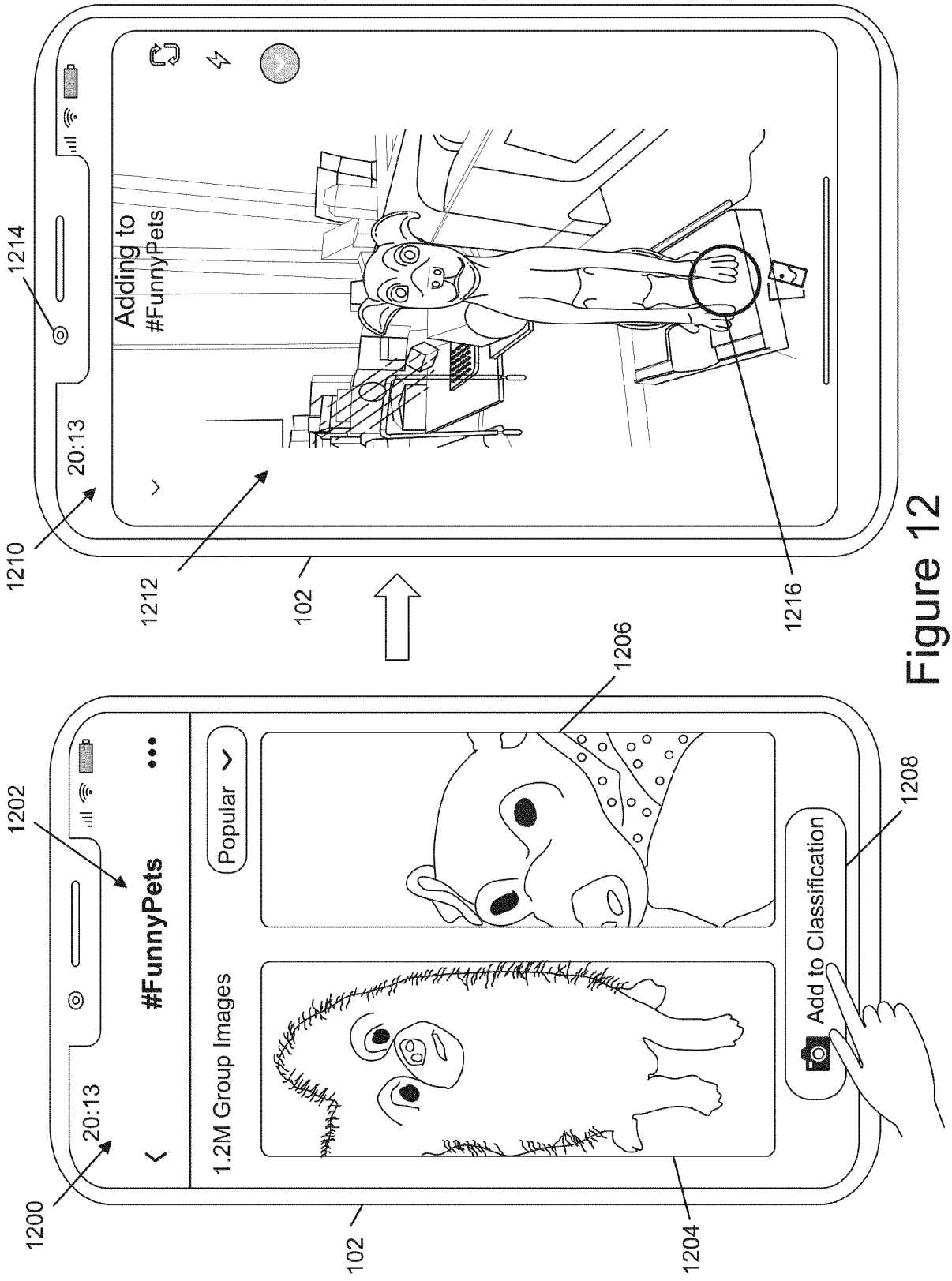

1214
1210
20:13
Adding to
#FunnyPets
1212
102
1216
1206
1202
#FunnyPets
Popular
20:13
1.2M Group Images
Add to Classification
1208
1200
102
1204

Figure 12

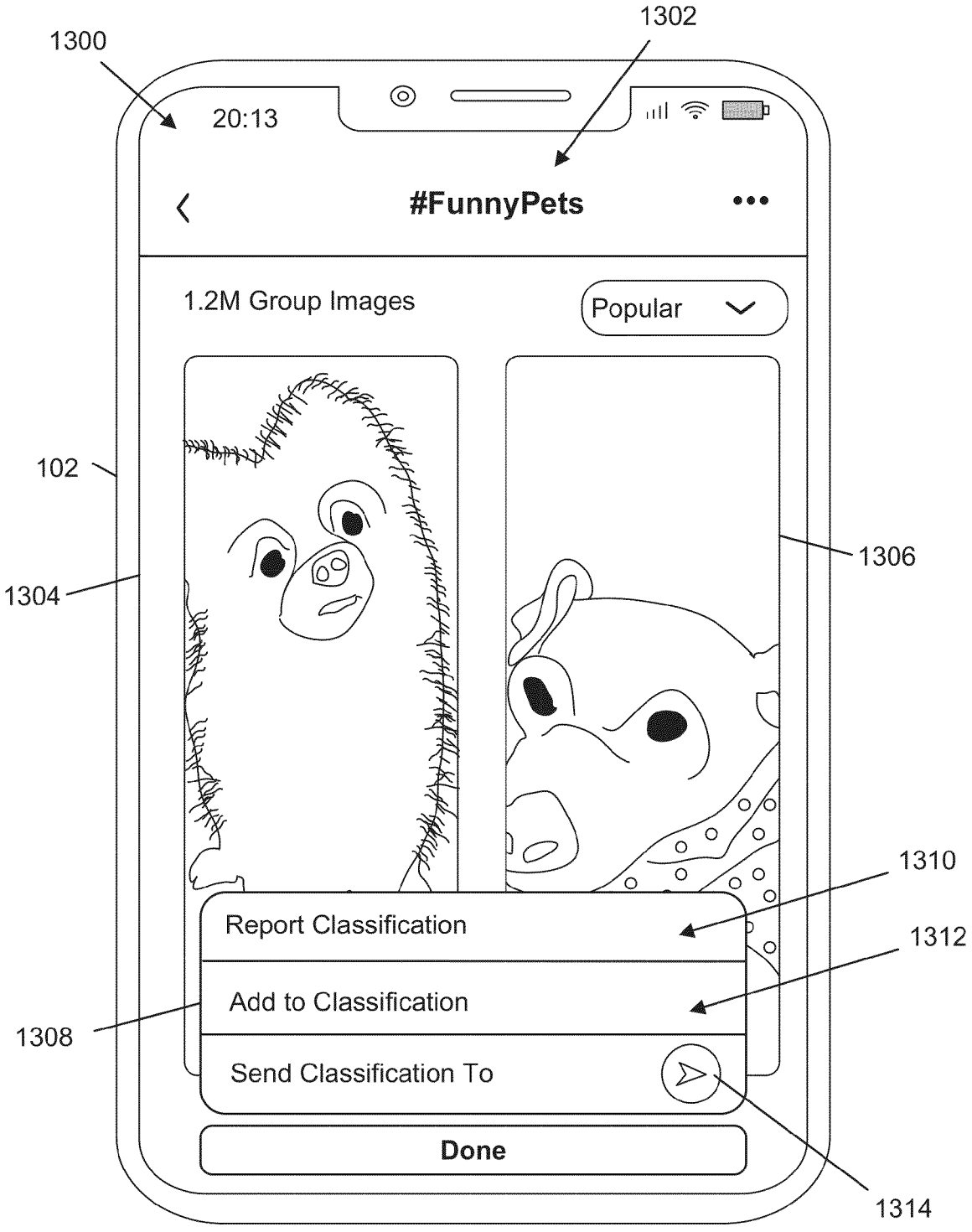

1300
1302
20:13
#FunnyPets
1.2M Group Images
Popular
102
1304
1306
1310
1312
1308
Report Classification
Add to Classification
Send Classification To
Done
1314

Figure 13

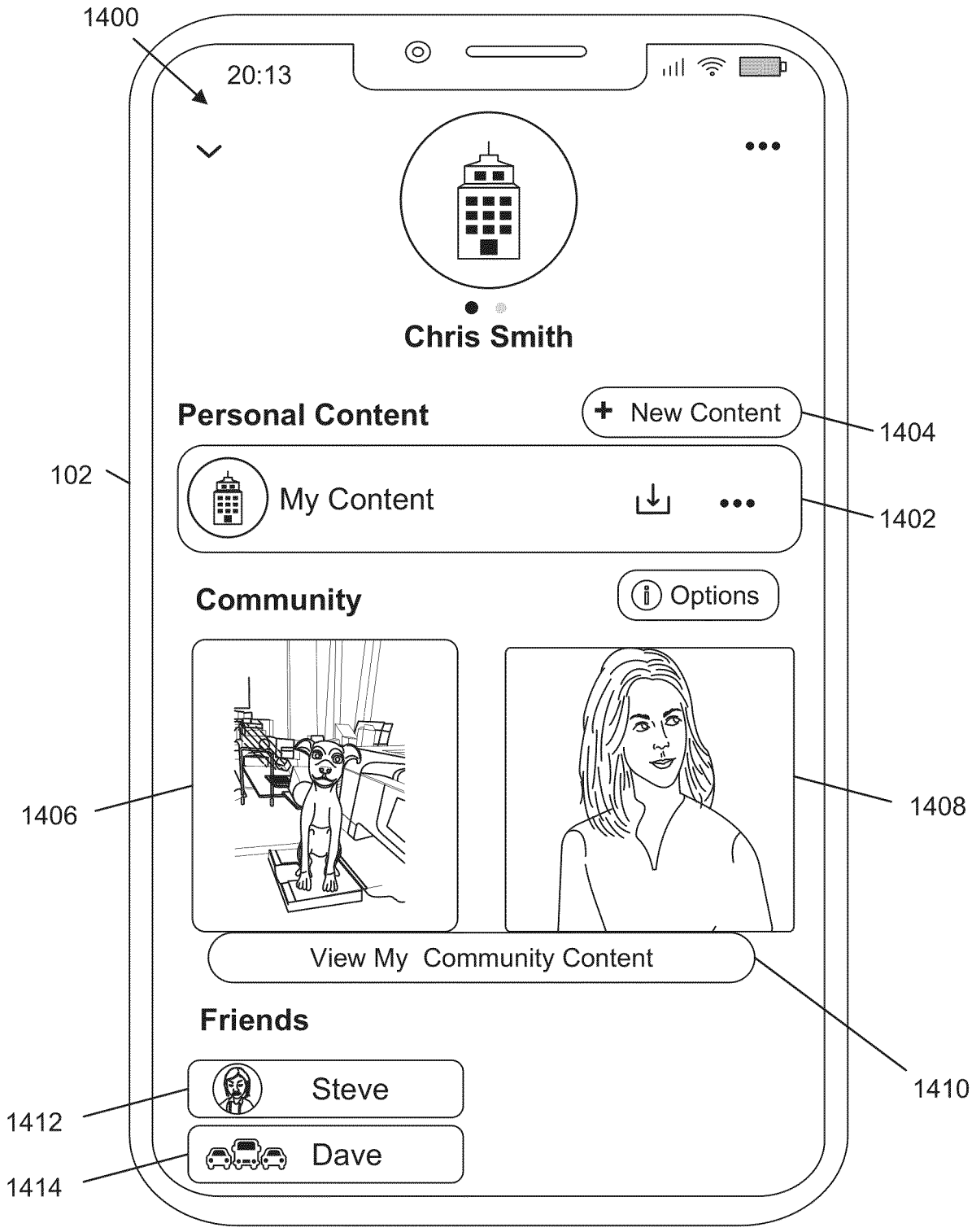

1400
20:13
Chris Smith
Personal Content
+ New Content
1404
102
My Content
1402
Community
Options
1406
1408
View My Community Content
Friends
1410
Steve
1412
Dave
1414

Figure 14

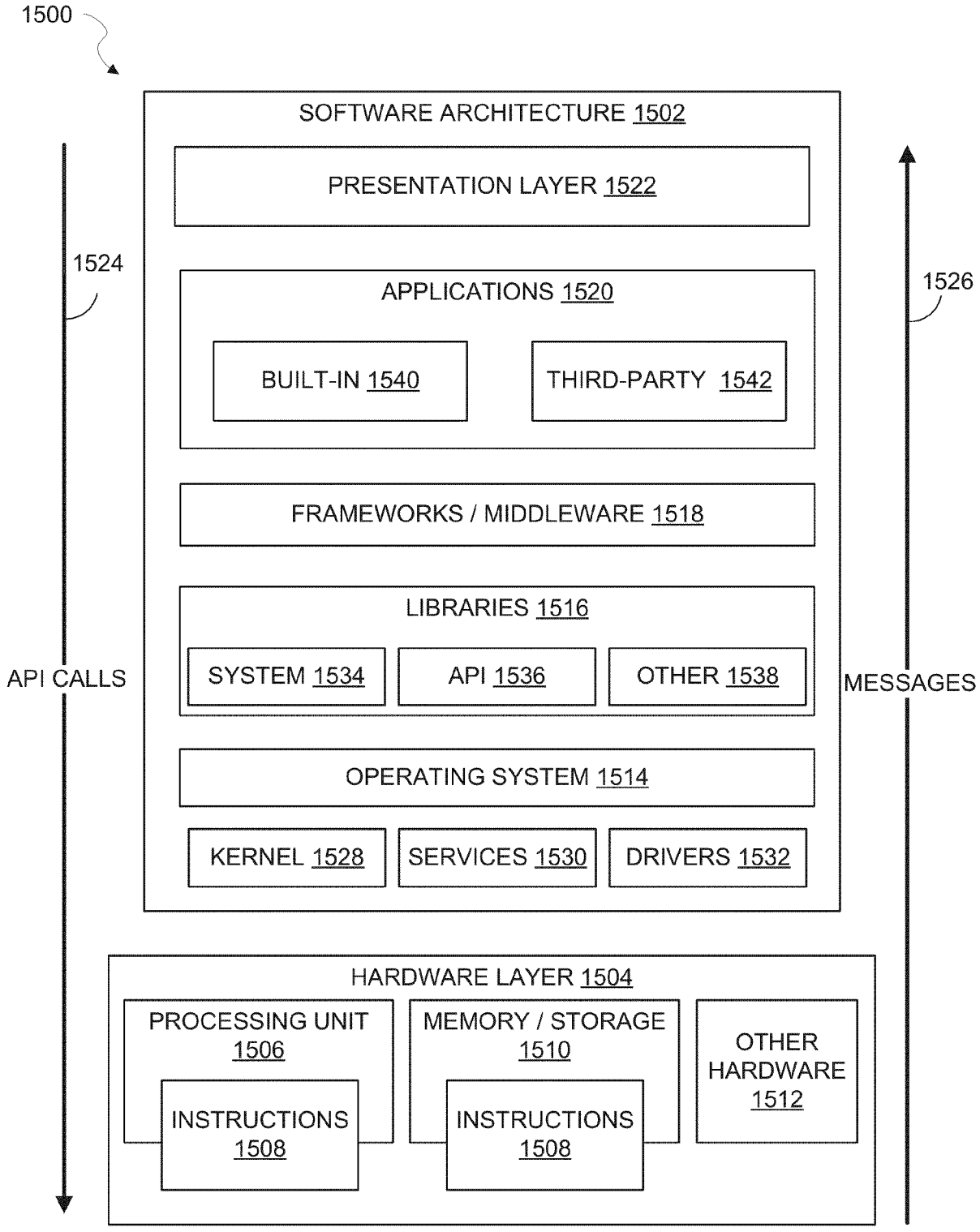

1500
SOFTWARE ARCHITECTURE 1502
PRESENTATION LAYER 1522
1524
APPLICATIONS 1520
BUILT-IN 1540
THIRD-PARTY 1542
1526
FRAMEWORKS / MIDDLEWARE 1518
LIBRARIES 1516
SYSTEM 1534
API 1536
OTHER 1538
API CALLS
MESSAGES
OPERATING SYSTEM 1514
KERNEL 1528
SERVICES 1530
DRIVERS 1532
HARDWARE LAYER 1504
PROCESSING UNIT 1506
INSTRUCTIONS 1508
MEMORY / STORAGE 1510
INSTRUCTIONS 1508
OTHER HARDWARE 1512

Figure 15

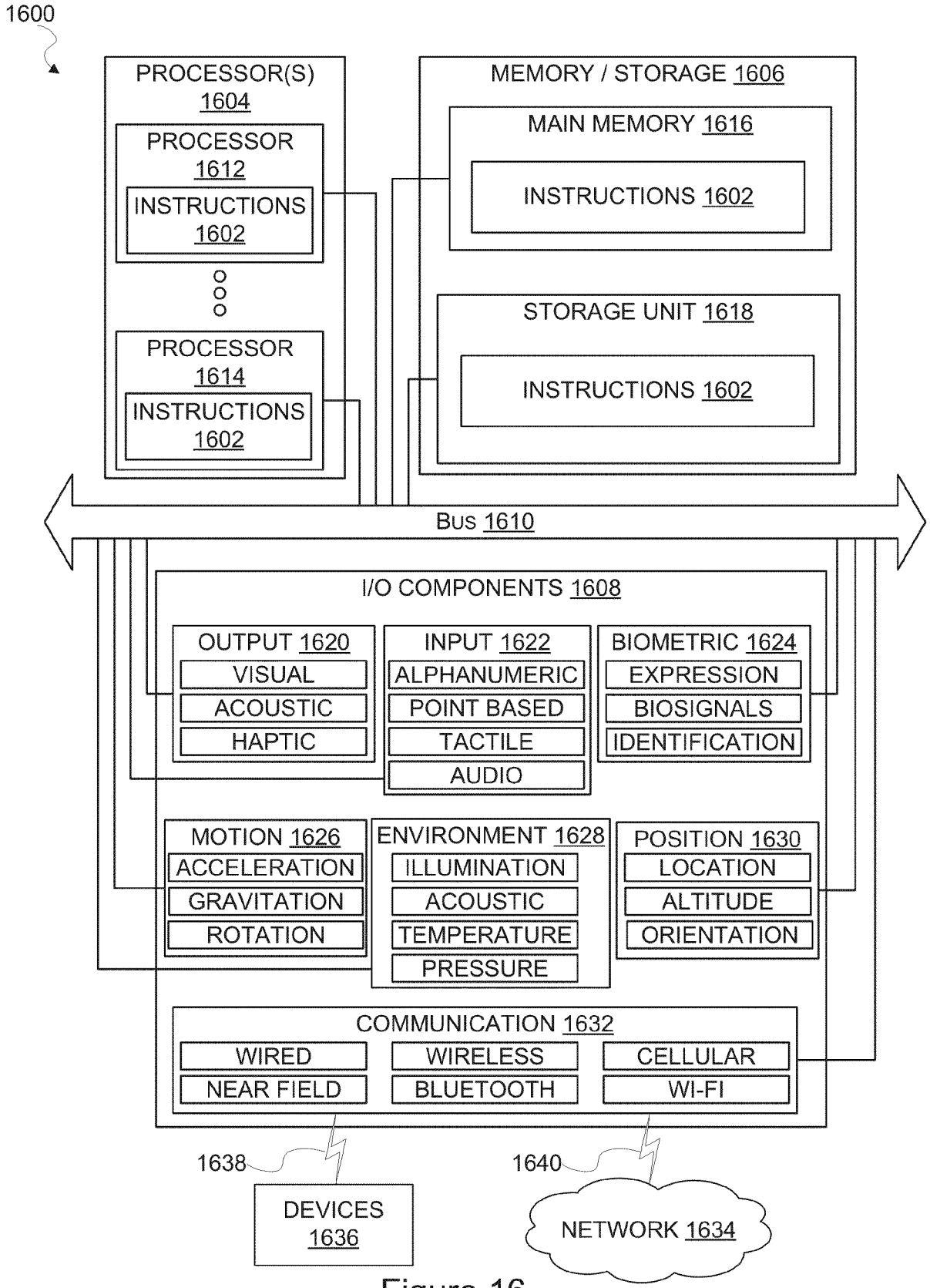

1600
PROCESSOR(S) 1604
PROCESSOR 1612
INSTRUCTIONS 1602
PROCESSOR 1614
INSTRUCTIONS 1602
MEMORY / STORAGE 1606
MAIN MEMORY 1616
INSTRUCTIONS 1602
STORAGE UNIT 1618
INSTRUCTIONS 1602
BUS 1610
I/O COMPONENTS 1608
OUTPUT 1620
VISUAL
ACOUSTIC
HAPTIC
INPUT 1622
ALPHANUMERIC
POINT BASED
TACTILE
AUDIO
BIOMETRIC 1624
EXPRESSION
BIOSIGNALS
IDENTIFICATION
MOTION 1626
ACCELERATION
GRAVITATION
ROTATION
ENVIRONMENT 1628
ILLUMINATION
ACOUSTIC
TEMPERATURE
PRESSURE
POSITION 1630
LOCATION
ALTITUDE
ORIENTATION
COMMUNICATION 1632
WIRED
NEAR FIELD
WIRELESS
BLUETOOTH
CELLULAR
WI-FI
1638
DEVICES 1636
1640
NETWORK 1634

Figure 16

CLIENT APPLICATION CONTENT CLASSIFICATION AND DISCOVERY

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is a continuation of U.S. Pat. Application Serial No. 16/885,849, filed May 28, 2020, which is incorporated by reference herein in its entirety.

BACKGROUND

[0002] Applications executed on client devices may be used to generate content. For example, client applications may be used to generate messaging content, image content, video content, audio content, media overlays, documents, creative artwork, combinations thereof, and the like. In various situations, this content may be exchanged between client devices via a computational system that enables the communication of content between client devices.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] In the drawings, which are not necessarily drawn to scale, like numerals may describe similar components in different views. 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. Some implementations are illustrated by way of example, and not limitation.

[0004] FIG. **1** is a diagrammatic representation of an architecture for exchanging data (e.g., messages and associated content) over a network, according to one or more example implementations.

[0005] FIG. **2** is a schematic diagram illustrating data that may be stored in a database of a server system, according to one or more example implementations.

[0006] FIG. **3** is a schematic diagram illustrating an example framework for content that may be generated by a client application, in accordance with one or more example implementations.

[0007] FIG. **4** is a diagrammatic representation illustrating an architecture that may determine classifications for content items and make content items accessible to users based on content item classifications, in accordance with one or more example implementations.

[0008] FIG. **5** is a flowchart illustrating example operations performed by a server system for content item classification based on data corresponding to overlays of content items, according to one or more example implementations

[0009] FIG. **6** is a flowchart illustrating example operations performed by a server system to add content to a classification from a page displaying content items associated with the classification, according to one or more example implementations.

[0010] FIG. **7** is a flowchart illustrating example operations performed by a client device to generate content items that are accessible based on classification, according to one or more example implementations.

[0011] FIG. **8** is an illustration of a user interface that includes content associated with a classification, according to one or more example implementations.

[0012] FIG. **9** is an illustration of a user interface to add a classification to content based on text input, according to one or more example implementations.

[0013] FIG. **10** is an illustration of a user interface to add a classification to content using a creative tool, according to one or more example implementations.

[0014] FIG. **11** is an illustration of a user interface to add a classification to content in relation to sharing the content, according to one or more example implementations.

[0015] FIG. **12** is an illustration of a user interface to add content to a collection of content having a classification, according to one or more example implementations.

[0016] FIG. **13** is an illustration of a user interface that includes an option to share a classification, according to one or more example implementations.

[0017] FIG. **14** is an illustration of a user interface to manage content associated with one or more classifications, according to one or more example implementations.

[0018] FIG. **15** is block diagram illustrating a representative software architecture that may be used in conjunction with one or more hardware architectures described herein, in accordance with one or more example implementations.

[0019] FIG. **16** is a block diagram illustrating components of a machine, in the form of a computer system, that may read and execute instructions from one or more machine-readable media to perform any one or more methodologies described herein, in accordance with one or more example implementations.

DETAILED DESCRIPTION

[0020] Content may be created using applications that are executed by client devices. For example, a client application may be used to create messages that can be exchanged between client devices of users. In these situations, the client application can include at least one of a messaging application or a social networking application. The messages may include content, such as text content, video content, audio content, image content, or one or more combinations thereof. Client applications may also be used outside of a messaging context to generate at least one of text content, image content, video content, or audio content that can be shared between client devices.

[0021] Client applications may be implemented by a large number of users, such as thousands of users, up to millions of users, to generate content. Thus, the volume of content generated using a client application can be large. The content generated using the client applications may be varied and be associated with a number of different topics, such as locations, events, various objects, individuals, or animals. In many situations, the content created using client applications is shared with a number of other users. In conventional systems, though, the large amounts of content are not curated in a manner that enables individuals to easily discover content that they might be interested in. Additionally, it can be challenging for users to publish their content in a way that is discoverable by additional users. Typically, conventional systems are limited in the ways that content is classified and in the channels that may be used to discover content that is of interest to users. For example, typical social networking platforms enable users to post content to a personal page or account that may include content that is accessible publicly. However, the content that is publicly posted by users is often discovered based on the identity of the user and not based on a topic that is related to the content. Additionally, the number of ways that content may be

categorized by conventional systems is also limited and may be dependent on user input.

[0022] The systems, methods, techniques, instruction sequences, and computing machine program products described herein are directed to the classification of content generated using client applications and to accessing content based on one or more classifications associated with the content. Content may be generated by a client application executed by a client device of a content creator and sent to a server system that may distribute the content to one or more additional client devices of recipients of the content. The server system may also determine one or more classifications for content and aggregate content having a same classification. Content associated with a classification may be accessible to other users based on the classification. In various examples, content may be accessible without providing an identifier of the user that created the content.

[0023] In various implementations, content may be created by users of a client application. The client application may include social networking functionality. Additionally, the client application may provide messaging functionality. In one or more implementations, a client device may capture content, such as image content or video content, in conjunction with a client application. The client application may utilize one or more input devices, such as at least one of one or more cameras or one or more microphones of the client device, and control operation of the one or more input devices within the client application. Data corresponding to the content may be used to determine one or more classifications for the content. In one or more illustrative examples, a user of the client application may provide data that is used to determine one or more classifications of the content. For example, a user of the client application may provide text for a caption, comment, annotation, or message corresponding to an image or video that may be used to determine one or more classifications for the content. In at least some examples, the text may include an explicit classification for the content that may be marked by one or more symbols, such as a "#" symbol. Further, a user of the client application may implement a creative tool with respect to the content and one or more classifications for the content may be determined based on the creative tool. The creative tool may alter the appearance of image content or video content, add an overlay to at least one of image or video content, add an animation to image content or video content, or one or more combinations thereof. One or more classifications for content may also be determined according to the selection of at least one classification identifier for the content from a list of classification identifiers corresponding to a number of classifications.

[0024] In additional examples, data related to the content may be analyzed to implicitly determine one or more classifications of the content. To illustrate, image recognition techniques may be used to determine one or more objects included in image content or video content. A classification for the content may then be based on at least one of the objects included in the image content or video content. In addition, location data corresponding to a client device may be used to determine one or more classifications of content. In one or more examples, location data may be used to identify one or more events that may be taking place at or near the location and one or more classifications may be determined based on one or more events that are related to the content.

[0025] In one or more implementations, a server system may obtain content from a number of client devices of users of a client application and aggregate content having one or more classifications. In this way, the system may produce repositories of content having a same or similar classification. Users of the client applicati on may access content associated with a classification of content by providing an identifier corresponding to the classification. In various examples, an order that the content is presented to a respective user may be based on a ranking of content that is determined based on one or more characteristics of the user. For example, the server system may analyze information of a user of the client application in relation to one or more characteristics of content associated with a classification to determine a level of interest of at least a portion of the content items having the classification. Based on the individual levels of interest, the server system may determine a ranking of a number of content items having the classification and cause the content items to be accessible to the user according to the ranking, such that content items having a relatively high level of interest for the user are presented to the user in one or more user interfaces of the client application before content items having a lower level of interest.

[0026] Accordingly, the systems, methods, techniques, instruction sequences, and computing machine program products described herein provide various implementations to classify content in a manner that makes content accessible to a greater number of users, if desired by the creator of the content, by providing discovery mechanisms for content that are lacking in conventional systems. Additionally, a number of different types of data and input may be used to determine classifications for content, which provides flexibility for content classification that is not found in conventional techniques and systems. For example, rather than relying on user input to determine classifications for content items, classifications of content items may be determined according to characteristics of content that are determined through an analysis of data associated with the content. In additional examples, classifications of content may be identified based on one or more characteristics of overlays included in content items.

[0027] FIG. **1** is a diagrammatic representation of an architecture **100** for exchanging data (e.g., messages and associated content) over a network. The architecture **100** may include multiple client devices **102**. The client devices **102** may individually comprise, but are not limited to, a mobile phone, a desktop computer, a laptop computing device, a portable digital assistant (PDA), smart phone, tablet computing device, ultrabook, netbook, multi-processor system, microprocessor-based or programmable consumer electronic system, game console, set-top box, computer in a vehicle, a wearable device, one or more combinations thereof, or any other communication device that a user may utilize to access one or more components included in the architecture **100**.

[0028] Each client device **102** may host a number of applications, including a client application **104** and one or more third-party applications **106**. A user may use the client application **104** to create content, such as video, images (e.g., photographs), audio, and media overlays. In one or more illustrative examples, the client application **104** may include a social networking functionality that enables users to create and exchange content. In various examples, the client application **104** may include messaging functionality that may be

used to send messages between instances of the client application **104** executed by various client devices **102**. The messages created using the client application **104** may include video, one or more images, audio, media overlays, text, content produced using one or more creative tools, annotations, and the like. In one or more implementations, the client application **104** may be used to view and generate interactive messages, view locations of other users of the client application **104** on a map, chat with other users of the client application **104**, and so forth.

[0029] One or more users may be a person, a machine, or other means of interacting with a client device, such as the first client device **102**. In example implementations, the user may not be part of the architecture **100** but may interact with one or more components of the architecture **100** via a client device **102** or other means. In various examples, users may provide input (e.g., touch screen input or alphanumeric input) to a client device **102** and the input may be communicated to other entities in the architecture **100**. In this instance, the other entities in the architecture **100**, responsive to the user input, may communicate information to a client device **102** to be presented to the users. In this way, users may interact with the various entities in the architecture **100** using the client device **102**.

[0030] Each instance of the client application **104** is able to communicate and exchange data with at least one of another instance of the client application **104**, one or more third-party applications **106**, or a server system **108**. The data exchanged between instances of the client applications **104**, between the third-party applications **106**, and between instances of the client application **104** and the server system **108** includes functions (e.g., commands to invoke functions) and payload data (e.g., text, audio, image, video, or other multimedia data). Data exchanged between instances of the client applications **104**, between the third-party applications **106**, and between at least one instance of the client application **104** and at least one third-party application **106** may be exchanged directly from an instance of an application executed by a client device **102** and an instance of an application executed by an additional client device **102**. Further, data exchanged between the client applications **104**, between the third-party applications **106**, and between at least one client application **104** and at least one third-party application **106** may be communicated indirectly (e.g., via one or more intermediate servers) from an instance of an application executed by a client device **102** to another instance of an application executed by an additional client device **102**. In one or more illustrative examples, the one or more intermediate servers used in indirect communications between applications may be included in the server system **108**.

[0031] The third-party application(s) **106** may be separate and distinct from the client application **104**. The third-party application(s) **106** may be downloaded and installed by the client device **102** separately from the client application **104**. In various implementations, the third-party application(s) **106** may be downloaded and installed by the client device **102** before or after the client application **104** is downloaded and installed. The third-party application(s) **106** may be an application that is provided by an entity or organization that is different from the entity or organization that provides the client application **104**. The third-party application(s) **106** may be accessed by the client device **102** using separate login credentials than the client application **104**. Namely, the third-party application(s) **106** may maintain a first user account and the client application **104** may maintain a second user account. In an implementation, the third-party application(s) **106** may be accessed by the client device **102** to perform various activities and interactions, such as listening to music, videos, track exercises, view graphical elements (e.g., stickers), communicate with other users, and so forth. As an example, the third-party application(s) **106** may include a social networking application, a dating application, a ride or car sharing application, a shopping application, a trading application, a gaming application, an imaging application, a music application, a video browsing application, an exercise tracking application, a health monitoring application, a graphical element or sticker browsing application, or any other suitable application.

[0032] The server system **108** provides server-side functionality via one or more networks **110** to the client application **104**. The server system **108** may be a cloud computing environment, according to some example implementations. For example, the server system **108**, and one or more servers associated with the server system **108**, may be associated with a cloud-based application, in one illustrative example. In one or more implementations, the first client device **102**, the second client device **104**, and the server system **108** may be coupled via the one or more networks **110**. One or more portions of the one or more networks **110** 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), a portion of the Internet, a portion of a public switched telephone network (PSTN), a cellular telephone network, a wireless network, a WI-FI network, a WiMax network, another type of network, or a combination of two or more such networks.

[0033] The server system **108** supports various services and operations that are provided to the client application **104**. Such operations include transmitting data to, receiving data from, and processing data generated by the client application **104**. This data may include message content, media content, client device information, geolocation information, media annotation and overlays, message content persistence conditions, social network information, and live event information, as examples. Data exchanges within the architecture **100** are invoked and controlled through functions available via user interfaces (UIs) of the client application **104**.

[0034] While certain functions of the architecture **100** are described herein as being performed by either a client application **104** or by the server system **108**, the location of functionality either within the client application **104** or the server system **108** is a design choice. For example, it may be technically preferable to initially deploy certain technology and functionality within the server system **108**, but to later migrate this technology and functionality to the client application **104** where a client device **102** has a sufficient processing capacity.

[0035] The server system **108** includes an Application Programming Interface (API) server **112** that is coupled to, and provides a programmatic interface to, an application server **114**. The application server **114** is communicatively coupled to a database server **116** that facilitates access to one or more databases **118**. The one or more databases **118** may store data associated with information processed by the application server **114**. The one or more databases **118** may be storage devices that store information such as

untreated media content, original media content from users (e.g., high-quality media content), processed media content (e.g., media content that is formatted for sharing with client devices **102** and viewing on client devices **102**), context data related to a media content item, context data related to a user device (e.g., a computing or client device **102**), media overlays, media overlay smart widgets or smart elements, user data, user device information, media content (e.g., video and images), media content data (e.g., data associated with video and images), computing device context data, serialized data, session data items, user device location data, mapping information, interactive message usage data, interactive message metrics data, and so forth. The one or more databases **118** may further store information related to third-party servers, client devices **102**, client applications **104**, users, third-party applications **106**, and so forth.

[0036] The API server **112** receives and transmits data (e.g., commands and message payloads) between client devices **102** and the application server **114**. Specifically, the Application Program Interface (API) server **112** provides a set of interfaces (e.g., routines and protocols) that can be called or queried by the client application **104** in order to invoke functionality of the application server **114**. The Application Program Interface (API) server **112** exposes various functions supported by the application server **114**, including account registration, login functionality, the sending of messages, via the application server **114**, from one instance of the client application **104** to another instance of the client application **104**, the sending of media files (e.g., images, audio, video) from a client application **104** to the application server **114**, and for possible access by another client application **104**, the setting of a collection of media content (e.g., a gallery, story, message collection, or media collection), 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, and opening an application event (e.g., relating to the client application **104**).

[0037] The application server **114** hosts a number of applications and subsystems, including a messaging application system **120**, a media content processing system **122**, a social network system **124**, and a content classification system **126**. The messaging application system **120** 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 client application **104**. For example, the messaging application system **120** may deliver messages using electronic mail (email), instant messaging (IM), Short Message Service (SMS), text, facsimile, or voice (e.g., Voice over IP (VoIP)) messages via wired networks (e.g., the Internet), plain old telephone service (POTS), or wireless networks (e.g., mobile, cellular, WIFI, Long Term Evolution (LTE), or Bluetooth). The messaging application system **120** may aggregate text and media content from multiple sources into collections of content. These collections are then made available, by the messaging application system **120**, to the client application **104**. Other processor- and memory-intensive processing of data may also be performed server-side by the messaging application system **120**, in view of the hardware requirements for such processing.

[0038] The media content processing system **122** is dedicated to performing various media content processing operations, typically with respect to images, audio, or video received within the payload of a message or other content item at the messaging application system **120**. The media content processing system **122** may access one or more data storages (e.g., the database(s) **118**) to retrieve stored data to use in processing media content and to store results of processed media content.

[0039] The social network system **124** supports various social networking functions and services, and makes these functions and services available to the messaging application system **120**. To this end, the social network system **124** maintains and accesses an entity graph within the database(s) **118**. Examples of functions and services supported by the social network system **124** include the identification of other users of the client application **104** with which a particular user has relationships or is "following", and also the identification of other entities and interests of a particular user. The social network system **124** may access location information associated with each of the user's friends to determine where they live or are currently located geographically. In addition, the social network system **124** may maintain a location profile for each of the user's friends indicating the geographical location where the user's friends live.

[0040] The content classification system **126** may determine one or more classifications for content that is generated using the client application **104**. The content may include text content, image content, video content, audio content, content annotations, or combinations thereof, that are produced using the client application **104**. In one or more illustrative examples, the content may include image content having one or more annotations. The one or more annotations may include overlays that include at least one of text content, content produced using one or more creative tools of the client application **104**, one or more additional images, or one or more animations. After a user of the client device **102** has generated the content by providing input via the client application **104**, the client device **102** may send data corresponding to the content to the server system **108**. In various examples, client application content data **128** may be communicated between the client device **102** and the server system **108**. The client application content data **128** may include data that corresponds to content generated using the client application **104** and sent to the server system **108** from the client device **102**. In addition, the client application content data **128** may include data sent from the server system **108** to the client device **102** in relation to the client application **104**. For example, the client application content data **128** may include data corresponding to content identified by the server system **108** based on one or more requests obtained from the client device **102**. In addition, the client application content data **128** may include data corresponding to content for which a user of the client device **102** is a recipient.

[0041] The server system **108** may store at least a portion of the client application content data **128** in the database(s) **118** as client application content **130**. The client application content **130** may include a number of content items **132**. Each content item **132** may include one or more images, one or more videos, text, audio, one or more content annotations, or one or more combinations thereof. In various examples, an individual content item **132** may include a col-

lection of images, videos, text, audio, content annotations, or combinations thereof. Additionally, the client application content **130** may include classification data **134**. The classification data **134** may correspond to one or more classifications associated with respective content items **132**. In one or more illustrative examples, the classification data **134** may include identifiers that correspond to respective classifications. At least a portion of the one or more classifications for a respective content item **132** may be determined by the content classification system **126**. In further examples, at least one classification for a respective content item **132** may be determined by the client application **104**.

[0042] In one or more implementations, the content classification system **126** may analyze portions of the client application content data **128** obtained from the client device **102** to determine one or more classifications of content generated by the client application **104**. In various examples, the client application content data **128** may include a content item **136** that corresponds to a content item generated by the client application **104** and sent to the server system **108**. The content classification system **126** may analyze data related to the content item **136** to determine one or more classifications corresponding to the content item. In one or more examples, data of the content item **136** may include image data and the content classification system **126** may analyze the image data to determine one or more objects that are included in the image. In these scenarios, the content classification system **126** may determine one or more classifications for the content item based on at least one object included in the image. In one or more additional examples, the content classification system **126** may determine one or more recommendations for classifications of the content item based on one or more objects included in the image.

[0043] Additionally, the content classification system **126** may analyze data corresponding to overlays of images. For example, users of the client application **104** may produce text content using the client application **104** that may overlay an image that is at least one of captured by the client device or stored by the client device **102**. In further examples, users of the client application **104** may overlay additional image content or additional video content atop an image or video. In various examples, an overlay may be generated by one or more creative tools of the client application **104**. In one or more examples, an overlay associated with an image may include an identifier of a classification. To illustrate, an overlay may include text that corresponds to an identifier of a classification. In one or more illustrative examples, the identifier of the classification may be identifiable by the use of a symbol, such as a "#" symbol. In these situations, the content classification system **126** may determine a classification for the content item **136** based on the identifier of the classification included in the overlay. The content classification system **126** may also determine a classification of the content item **136** based on a creative tool used to generate at least one of an overlay or an identifier of the overlay. In one or more implementations, an overlay may be associated with an identifier based on input from a creator of the overlay or a service provider that makes the overlay available to users of the client application **104**. In one or more illustrative examples, an identifier of an overlay may include "Current Time" or "Current Temperature". In these situations, a classification of the content item **136** may correspond to the identifier associated with the overlay.

[0044] In one or more implementations, the content classification system **126** may determine a classification of the content item **136** based on selection of one or more classification identifiers by a user of the client device **102** with respect to the content item **136**. For example, the client application **104** may generate a user interface that includes one or more identifiers of classifications for the content item **136**. The one or more identifiers may include one or more recommendations of classifications for the content item **136**. In various examples, the classification identifiers included in a user interface that may be selectable by a user of the client application **104** may be determined by at least one of the client application **104** or the content classification system **126** based on at least one of overlays related to the content item **136**, image content data of the content item **136**, such as objects included in an image of the content item **136**, text data of the content item **136**, additional annotation data for the content item **136**, video data of the content item **136**, or audio data of the content item **136**. In one or more illustrative examples, identifiers of classifications may be included in a user interface generated by the client application **104** when a user of the client application **104** is selecting one or more recipients for the content item **136**. In these scenarios, a user interface element corresponding to a classification identifier may be selectable to classify the content item **136** according to the classification related to the classification identifier.

[0045] After determining one or more classifications for the content item **136**, the content classification system **126** may store the content item in the database(s) **118** as part of the content items **132**. The content classification system **126** may also store one or more classification identifiers related to the content item **136** as part of the classification data **134**. In one or more examples, the content classification system **126** may store the content item **136** in association with one or more classifications such that the content item **136** may be retrievable based on identifiers of the one or more classifications associated with the content item **136**. To illustrate, the content item **136** may be retrieved in response to a request for content items corresponding to a classification identifier related to at least one classification of the content item **136**. In this way, the content item **136** may be provided to users of the client application **104** as part of a collection of content items associated with at least one classification of the content item **136**.

[0046] In one or more illustrative examples, the content item **136** may be associated with a classification of "classic cars". In these scenarios, the content item **136** may be stored in the database(s) **118** with respect to an identifier corresponding to "classic cars". In response to a request for content items associated with "classic cars", the content classification system **126** may identify the content item **136** and provide the content item **136** such that the content item **136** may be displayed in a user interface in conjunction with one or more additional content items related the classification "classic cars". In one or more implementations, the content classification system **126** may determine rankings for content items associated with one or more classifications before providing one or more of the content items in response to a request for content having the one or more classifications. The rankings for the content items may be based on information related to a user that is requesting content associated with the one or more classifications. For example, profile information of a user of the client application **104** that

requests content related to "classic cars" may be analyzed by the content classification system **126** in relation to information of a number of content items associated with the classification "classic cars" to determine an order in which at least a portion of the content items associated with the classification "classic cars" is to be provided to the user via the client application **104**.

[0047] FIG. **2** is a schematic diagram illustrating data structures **200** which may be stored in the database(s) **118** of the server system **108**, according to one or more example implementations. While the content of the database(s) **118** 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).

[0048] The database(s) **118** may include message data stored within a message table **202**. In various examples, the message data may correspond to one or more ephemeral messages that are stored for a limited duration. The entity table **204** may store entity data, including an entity graph **206**. Entities for which records are maintained within the entity table **204** may include individuals, corporate entities, organizations, objects, places, events, etc. Regardless of type, any entity regarding which the 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).

[0049] The entity graph **206** furthermore stores information regarding relationships and associations between entities. Such relationships may be social, professional (e.g., work at a common corporation or organization) interest-based, or activity-based, merely for example.

[0050] The database(s) **118** may also store annotation data, in the example form of filters, in an annotation table **208**. Filters for which data is stored within the annotation table **208** are associated with and applied to videos (for which data is stored in a video table **210**) or images (for which data is stored in an image table **212**). Filters, in one example, are overlays that are displayed as overlaid on an image or video during presentation to a recipient user. Filters may be of various types, including user-selected filters from a gallery of filters presented to a sending user by the client application **104** when the sending user is composing a message. Other types of filters 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 client application **104**, based on geolocation information determined by a GPS unit of a client device **102**. Another type of filter is a data filter, which may be selectively presented to a sending user by the client application **104**, based on other inputs or information gathered by a client device **102** during the message creation process. Examples 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.

[0051] Other annotation data that may be stored within the image table **212** are augmented reality content items (e.g., corresponding to applying Lenses or augmented reality experiences). An augmented reality content item may be a real-time special effect and sound that may be added to an image or a video.

[0052] As described above, augmented reality content items, overlays, image transformations, AR images and similar terms refer to modifications that may be made to videos or images. This includes real-time modification which modifies an image as it is captured using a device sensor and then displayed on a screen of the device with the modifications. This also includes modifications to stored content, such as video clips in a gallery that may be modified. For example, in a device with access to multiple augmented reality content items, a user can use a single video clip with multiple augmented reality content items to see how the different augmented reality content items will modify the stored clip. For example, multiple augmented reality content items that apply different pseudorandom movement models can be applied to the same content by selecting different augmented reality content items for the content. Similarly, real-time video capture may be used with an illustrated modification to show how video images currently being captured by sensors of a device would modify the captured data. Such data may simply be displayed on the screen and not stored in memory, or the content captured by the device sensors may be recorded and stored in memory with or without the modifications (or both). In some systems, a preview feature can show how different augmented reality content items will look within different windows in a display at the same time. This can, for example, enable multiple windows with different pseudorandom animations to be viewed on a display at the same time.

[0053] Data and various systems using augmented reality content items or other such transform systems to modify content using this data can thus involve detection of objects (e.g., faces, hands, bodies, cats, dogs, surfaces, objects, etc.), tracking of such objects as they leave, enter, and move around the field of view in video frames, and the modification or transformation of such objects as they are tracked. In various implementations, different methods for achieving such transformations may be used. For example, some implementations may involve generating a three-dimensional mesh model of the object or objects, and using transformations and animated textures of the model within the video to achieve the transformation. In other implementations, tracking of points on an object may be used to place an image or texture (which may be two dimensional or three dimensional) at the tracked position. In still further implementations, neural network analysis of video frames may be used to place images, models, or textures in content (e.g., images or frames of video). Augmented reality content items thus refer both to the images, models, and textures used to create transformations in content, as well as to additional modeling and analysis information needed to achieve such transformations with object detection, tracking, and placement.

[0054] Real-time video processing can be performed with any kind of video data (e.g., video streams, video files, etc.) saved in a memory of a computerized system of any kind. For example, a user can load video files and save them in a memory of a device, or can generate a video stream using sensors of the device. Additionally, any objects can be processed using a computer animation model, such as a human's face and parts of a human body, animals, or non-living things such as chairs, cars, or other objects.

[0055] In some implementations, when a particular modification is selected along with content to be transformed, elements to be transformed are identified by the computing device, and then detected and tracked if they are present in the frames of the video. The elements of the object are mod-

ified according to the request for modification, thus transforming the frames of the video stream. Transformation of frames of a video stream can be performed by different methods for different kinds of transformation. For example, for transformations of frames mostly referring to changing forms of obj ect's elements characteristic points for each of element of an object are calculated (e.g., using an Active Shape Model (ASM) or other known methods). Then, a mesh based on the characteristic points is generated for each of the at least one element of the object. This mesh used in the following stage of tracking the elements of the object in the video stream. In the process of tracking, the mentioned mesh for each element is aligned with a position of each element. Then, additional points are generated on the mesh. A first set of first points is generated for each element based on a request for modification, and a set of second points is generated for each element based on the set of first points and the request for modification. Then, the frames of the video stream can be transformed by modifying the elements of the object on the basis of the sets of first and second points and the mesh. In such method, a background of the modified object can be changed or distorted as well by tracking and modifying the background.

[0056] In one or more implementations, transformations changing some areas of an object using its elements can be performed by calculating of characteristic points for each element of an object and generating a mesh based on the calculated characteristic points. Points are generated on the mesh, and then various areas based on the points are generated. The elements of the object are then tracked by aligning the area for each element with a position for each of the at least one element, and properties of the areas can be modified based on the request for modification, thus transforming the frames of the video stream. Depending on the specific request for modification properties of the mentioned areas can be transformed in different ways. Such modifications may involve changing color of areas; removing at least some part of areas from the frames of the video stream; including one or more new objects into areas which are based on a request for modification; and modifying or distorting the elements of an area or object. In various implementations, any combination of such modifications or other similar modifications may be used. For certain models to be animated, some characteristic points can be selected as control points to be used in determining the entire state-space of options for the model animation.

[0057] In some implementations of a computer animation model to transform image data using face detection, the face is detected on an image with use of a specific face detection algorithm (e.g., Viola-Jones). Then, an Active Shape Model (ASM) algorithm is applied to the face region of an image to detect facial feature reference points.

[0058] In other implementations, other methods and algorithms suitable for face detection can be used. For example, in some implementations, features are located using a landmark which represents a distinguishable point present in most of the images under consideration. For facial landmarks, for example, the location of the left eye pupil may be used. In an initial landmark is not identifiable (e.g., if a person has an eyepatch), secondary landmarks may be used. Such landmark identification procedures may be used for any such objects. In some implementations, a set of landmarks forms a shape. Shapes can be represented as vectors using the coordinates of the points in the shape. One shape is aligned to another with a similarity transform (allowing translation, scaling, and rotation) that minimizes the average Euclidean distance between shape points. The mean shape is the mean of the aligned training shapes.

[0059] In some implementations, a search for landmarks from the mean shape aligned to the position and size of the face determined by a global face detector is started. Such a search then repeats the steps of suggesting a tentative shape by adjusting the locations of shape points by template matching of the image texture around each point and then conforming the tentative shape to a global shape model until convergence occurs. In some systems, individual template matches are unreliable and the shape model pools the results of the weak template matchers to form a stronger overall classifier. The entire search is repeated at each level in an image pyramid, from coarse to fine resolution.

[0060] Implementations of a transformation system can capture an image or video stream on a client device (e.g., the client device **102**) and perform complex image manipulations locally on the client device **102** while maintaining a suitable user experience, computation time, and power consumption. The complex image manipulations may include size and shape changes, emotion transfers (e.g., changing a face from a frown to a smile), state transfers (e.g., aging a subject, reducing apparent age, changing gender), style transfers, graphical element application, and any other suitable image or video manipulation implemented by a convolutional neural network that has been configured to execute efficiently on the client device **102**.

[0061] In some example implementations, a computer animation model to transform image data can be used by a system where a user may capture an image or video stream of the user (e.g., a selfie) using a client device **102** having a neural network operating as part of a messaging client application **104** operating on the client device **102**. The transform system operating within the messaging client application **104** determines the presence of a face within the image or video stream and provides modification icons associated with a computer animation model to transform image data, or the computer animation model can be present as associated with an interface described herein. The modification icons include changes which may be the basis for modifying the user's face within the image or video stream as part of the modification operation. Once a modification icon is selected, the transform system initiates a process to convert the image of the user to reflect the selected modification icon (e.g., generate a smiling face on the user). In some implementations, a modified image or video stream may be presented in a graphical user interface displayed on the mobile client device as soon as the image or video stream is captured and a specified modification is selected. The transform system may implement a complex convolutional neural network on a portion of the image or video stream to generate and apply the selected modification. That is, the user may capture the image or video stream and be presented with a modified result in real time or near real time once a modification icon has been selected. Further, the modification may be persistent while the video stream is being captured and the selected modification icon remains toggled. Machine taught neural networks may be used to enable such modifications.

[0062] In some implementations, the graphical user interface, presenting the modification performed by the transform system, may supply the user with additional interaction

options. Such options may be based on the interface used to initiate the content capture and selection of a particular computer animation model (e.g., initiation from a content creator user interface). In various implementations, a modification may be persistent after an initial selection of a modification icon. The user may toggle the modification on or off by tapping or otherwise selecting the face being modified by the transformation system and store it for later viewing or browse to other areas of the imaging application. Where multiple faces are modified by the transformation system, the user may toggle the modification on or off globally by tapping or selecting a single face modified and displayed within a graphical user interface. In some implementations, individual faces, among a group of multiple faces, may be individually modified or such modifications may be individually toggled by tapping or selecting the individual face or a series of individual faces displayed within the graphical user interface.

[0063] As mentioned above, the video table **210** stores video data which, in one or more implementations, is associated with messages for which records are maintained within the message table **202**. Similarly, the image table **212** stores image data associated with messages for which message data is stored in the entity table **204**. The entity table **204** may associate various annotations from the annotation table **208** with various images and videos stored in the image table **212** and the video table **210**.

[0064] A story table **214** stores data regarding collections of messages and associated image, video, or audio data, which are compiled into a collection (e.g., a 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 **204**). 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, one or more user interfaces generated by the 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.

[0065] 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 various locations and events. Users whose client devices **102** 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 client application **104**, to contribute content to a particular live story. The live story may be identified to the user by the client application **104**, based on a user location. The end result is a "live story" told from a community perspective.

[0066] 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 implementations, 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).

[0067] The database(s) **118** may also store content classification data **216** that indicates classifications of content items produced by the client application **104**. For example, the content classification data **216** may include one or more identifiers of respective classifications of content items. In one or more examples, the content classification data **216** may include one or more lists of classification identifiers that may be applied to respective content items. In various implementations, the content classification data **216** may indicate a number of content items that are associated with a respective content identifier. For example, the content classification data **216** may indicate a first number of content items that are associated with a first content identifier (e.g., "keto diet") and a second number of content items that are associated with a second content identifier (e.g., "plant-based diet"). Additionally, the content classification data **216** may indicate one or more classification identifiers that are associated with respective content items. To illustrate, the content classification data **216** may indicate a first content item that is associated with one or more first content identifiers and a second content item that is associated with one or more second content identifiers. In one or more illustrative examples, at least one first content identifier of the one or more first content identifiers may be different from at least one second content identifier of the one or more second content identifiers.

[0068] FIG. **3** is a schematic diagram illustrating an example framework for content **300**, according to some implementations. The content **300** may be generated by the client application **104**. In various examples, the content **300** may be generated by a first instance of the client application **104** and communicated to at least one of a second instance of the client application **104** or the server system **108**. In situations where the content **300** includes a message, the content **300** may be used to populate the message table **202** stored within the database(s) **118** and accessible by the application server **114**. In one or more implementations, the content **300** may be stored in memory as "in-transit" or "in-flight" data of at least one of client devices **102** or the application server **114**. The content **300** is shown to include the following components:

- **[0069]** A content identifier **302**: a unique identifier that identifies the content **300**.
- **[0070]** A content text payload **304**: text, to be generated by a user via a user interface of the client application **104** and that may be included in the content **300**.
- **[0071]** A content image payload **306**: image data, captured by a camera component of a client device **102** or retrieved from a memory component of a client device **102**, and that is included in the content **300**.
- **[0072]** A content video payload **308**: video data, captured by a camera component or retrieved from a memory component of a client device **102**, and that is included in the content **300**.
- **[0073]** A content audio payload **310**: audio data, captured by a microphone or retrieved from a memory component of a client device **102**, and that is included in the content **300**.
- **[0074]** Content annotations **312**: annotation data (e.g., filters, stickers, overlays, or other enhancements) that represents annotations to be applied to content image payload **306**, content video payload **308**, or content audio payload **310** of the content **300**.
- **[0075]** A content duration parameter **314**: parameter value indicating, in seconds, the amount of time for which the content **300** (e.g., the content image payload **306**, content video payload **308**, content audio payload

310) is to be presented or made accessible to a user via the client application **104**.

[0076] A content geolocation parameter **316**: geolocation data (e.g., latitudinal and longitudinal coordinates) associated with the payload of the content **300**. Multiple values of the geolocation parameter **316** may be included in the payload with each of the values of the geolocation parameter **316** being associated with respect to content items included in the content **300** (e.g., a specific image within the content image payload **306**, or a specific video in the content video payload **308**).

[0077] A content story identifier **318**: identifier values identifying one or more content collections (e.g., "stories") with which a particular content item in the content image payload **306** of the content **300** is associated. For example, multiple images within the content image payload **306** may each be associated with multiple content collections using identifier values.

[0078] A content tag **320**: content **300** may be tagged with multiple tags, each of which is indicative of the subject matter of one or more content items included in the payload of the content **300**. For example, where a particular image included in the content image payload **306** depicts an animal (e.g., a lion), a tag value may be included within the content tag **320** 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.

[0079] A content sender identifier **322**: an identifier (e.g., a system identifier, email address, or device identifier) indicative of a user of a client device **102** on which the content **300** was generated and from which the content **300** was generated or sent.

[0080] A content recipient identifier **324**: an identifier (e.g., a system identifier, email address, or device identifier) indicative of a user of another client device **102** to which the content **300** is addressed or otherwise accessible.

[0081] A content classification identifier **326**: an identifier of a classification of a content item included in the content **300**. The content item classification identifier **326** may be one of a plurality of classification identifiers associated with the content **300**. In one or more illustrative examples, the content classification identifier **326** may correspond to one or more alphanumeric characters or symbols.

[0082] The data (e.g., values) of the various components of content **300** may correspond to pointers to locations in tables within which the data is stored. For example, an image value in the content image payload **306** may be a pointer to (or address of) a location within an image table **212**. Similarly, values within the content video payload **308** may point to data stored within a video table **210**, values stored within the annotations **312** may point to data stored in an annotation table **208**, values stored within the content story identifier **318** may point to data stored in a story table **214**, and values stored within the content sender identifier **322** and the content recipient identifier **324** may point to user records stored within an entity table **204**. Further, values of the content classification identifier **326** may point to data stored within a data structure that includes content classification data **216**.

[0083] FIG. **4** is a diagrammatic representation illustrating an architecture **400** that may determine classifications for content items and make content items accessible to users based on content item classifications. The architecture **400** includes the content classification system **126**. The content classification system **126** includes a content item classifier **402**, a content item storage and retrieval system **404**, a content item ranking system **406**, and a content item manager **408**.

[0084] The content item classifier **402** may analyze the data related to the content item **136** to determine one or more classifications for the content item **136**. The data related to the content item **136** may be obtained by the content classification system **126** from an instance of the client application **104** executed by the client device **102**. The data analyzed by the content item classifier **402** with respect to the content item **136** may include at least one of text overlay data **412**, image or video overlay data **414**, image or video data **416**, or classification identifier data **418**. In various examples, at least a portion of the classifications determined by the content item classifier **402** with respect to the content item **136** may be recommendations for classifications of the content item **136**. Recommendations for classifications of the content item **136** may be accepted or rejected by a user of the client application **104** based on input obtained via one or more user interfaces displayed in conjunction with the client application **104**.

[0085] The text overlay data **412** may correspond to data related to text content that overlays image content or video content of the content item **136**. The text overlay data **412** may indicate one or more alphanumeric characters, one or more symbols, or combinations thereof, that are included in text that overlays at least one of the image content or video content of the content item **136**. In one or more examples, the text overlay data **412** may indicate one or more identifiers of one or more classifications. For example, the text overlay data **412** may indicate at least one of words, letters, or symbols that correspond to one or more classification identifiers. In one or more illustrative examples, the text overlay data **412** may include a symbol indicating an identifier of a classification for content, such as a "#".

[0086] In various examples, the content item classifier **402** may analyze text of the text overlay data **412** to determine at least one of letters, words, or symbols related to at least one text overlay of the content item **136**. In various examples, the content item classifier **402** may implement one or more natural language processing techniques to determine at least one of letters, words, or symbols of a text overlay. The content item classifier **402** may then determine a level of similarity between at least a portion of the text included in a text overlay of the content item **136** and at least one of letters, words, or symbols of a plurality of identifiers of classifications. The level of similarity may indicate a number of at least one of letters, words, or symbols of the text overlay of the content item **136** that correspond to a number of letters, words, symbols, or combinations thereof, of at least one classification identifier. The level of similarity may also correspond to an order in which groups of letters, words, symbols, or combinations thereof, appear in a text overlay of the content item **136** with respect to groups of at least one of letters, words, or symbols of classification identifiers. A level of similarity between text of an overlay of the content item **136** and a classification identifier may increase as the number of words, letters, symbols, or com-

binations thereof, of text of an overlay of the content item **136** increases that are in common with and have an order that corresponds to words, letters, symbols, or combinations thereof, of a classification identifier. Based on a level of similarity between text included in an overlay of the content item **136** and text of classification identifiers, the content item classifier **402** may determine one or more classifications to associate with the content item **136**. In one or more illustrative examples, the content item classifier **402** may determine that at least a portion of a text overlay of the content item **136** corresponds to a classification identifier based on a level of similarity between the classification identifier and the at least a portion of the text overlay is greater than a threshold level of similarity. In additional examples, the content item classifier **402** may determine one or more classification identifiers having relatively high levels of similarity with at least a portion of a text overlay of the content item **136** in relation to other classification identifiers and determine that the classification(s) corresponding to the one or more classification identifiers are associated with the content item **136**.

[0087] The content item classifier **402** may also analyze image or video overlay data **414** of the content item **136** to determine one or more classifications for the content item **136**. An image overlay may include at least a portion of an image captured using a camera device. The image overlay may be related to an image captured by a user of the client application **104** that also produced the content item **136** using the client application **104**. In additional examples, the image overlay may be obtained from an additional user of the client application **104** or from a service provider that produces images that may be used as overlays for content items produced using the client application **104**. Further, the image overlay may be produced by at least one user of the client application **104** or a service provider using one or more creative tools of the client application **104**. For example, at least one of one or more drawing tools or one or more painting tools may be used to create an image overlay for the content item **136**. A video overlay may include video captured by one or more users of the client application **104** using a camera device. Additionally, a video overlay may include video produced by a service provider that generates video overlays for content items. In one or more implementations, a video overlay may include animated content.

[0088] In various examples, the image or video overlay data **414** may indicate an identifier of at least one of an image overlay or a video overlay of the content item **136**. The identifier of at least one of an image overlay or a video overlay may correspond to a creative tool that is used to generate the at least one of the image overlay or the video overlay. Additionally, an identifier of an image overlay or a video overlay may be assigned by a creator of the overlay, such as a user of the client application **104** or a service provider that produces at least one of image overlays or video overlays for content items. In scenarios where the image or video overlay data includes an identifier that corresponds to the image overlay or video overlay, the content item classifier **402** may determine a classification of the content item based on the identifier of the overlay.

[0089] Additionally, the content item classifier **402** may analyze the image or video overlay data to determine one or more characteristics of an image or video overlay of the content item **136**. The one or more characteristics may include one or more objects included in an image overlay or a video overlay, one or more locations of an image overlay or a video overlay, one or more individuals included in an image overlay or a video overlay, or one or more combinations thereof. In one or more illustrative examples, the content item classifier **402** may implement object recognition techniques to determine at least one of objects or individuals included in at least one of an image overlay or a video overlay of the content item **136**. In one or more implementations, the content item classifier **402** may implement one or more machine learning techniques to identify at least one of objects or individuals included in an image overlay or a video overlay of the content item **136**. In various examples, the content item classifier **402** may analyze one or more template images stored by the database(s) **118** to determine at least one of one or more objects or one or more individuals included in an image overlay or a video overlay of the content item **136**.

[0090] The content item classifier **402** may determine at least one classification for the content item **136** based on one or more characteristics of an image overlay or a video overlay of the content item **136**. For example, the content item classifier **402** may determine one or more keywords related to a characteristic of an image overlay or a video overlay and analyze the one or more keywords related to the characteristic with respect to one or more classification identifiers. In various implementations, one or more keywords related to a respective object, an individual, or a location may be stored by the database(s) **118** and used by the content item classifier **402** to determine a classification of the content item **136**. In one or more illustrative examples, the content item classifier **402** may determine one or more keywords related to at least one of an object, an individual, or a location of an image overlay or a video overlay of the content item **136** and determine a level of similarity between the one or more keywords and one or more classification identifiers. Based on the levels of similarity with respect to one or more threshold levels of similarity or with respect to a ranking of the levels of similarity, the content item classifier **402** may determine at least one classification identifier that corresponds to the content item **136** in relation to at least one of an image overlay or a video overlay for the content item **136**.

[0091] Further, the content item classifier **402** may determine one or more classifications for the content item **136** based on at least one of image data or video data **416** of the content item **136**. In one or more examples, the content item **136** may comprise one or more images, one or more videos, or both one or more images and one or more videos. For example, a user of the client application **104** may capture at least one of one or more images or one or more videos using a camera device of a client device **102** and use the client application **104** to generate the content item **136** such that the content item **136** includes the one or more images or the one or more videos. In a manner similar to that described previously with respect to the image or video overlay data **414**, the content item classifier **402** may analyze at least one of one or more images or one or more videos included in the content item **136** to determine one or more objects, one or more individuals, one or more locations, or one or more combinations thereof included in at least one of one or more images or one or more videos included in the content item **136**. For example, the content item classifier **402** may implement one or more object recognition techniques to determine at least one of one or

more objects or one or more individuals included in at least one of one or more images or one or more videos of the content item **136**. The content item classifier **402** may then determine one or more keywords corresponding to an object or individual included in an image or video of the content item **136** and analyze the one or more keywords in relation to identifiers of classifications for content items. Based on the analysis, such as a similarity analysis, the content item classifier **402** may determine one or more classifications for the content item **136** according to one or more characteristics of at least one of images or videos of the content item **136**.

[0092] The content item classifier **402** may also analyze classification identifier data **418** of the content item **136** to determine one or more classifications for the content item **136**. For example, when the content item **136** is being generated using the client application **104**, the client application **104** may associate one or more classification identifiers with the content item **136**. In various examples, an instance of a client application **104** executed by a client device **102** may implement at least a portion of the operations performed by the content item classifier **402** to determine one or more classifications of the content item **136** and assign identifiers of the one or more classifications to the content item **136**. To illustrate, the client application **104** may analyze at least one of text overlay data **412**, image or video overlay data **414**, or image or video data **416** to determine one or more classifications of the content item **136**. The client application **104** may send identifiers of the one or more classifications of the content item **136** to the content classification system **126** as classification identifier data **418**. Further, the classification identifier data **418** may include identifiers of classifications selected by a user of the client application **104**. In one or more illustrative examples, the client application **104** may cause one or more user interfaces to be displayed that may include user interface elements that are selectable to associate a classification to the content item **136**. The one or more user interfaces may include a list of classifications that may be selectable for the content item **136**. In one or more examples, the one or more user interfaces may include one or more recommendations for classifications of the content item **136**. Selection of a user interface element corresponding to a classification identifier may cause the client application **104** to associate a corresponding classification with the content item **136**. In these scenarios, the classification identifier data **418** may indicate one or more identifiers of at least one classification selected by a user of the client application **104** for the content item **136**.

[0093] After determining one or more classifications for the content item **136**, the content item classifier **402** may operate in conjunction with the content item storage and retrieval system **404** to store data related to the content item **136** in the database(s) **118** in association with the one or more classifications. For example, the content item classifier **402** may determine that a first classification **420** and a second classification **422** correspond to the content item **136**. The content item storage and retrieval system **404** may store the content item **136** in the database(s) **118** in association with the first classification **420** and the second classification **422**. In various examples, the content item **136** may be stored in a data structure indicating that the content item **136** corresponds to the first classification **420** and the second classification **422**. In one or more illustrative examples, the content item **136** may be stored in a database table that includes one or more fields corresponding to classifications associated with the content item **136**, such as the first classification **420** and the second classification **422**. The database(s) **118** may store data related to a number of additional content items up to an Nth content item **424** that is associated with one or more classifications, such as the first classification **420**.

[0094] In one or more implementations, the content item storage and retrieval system **404** may retrieve data corresponding to content items based on requests received from client devices **102** executing instances of the client application **104**. In various examples, the content item storage and retrieval system **404** may retrieve data related to content items stored by the database(s) **118** responsive to requests for content related to one or more classification identifiers. For example, the server system **108** may receive a request from a client device **102** executing an instance of the client application **104** for content related to a respective classification identifier, such as "spring flowers". In one or more examples, the classification identifier may be entered by a user of the client application **104** into one or more user interface elements generated by the client application **104**. In additional examples, the classification identifier may be selected by a user of the client application **104** via selection of a user interface element corresponding to the classification identifier that is displayed in a user interface generated by the client application **104**.

[0095] In response to receiving a request for content related to one or more classifications, the content item storage and retrieval system **404** may obtain content item data from the database(s) **118** that are stored in association with the one or more classifications. In various examples, the content item storage and retrieval system **404** may query the database(s) **118** to retrieve one or more content items that correspond to a classification identifier included in a request for content. In one or more illustrative examples, the server system **108** may obtain a request for content items corresponding to the first classification **420**. The content item storage and retrieval system **404** may retrieve data corresponding to at least a portion of the content items related to the first classification **420**, such as the content item **136** and the Nth content item **424**.

[0096] In various implementations, the content item ranking system **406** may determine rankings of content items that indicate a level of interest of the content items to one or more users of the client application **104**. In one or more examples, the content item ranking system **406** may analyze one or more characteristics of a number of content items in relation to characteristics of a user of the client application **104** to determine a respective ranking for an individual content item with respect to other content items. To illustrate, the content item ranking system **406** may analyze profile information of a user of the client application **104**, account information of the user, content viewed by the user, an amount of time a user views one or more content items, location of the user, classifications of content viewed by the user, characteristics of additional users of the client application **104** that the user is following, characteristics of additional users of the client application **104** that are following the user, one or more combinations thereof and the like, to determine one or more characteristics of the user of the client application **104**. Additionally, the content item ranking system **406** may analyze one or more classifications of content items, one or more locations related to content

items, one or more objects related to content items, one or more individuals included in the content items, characteristics of users of the client application **104** that created the content items, a number of times that content items have been viewed, an amount of time that content items have been viewed, characteristics of users of the client application **104** that viewed the content items, one or more combinations thereof, and so forth, to determine one or more characteristics of individual content items. Based on the characteristics of a user of the client application **104** and the characteristics of a number of content items, the content item ranking system **406** may determine a ranking for individual content items with respect to the user that indicates a level of interest of the user in viewing the respective content items. In one or more illustrative examples, the ranking of a respective content item for the user may correspond to an order in which the content item is presented to the user in a user interface of the client application **104**. For example, a first content item having a first ranking that is higher than a second ranking of a second content item may be presented to the user in a user interface of the client application **104** before the second content item. In one or more implementations, the second ranking of the second content item may correspond to a level of interest that is less than a level of interest of the first content item.

[0097] The content item ranking system **406** may implement one or more computational techniques to determine rankings of content items with respect to one or more users of the client application **104**. For example, the content item ranking system **406** may implement one or more statistical techniques to determine rankings of content items with respect to one or more users of the client application **104**. In one or more illustrative examples, the content item ranking system **406** may implement one or more linear regression modeling techniques to determine rankings of content items for a user of the client application **104**. Additionally, the content item ranking system **406** may implement one or more gradient descent techniques to determine rankings of content items with respect to a user of the client application **104**. Further, the content item ranking system **406** may implement one or more machine learning techniques to determine rankings of content items for a user of the client application **104**. To illustrate, the content item ranking system **406** may implement one or more neural networks, such as one or more convolutional neural networks, to determine rankings for content items with respect to a user of the client application **104**. In one or more examples, one or more neural networks may be implemented by the content item ranking system **406** to determine characteristics of users of the client application **104** that may indicate at least a threshold level of interest in one or more content items associated with a content item classification.

[0098] In one or more implementations, the content item storage and retrieval system **404** may operate in conjunction with the content item ranking system **406** to provide content items in response to requests for content related to a given classification. For example, the content item ranking system **406** may determine rankings for individual content items retrieved by the content item storage and retrieval system **404** in response to a request for content related to one or more classifications. To illustrate, in response to a request for content related to the first classification **420**, the content item storage and retrieval system **404** may obtain at least a portion of the content items stored by the database(s) **118** that correspond to the first classification **420**. The content item ranking system **406** may then determine rankings for the content items retrieved by the content item storage and retrieval system **404**. In various examples, the content item ranking system **406** may determine rankings for a number of content items based on one or more characteristics of a user requesting the content having a respective classification. In this way, the content item storage and retrieval system **404** and the content item ranking system **406** may operate to provide a number of content items in response to a request by a user of the client application **104** for content related to a classification that may be of more interest to the user than other content items having the classification. Accordingly, ranking content items having a classification for individual users of the client application **104** may be used to customize the presentation of content items for the user based on a level of interest for a respective user in content items associated with the classification.

[0099] The content item manager **408** may enable users of the client application **104** to at least one of view, organize, share, or manage content items generated using the client application **104** that have been associated with a classification. For example, the content item manager **408** may operate in conjunction with the content item storage and retrieval system **404** to provide content items generated by a user of the client application **104** having one or more classifications to a client device **102** of the user. To illustrate, the content item manager **408** may receive a request to view content items created by the user having one or more classifications where the request is sent in response to one or more inputs provided via one or more user interfaces displayed by the client application **104**. The content item manager **408** may then cause data corresponding to the content items of the user corresponding to the request to be sent to the client device **102** of the user for display by the client application **104**. The content item manager **408** may also cause content items to be added to at least one of an account or profile of a user of the client application **104** or deleted from at least one of an account or profile of the user based on input obtained by the content item manager **408** via the client application **104**.

[0100] In various examples, the content item manager **408** may provide content items to a client device **102** of a user of the client application **104** such that the content items of the user that are associated with one or more classifications are displayed in one or more pages of the client application **104** that are dedicated to displaying content items of the user having one or more classifications. In one or more illustrative examples, content items created by the user that are not associated with at least one classification may not be displayed in the one or more pages. In one or more implementations, the content items created by a user of the client application **104** that are associated with at least one classification determined by the content classification system **126** may be publicly accessible to other users of the client application **104** and content items created by the user that are not associated with a classification determined by the content classification system **126** may have limited accessibility to users of the client application **104**. To illustrate, content items that are not associated with a particular classification identifier may be limited to access by recipients of the content items as specified by the user creating the content items.

[0101] FIGS. **5-7** illustrate flowcharts of processes to classify and discover content created using a client application

104. The processes may be embodied in computer-readable instructions for execution by one or more processors such that the operations of the processes may be performed in part or in whole by the functional components of the at least one of the client application **104** or the server system **108**. Accordingly, the processes described below are by way of example with reference thereto, in some situations. However, in other implementations, at least some of the operations of the processes described with respect to FIGS. **5-7** may be deployed on various other hardware configurations. The processes described with respect to FIGS. **5-7** are therefore not intended to be limited to the server system **108** or client device **102** and can be implemented in whole, or in part, by one or more additional components. Some or all of the operations of the processes described with respect to FIGS. **5-7** can be performed in parallel, out of order, or entirely omitted, in various implementations.

[0102] FIG. **5** is a flowchart illustrating example operations of a process **500** performed by a server system for content item classification based on data corresponding to overlays of content items, according to one or more example implementations. At operation **502**, the process **500** includes receiving, from a client device, content item data. The content item data may be produced by an instance of a client application executed by the client device. In one or more implementations, the content item data may include image data corresponding to an image. The content item data may also include overlay data indicating an overlay of the image. In one or more examples, the image may be captured by at least one camera device of the client device in response to input of a user of the client device obtained via one or more user interfaces displayed by the client application. Additionally, the overlay may be produced by the input obtained from a user of the client application. The overlay may include text content that includes at least one of words, letter, symbols, or numbers that are related to the image. Further, the overlay may include content generated using one or more creative tools of the client application. To illustrate, the overlay may include artwork, drawings, illustrations, animations, or one or more combinations thereof, generated by a user of the client application.

[0103] The process **500** may also include, at operation **504**, determining a classification for the content item based at least partly on the overlay data. The overlay data may be analyzed to identify classification identifiers that may be included in the overlay. In one or more examples, the overlay may include text data that indicates a classification identifier. Additionally, a classification of the overlay may be determined based on a creative tool used to produce the overlay. Further, a classification of the overlay may be determined based on an identifier of an overlay, such as a name of the overlay specified by a creator of the overlay. In various examples, the overlay may be associated with a location and a classification of the overlay may be determined based on the location.

[0104] In addition, at operation **506**, the process **500** may include adding the content item to a group of content items having the classification. In one or more implementations, the content item may be stored in a database in association with the classification. In various examples, individual content items associated with the classification may be stored in association with an identifier of the classification. At operation **508**, the process **500** may include receiving, from a second client device, a request for content items having the classification. For example, a request including an identifier of the classification may be received from an instance of the client application executed by the second client device.

[0105] The process **500** may include, at operation **510**, identifying, in response to the request, at least a portion of the group of content items having the classification. In various examples, at least a portion of the group of content items having the classification may be retrieved from a database using an identifier of the classification. In one or more examples, the content items retrieved from the database having the classification may be ranked. The rankings for content items having the classification may be determined based on an analysis of characteristics of the content items having the classification in relation to characteristics of a user of the client application to determine content items having the classification that may have at least a threshold level of interest for the user. In one or more implementations, the ranking of a content item may be based at least partly on characteristics of a creator of the content item. To illustrate, creators of content items having a public profile with respect to the client application may be weighted in favor of relatively higher rankings than content items produced by creators that do not have public profiles in relation to the client application.

[0106] In additional implementations, a ranking of content items may be determined according to input provided by one or more representatives of a service provider that provides services in relation to the client application. For example, a representative of the service provider may indicate a level of interest of a content item with respect to one or more users of the client application. In these scenarios, a weighting of the content item with respect to other content items may be modified based on the input obtained from the representative of the service provider. In various examples, content items for which input is obtained from a representative of the service provider that indicates a relatively high level of interest may be ranked more highly than content items for which input from a representative of the service provider is not obtained. Further, input from a representative of a service provider may also indicate a lower level of interest for users of the client application, such as in situations where the content item includes content that may be inappropriate for users of the client application. In these situations, the content item may be ranked lower than content items for which service provider representative input is not obtained.

[0107] At operation **512**, the process **500** may include sending user interface data to the second client device in response to the request. The user interface data may be configured to produce one or more user interfaces that include at least the portion of the content items. In various examples, the one or more user interfaces may display a page of content items that is dedicated to the classification. In one or more implementations, the content items may be presented in the user interface in relation to rankings of the content items having the classification. For example, content items having a relatively higher ranking with respect to the user of the second client device may be presented at a top portion of a page displayed in the user interface. To access content items having relatively lower rankings, a user of the second client device may scroll down the page.

[0108] FIG. **6** is a flowchart illustrating example operations of a process **600** performed by a server system to add content to a classification from a page displaying content items associated with the classification, according to one

or more example implementations. The process **600** includes, at operation **602**, receiving, from a client device executing a client application, a request for a number of content items having a classification. The request may include at least one of one or more keywords corresponding to the classification or an identifier of the classification. At operation **604**, in response to the request, a number of content items having the classification may be determined. The number of content items may be retrieved from a database storing content items according to respective classifications of the content items. In various examples, a query to the database that includes at least one of the one or more keywords or the identifier of the classification may be used to retrieve the content items from the database. Additionally, rankings may be determined for the number of content items having the classification that indicate a level of interest of respective content items in relation to a user of the client device making the request.

[0109] Further, at operation **606**, the process **600** may include sending user interface data to the client device in response to the request. The user interface data may be configured to produce one or more user interfaces that include a page having at least a subgroup of the number of content items having the classification. In one or more examples, a subgroup of content items displayed in the page may have rankings that are higher than rankings of additional content items that are not included in the page. In addition, the one or more user interfaces may include a user interface element that is selectable to add a content item to content items having the classification. In one or more implementations, selection of the user interface element may cause at least one camera of the client device to become active. The at least one camera may be used to capture an image that is included in the content item. Further, due to the image being captured in relation to selection of the user interface element that is included in a page dedicated to content items having a respective classification, the classification may also be associated with the content item that includes the image.

[0110] At operation **608**, the process **600** may include receiving, from the client device, content item data that includes the image captured by a camera of the client device. The content item data may also indicate an identifier of the classification. The process **600** may also include, at operation **610**, storing the content item in a database in association with the identifier of the classification. In this way, the content item may be retrieved in association with the classification identifier in response to subsequent requests for content items having the classification. In one or more implementations, the content item may include an overlay that is produced using one or more creative tools of the client application.

[0111] FIG. **7** is a flowchart illustrating example operations of a process **700** performed by a client device to generate content items that are accessible based on respective classifications of the content items, according to one or more example implementations. The process **700** may include, at operation **702**, obtaining input via one or more input devices of a client device. The input may be provided in conjunction with an instance of a client application that is executed by the client device. In various examples, the input may be directed to capturing an image using at least one camera of the client device. The image may be captured using one or more user interface elements that are displayed in at least one user interface of the client application. The input may also be directed to producing one or more annotations. In various examples, the annotations may be produced using one or more creative tools of the client application. Further, the input may be directed to selection of one or more classification identifiers.

[0112] At operation **704**, the process **700** may include generating, based on the input, a content item that includes an image. In addition to the image, the content item may include one or more annotations related to the image. The one or more annotations may include at least one overlay that is displayed atop the image. The at least one overlay may include text content. In various examples, the at least one overlay may include content produced using the one or more creative tools of the client application. Further, at operation **706**, the process **700** may include determining, based on at least one of the input or the image, a classification for the image. The classification of the image may be determined according to input indicating at least one identifier of the classification. In various examples, the classification may also be determined based on an overlay of the image. In one or more implementations, the classification may be determined according to at least one of objects or individuals included in the image.

[0113] The process **700** may include, at operation **708**, sending a request to a server system for content corresponding to the classification. The request may include an identifier of the classification. In one or more examples, the request may be generated and sent in response to selection of a user interface element that is displayed in a user interface that includes a number of selectable user interface elements with each user interface element corresponding to a respective classification. Additionally, the process **700** may include, at operation **710**, receiving, in response to the request, user interface data and, at operation **712**, the process **700** may include generating, based on the user interface data, one or more user interfaces that include content items that correspond to the classification. In one or more illustrative examples, the one or more user interfaces may include a number of images that correspond to the content items. The content items may be ranked such that content items having a greater level of interest for a user of the client device may be displayed at a top of a page included in the one or more user interfaces with content items having a lower level of interest being displayed at a bottom of the page. In one or more implementations, the one or more user interfaces may include at least one content item created by a user of the client device.

[0114] FIG. **8** is an illustration of a user interface **800** that includes content associated with a classification, according to one or more example implementations. The user interface **800** may be displayed by a display device of a client device **102**. In addition, the user interface **800** may be displayed in conjunction with a client application executed by the client device **102**, such as the client application **104** described with respect to FIG. **1**. The user interface **800** may include a first section **804** that includes user interface elements that are selectable to view content related to contacts of a user of a client application. For example, the first section **804** may include a first user interface element **806** that is selectable to view content related to a contact of the user. The content related to contacts of the user may include at least one of text content, image content, message content, video content, audio content, content produced by one or more creative tools, or annotation content.

[0115] The user interface **800** may also include a second section **808** that includes user interface elements that are selectable to access content related to one or more individuals, one or more groups of individuals, or one or more organizations that the user of the client device **102** is following using the client application. The user may be following an individual, group, or organization by subscribing to content that is produced by or otherwise published by the individual, group, or organization. In the illustrative example of FIG. **8**, the second section **808** may include a second user interface element **810** that is selectable to view content related to an individual, group, or organization that corresponds to the second user interface element **810**.

[0116] Additionally, the user interface **800** may include a third section **812** that includes one or more user interface elements that may be selectable to view content that is recommended for a user of the client device **102** in relation to the client application. In one or more examples, content included in the third section **812** may have a predicted level of interest for the user. The predicted level of interest may be determined by a server system based on an analysis of characteristics of the user in relation to characteristics of a number of content items. In one or more examples, the third section **812** may include a third user interface element **814** that is selectable to view content related to the image displayed by the third user interface element **814**. In various examples, the third user interface element **814** may indicate an identifier **816** of a classification associated with content displayed by the third user interface element **814**. In one or more implementations, the content included in the third section **812** may correspond to one or more classifications that are related to content produced by the user of the client application. To illustrate, a server system may determine that content having a classification that is the same or similar to a classification of content produced by the user may have at least a threshold level of interest for the user. In the illustrative example of FIG. **8**, the user of the client application may have previously generated content that is related to the classification "FunnyPets". Accordingly, the server system may determine that additional content related to the classification "FunnyPets" may have at least a threshold level of interest for the user and include content items corresponding to the classification "FunnyPets" in the third section **812**.

[0117] FIG. **9** is an illustration of a user interface **900** to add a classification to content based on text input, according to one or more example implementations. The user interface **900** may be displayed by a display device of a client device **102**. In addition, the user interface **900** may be displayed in conjunction with a client application executed by the client device **102**, such as the client application **104** described with respect to FIG. **1**. The user interface **900** may include an image **904**. The image **904** may have been captured using at least one camera of the client device **102**, such as a camera **906**. The user interface **900** may also include an overlay **908** displayed atop the image **904**. In the illustrative example of FIG. **9**, the overlay **908** includes text content. The text content of the overlay **908** may be entered via a keyboard input device **910** included in the user interface **900**.

[0118] In various examples, the keyboard input device **910** may be used to enter an identifier of a classification that may be related to at least one of the image **904** or the overlay **908**. For example, the user interface **900** may include a user interface element **912** that may display text **914** that is directed to a classification of at least one of the image **904** or the overlay **908**. In one or more illustrative examples, the text **914** may include a symbol **916** that may indicate that the text **914** is related to a classification for at least one of the image **904** or the overlay **908**. In one or more implementations, selection of an additional user interface element **918** may cause the user interface element **912** to be displayed such that a user of the client device **902** may enter at least one of the text **914** or the symbol **916** using the keyboard input device **910** to indicate an identifier of a classification for at least one of the image **904** or the overlay **908**. FIG. **9** also includes an additional user interface **920** corresponding to an additional version of the user interface **900** that includes a final version of the overlay **908** that includes an identifier **922** of a classification corresponding to at least one of the image **904** of the overlay **908**. The final version of the overlay **908** may also include text in addition to the identifier **922**. Further, the additional user interface **920** may include a number of user interface elements **924** that are selectable to activate one or more creative tools to generate one or more additional overlays for the image **904**.

[0119] FIG. **10** is an illustration of a user interface **1000** to add a classification to content using a creative tool, according to one or more example implementations. The user interface **1000** may be displayed by a display device of a client device **102**. In addition, the user interface **1000** may be displayed in conjunction with a client application executed by the client device **102**, such as the client application **104** described with respect to FIG. **1**. The user interface **1000** may include an image **1004**. The image **1004** may have been captured using at least one camera of the client device **102**, such as a camera **1006**. The user interface **1000** may also include a number of user interface elements that may be selectable to perform one or more operations with respect to the image **1004**. In various examples, the user interface **1000** may include one or more user interface elements to modify an appearance of the image **1004**. For example, the user interface **1000** may include a user interface element **1008** to generate an overlay for the image **1004**.

[0120] In one or more illustrative examples, selection of the user interface element **1008** may cause the client device **102** to generate an additional user interface **1010**. The additional user interface **1010** may include a number of user interface elements that are selectable to add a number of different types of overlays with respect to the image **1004**. To illustrate, the additional user interface **1010** may include a first user interface element **1012** that is selectable to mention an additional user within an overlay of the image **1004**, such as by adding an identifier of the user as an overlay of the image **1004**. The additional user interface **1010** may include a second user interface element **1014** that may be selectable to add a classification identifier as an overlay to the image **1004**. Further, the additional user interface **1010** may include a third user interface element **1016** that is selectable to add an overlay to the image **1004** that indicates a location that may be related to the image **1004**. Additionally, the additional user interface **1010** may include a fourth user interface element **1018** to add an overlay of the image **1004** that includes an identifier of a group.

[0121] In the illustrative example of FIG. **10**, selection of the second user interface element **1014** may cause a first additional user interface element **1020** to be displayed. The first additional user interface element **1020** may include a second additional user interface element **1022** that may be used to capture text **1024** that corresponds to an identifier of

a classification. The additional user interface **1010** may also include a touch input device keyboard **1026** that includes user interface elements that are selectable to add letters, numbers, symbols, or characters to the text **1024**. In various examples, as letters, numbers, symbols, or characters are added to the text **1024** via the touch input device keyboard **1026**, recommendations for identifiers for classifications may be displayed in the first additional user interface element **1020**. For example, the first additional user interface element **1020** may include a third additional user interface element **1028** that includes a first recommendation for a classification identifier based at least partly on the text **1024** included in the second additional user interface element **1022**. Further the first additional user interface element **1020** may include a fourth additional user interface element **1030** that includes a second recommendation for another classification identifier based at least partly on the text **1024** included in the second additional user interface element **1022**.

[0122] FIG. **11** is an illustration of a user interface **1100** to add a classification to content in relation to sharing the content, according to one or more example implementations. The user interface **1100** may be displayed by a display device of a client device **102**. In addition, the user interface **1100** may be displayed in conjunction with a client application executed by the client device **102**, such as the client application **104** described with respect to FIG. **1**. The user interface **1100** may include an image **1104**. The image **1104** may have been captured using at least one camera of the client device **102**, such as a camera **1106**. The user interface **1100** may include an overlay **1108** that indicates an identifier of a classification of the image **1104**. Further, the user interface **1100** may include a user interface element **1110** that is selectable to cause the client application **104** to generate an additional user interface **1112**.

[0123] The additional user interface **1112** may include a number of user interface elements that are selectable to identify one or more recipients of a content item including the image **1104** and the overlay **1108**. For example, the additional user interface **1112** may include a first additional user interface element **1114** to add the image **1104** and the overlay **1108** to a personal collection of the user that captured the image **1104** using the camera **1106**. The additional user interface **1112** may also include a second additional user interface element **1116** that indicates a number of classifications that may correspond to the image **1104**. Selection of the second additional user interface element **1116** may cause the image **1104** and the overlay **1108** to be associated with the classifications indicated by the second additional user interface element **1116**.

[0124] In addition, the additional user interface **1112** may include a third additional user interface element **1118** that includes a fourth additional user interface element **1120**, a fifth additional user interface element **1122**, and a sixth additional user interface element **1124**. The fourth additional user interface element **1120** may correspond to text of the overlay **1108**. The fifth additional user interface element **1122** may correspond to a location associated with the image **1104** and the sixth additional user interface element **1124** may correspond to one or more objects included in the image **1104**. Each of the additional user interface elements **1120**, **1122**, **1124** may be selectable to remove the corresponding classification from the second additional user interface element **1116**. To illustrate, selection of the sixth additional user interface element **1124** may remove the classification "Office Supplies" from the second additional user interface element **1116**. Further, the additional user interface **1112** may include at least a seventh additional user interface element **1126** that is selectable to share a content item including the image **1104** and the overlay **1108** with a contact of a user of the client device **102**.

[0125] FIG. **12** is an illustration of a user interface **1200** to add content to a collection of content having a classification, according to one or more example implementations. The user interface **1200** may be displayed by a display device of a client device **102**. In addition, the user interface **1200** may be displayed in conjunction with a client application executed by the client device **102**, such as the client application **104** described with respect to FIG. **1**. The user interface **1200** may include a number of user interface elements that correspond to content items associated with a classification **1202**. For example, the user interface **1200** may include a first user interface element **1204** that corresponds to a first content item having the classification **1202** and a second user interface element **1206** that corresponds to a second content item having the classification **1202**. In various examples, the first user interface element **1204** and the second user interface element **1206** may be selectable to cause the respective content item corresponding to the first user interface element **1202**, **1204** to be displayed in a single page view.

[0126] The user interface **1200** may also include a third user interface element **1208** that is selectable to add a content item to the classification **1202**. For example, selection of the third user interface element **1208** may cause the client device **102** to display an additional user interface **1210**. The additional user interface **1210** may indicate an image **1212** that may be captured by a camera **1214** of the client device **102** in response to selection of an additional user interface element **1216**. Selection of the additional user interface element **1216** may cause the image **1212** to be captured by the camera **1214** and may also cause a content item that includes the image to be classified according to the classification **1202**. In this way, a content item that includes the image **1212** may be added to a collection of content items having the classification **1202** via a page dedicated to content items having the classification **1202**, such as the page shown in the user interface **1200**.

[0127] FIG. **13** is an illustration of a user interface that includes an option to share a classification, according to one or more example implementations. The user interface **1300** may be displayed by a display device of a client device **102**. In addition, the user interface **1300** may be displayed in conjunction with a client application executed by the client device **102**, such as the client application **104** described with respect to FIG. **1**. The user interface **1300** may include a number of user interface elements that correspond to content items associated with a classification **1302**. For example, the user interface **1300** may include a first user interface element **1304** that corresponds to a first content item having the classification **1302** and a second user interface element **1306** that corresponds to a second content item having the classification **1302**. The user interface **1300** may also include a third user interface element **1308** that includes a first selectable option **1310** to report the classification **1302** as being inappropriate, a second selectable option **1312** to add a content item to the classification **1302**, and an additional option to share the classification **1302** with one or

more additional users of the client application **104**. In various examples, the classification **1302** may be shared with one or more additional users of the client application **104** by selection of a fourth user interface element **1314**. In one or more implementations, selection of the fourth user interface element **1314** may cause an additional user interface to be displayed that includes one or more selectable user interface elements that individually correspond to additional users of the client application **104** with whom the classification **1302** and content items associated with the classification **1302** may be shared. Further, selection of the second selectable option **1312** may cause an additional user interface to be displayed that may be used to capture an image for which a content item may be created and associated with the classification **1302**. In one or more illustrative examples, a user interface that is the same as or similar to the additional user interface **1210** may be displayed in response to selection of the second selectable option **1312**.

[0128] FIG. **14** is an illustration of a user interface to manage content associated with one or more classifications, according to one or more example implementations. The user interface **1400** may be displayed by a display device of a client device **102**. In addition, the user interface **1400** may be displayed in conjunction with a client application executed by the client device **102**, such as the client application **104** described with respect to FIG. **1**. The user interface **1400** may include a number of user interface elements that may be selectable to manage content of a user of the client application **104**. The user interface **1400** may include a first user interface element **1402** that is selectable to view one or more content items related to the user of the client application **104**. In various examples, the first user interface element **1402** may be selectable to view one or more collections of content items related to the user of the client application **104**. In addition, the user interface **1400** may include a second user interface element **1404** that is selectable to add content to one or more collections of content related to the user of the client application.

[0129] The user interface **1400** may also include a third user interface element **1406** and a fourth user interface element **1408** that may be selectable to view content of the user of the client application **104** that is associated with a respective classification. In one or more examples, the content items corresponding to the third user interface element **1406** and the fourth user interface element **1408** may be accessible to a larger audience than the content corresponding to the first user interface element **1402** and the second user interface element **1404**. To illustrate, content corresponding to the first user interface element **1402** and the second user interface element **1404** may correspond to content that is accessible to one or more contacts of the user of the client application **104**. Additionally, the content corresponding to the third user interface element **1406** and the fourth user interface element **1408** may be accessible publicly, such as accessible to users of the client application **104** that are not included in the contacts of the user of the client application **104**. Selection of the third user interface element **1406** may cause a full-page version of the content corresponding to the third user interface element **1406** to be displayed in a user interface. Also, selection of the fourth user interface element **1408** may cause a full-page version of the content corresponding to the third user interface element **1406** to be displayed in a user interface.

[0130] The user interface **1400** may also include a fifth user interface element **1410** that is selectable to view additional content items of the user of the client application **104** having at least one classification in one or more additional user interfaces. In one or more examples, selection of the fifth user interface element **1410** may cause content items of the user of the client application **104** to be displayed according to at least one of date, location, or classification of the content items. Additionally, selection of the fifth user interface element **1410** may cause one or more user interfaces to be displayed that may include user interface elements to add content items, delete content items, modify a classification of content items, or combinations thereof. Additionally, the user interface **1400** may include a sixth user interface element **1412** to view content corresponding to a first contact of the user of the client application **104** and a seventh user interface element **1414** to view content corresponding to a second contact of the user of the client application **104**.

[0131] FIG. **15** is a block diagram illustrating system **1500** that includes an example software architecture **1502**, which may be used in conjunction with various hardware architectures herein described. FIG. **15** 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 **1502** may execute on hardware such as machine **1600** of FIG. **16** that includes, among other things, processors **1604**, memory/storage **1606**, and input/output (I/O) components **1608**. A representative hardware layer **1504** is illustrated and can represent, for example, the machine **1600** of FIG. **16**. The representative hardware layer **1504** includes a processing unit **1506** having associated executable instructions **1508**. Executable instructions **1508** represent the executable instructions of the software architecture **1502**, including implementation of the methods, components, and so forth described herein. The hardware layer **1504** also includes at least one of memory or storage modules memory/storage **1510**, which also have executable instructions **1508** The hardware layer **1504** may also comprise other hardware **1512**.

[0132] In the example architecture of FIG. **15**, the software architecture **1502** may be conceptualized as a stack of layers where each layer provides particular functionality. For example, the software architecture **1502** may include layers such as an operating system **1514**, libraries **1516**, frameworks/middleware **1518**, applications **1520**, and a presentation layer **1522**. Operationally, the applications **1520** or other components within the layers may invoke API calls **1524** through the software stack and receive messages **1526** in response to the API calls **1524**. 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 **1518**, while others may provide such a layer. Other software architectures may include additional or different layers.

[0133] The operating system **1514** may manage hardware resources and provide common services. The operating system **1514** may include, for example, a kernel **1528**, services **1530**, and drivers **1532**. The kernel **1528** may act as an abstraction layer between the hardware and the other software layers. For example, the kernel **1528** may be responsible for memory management, processor management (e.g.,

scheduling), component management, networking, security settings, and so on. The services **1530** may provide other common services for the other software layers. The drivers **1532** are responsible for controlling or interfacing with the underlying hardware. For instance, the drivers **1532** 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.

[0134] The libraries **1516** provide a common infrastructure that is used by at least one of the applications **1520**, other components, or layers. The libraries **1516** provide functionality that allows other software components to perform tasks in an easier fashion than to interface directly with the underlying operating system **1514** functionality (e.g., kernel **1528**, services **1530**, drivers **1532**). The libraries **1516** may include system libraries **1534** (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 **1516** may include API libraries **1536** such as media libraries (e.g., libraries to support presentation and manipulation of various media format such as MPEG4, H.264, MP3, AAC, AMR, JPG, PNG), graphics libraries (e.g., an OpenGL framework that may be used to render two-dimensional and three-dimensional 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 **1516** may also include a wide variety of other libraries **1538** to provide many other APIs to the applications **1520** and other software components/modules.

[0135] The frameworks/middleware **1518** (also sometimes referred to as middleware) provide a higher-level common infrastructure that may be used by the applications **1520** or other software components/modules. For example, the frameworks/middleware **1518** may provide various graphical user interface functions, high-level resource management, high-level location services, and so forth. The frameworks/middleware **1518** may provide a broad spectrum of other APIs that may be utilized by the applications **1520** or other software components/modules, some of which may be specific to a particular operating system **1514** or platform.

[0136] The applications **1520** include built-in applications **1540** and third-party applications **1542**. Examples of representative built-in applications **1540** 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, or a game application. Third-party applications **1542** 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 **1542** may invoke the API calls **1524** provided by the mobile operating system (such as operating system **1514**) to facilitate functionality described herein.

[0137] The applications **1520** may use built-in operating system functions (e.g., kernel **1528**, services **1530**, drivers **1532**), libraries **1516**, and frameworks/middleware **1518** to create UIs 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 **1522**. In these systems, the application/component "logic" can be separated from the aspects of the application/component that interact with a user.

[0138] FIG. **16** is a block diagram illustrating components of a machine **1600**, according to some example implementations, 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. **16** shows a diagrammatic representation of the machine **1600** in the example form of a computer system, within which instructions **1602** (e.g., software, a program, an application, an applet, an app, or other executable code) for causing the machine **1600** to perform any one or more of the methodologies discussed herein may be executed. As such, the instructions **1602** may be used to implement modules or components described herein. The instructions **1602** transform the general, non-programmed machine **1600** into a particular machine **1600** programmed to carry out the described and illustrated functions in the manner described. In alternative implementations, the machine **1600** operates as a standalone device or may be coupled (e.g., networked) to other machines. In a networked deployment, the machine **1600** 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 **1600** 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 **1602**, sequentially or otherwise, that specify actions to be taken by machine **1600**. Further, while only a single machine **1600** is illustrated, the term "machine" shall also be taken to include a collection of machines that individually or jointly execute the instructions **1602** to perform any one or more of the methodologies discussed herein.

[0139] The machine **1600** may include processors **1604**, memory/storage **1606**, and I/O components **1608**, which may be configured to communicate with each other such as via a bus **1610**. In an example implementation, the processors **1604** (e.g., 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), another processor, or any suitable combination thereof) may include, for example, a processor **1612** and a processor **1614** that may execute the instructions **1602**. The term "processor" is intended to include multi-core processors **1604** that may comprise two or more independent processors (sometimes referred to as "cores") that may execute instructions **1602** contemporaneously. Although FIG. **16** shows multiple processors **1604**, the machine **1600** may include a single processor **1612** with a single core, a single processor **1612** with multiple cores (e.g., a multi-core processor), multiple processors

1612, **1614** with a single core, multiple processors **1612**, **1614** with multiple cores, or any combination thereof.

[0140] The memory/storage **1606** may include memory, such as a main memory **1616**, or other memory storage, and a storage unit **1618**, both accessible to the processors **1604** such as via the bus **1610**. The storage unit **1618** and main memory **1616** store the instructions **1602** embodying any one or more of the methodologies or functions described herein. The instructions **1602** may also reside, completely or partially, within the main memory **1616**, within the storage unit **1618**, within at least one of the processors **1604** (e.g., within the processor's cache memory), or any suitable combination thereof, during execution thereof by the machine **1600**. Accordingly, the main memory **1616**, the storage unit **1618**, and the memory of processors **1604** are examples of machine-readable media.

[0141] The I/O components **1608** 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 **1608** that are included in a particular machine **1600** 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 **1608** may include many other components that are not shown in FIG. **16**. The I/O components **1608** are grouped according to functionality merely for simplifying the following discussion and the grouping is in no way limiting. In various example implementations, the I/O components **1608** may include output components **1620** and input components **1622**. The output components **1620** 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 **1622** 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 or force of touches or touch gestures, or other tactile input components), audio input components (e.g., a microphone), and the like.

[0142] In further example implementations, the I/O components **1608** may include biometric components **1624**, motion components **1626**, environmental components **1628**, or position components **1630** among a wide array of other components. For example, the biometric components **1624** 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 **1626** may include acceleration sensor components (e.g., accelerometer), gravitation sensor components, rotation sensor components (e.g., gyroscope), and so forth. The environmental components **1628** 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 **1630** may include location sensor components (e.g., a 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.

[0143] Communication may be implemented using a wide variety of technologies. The I/O components **1608** may include communication components **1632** operable to couple the machine **1600** to a network **1634** or devices **1636** via coupling **1638** and coupling **1640**, respectively. For example, the communication components **1632** may include a network interface component or other suitable device to interface with the network **1634**. In further examples, communication components **1632** 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 **1636** may be another machine **1600** or any of a wide variety of peripheral devices (e.g., a peripheral device coupled via a USB).

[0144] Moreover, the communication components **1632** may detect identifiers or include components operable to detect identifiers. For example, the communication components **1632** 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 **1040**, such as location via Internet Protocol (IP) geo-location, location via Wi-Fi® signal triangulation, location via detecting an NFC beacon signal that may indicate a particular location, and so forth.

Glossary

[0145] "CARRIER SIGNAL," in this context, refers to any intangible medium that is capable of storing, encoding, or carrying transitory or non-transitory instructions **1602** for execution by the machine **1600**, and includes digital or analog communications signals or other intangible medium to facilitate communication of such instructions **1602**. Instructions **1602** may be transmitted or received over the network **110**, **1634** using a transitory or non-transitory transmission

medium via a network interface device and using any one of a number of well-known transfer protocols.

[0146] "CLIENT DEVICE," in this context, refers to any machine **1600** that interfaces to a communications network **110**, **1634** to obtain resources from one or more server systems or other client devices **102**. A client device **102** may be, but is not limited to, a mobile phone, desktop computer, laptop, 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 **110**, **1634**.

[0147] "COMMUNICATIONS NETWORK," in this context, refers to one or more portions of a network **110** 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 **110**, **1634** 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 (1xRTT), 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.

[0148] "EPHEMERAL 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.

[0149] "MACHINE-READABLE MEDIUM," in this context, refers to a component, device, or other tangible media able to store instructions **1602** and data temporarily or permanently and may include, but is not 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)) 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 **1610**. The term "machine-readable medium" shall also be taken to include any medium, or combination of multiple media, that is capable of storing instructions **1602** (e.g., code) for execution by a machine **1600**, such that the instructions **1602**, when executed by one or more processors **1604** of the machine **1600**, cause the machine **1600** 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.

[0150] "COMPONENT," in this context, refers to a device, physical entity, or logic having boundaries defined by function or subroutine calls, branch points, 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 implementations, 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.

[0151] 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 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 **1604** or other programmable processor. Once configured by such software, hardware components become specific machines (or specific components of a machine **1600**) uniquely tailored to perform the configured functions and are no longer general-purpose processors **1604**. 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 implementations 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 **1604** configured by software to become a

special-purpose processor, the general-purpose processor **1604** may be configured as respectively different special-purpose processors (e.g., comprising different hardware components) at different times. Software accordingly configures a particular processor **1612**, **1614** or processors **1604**, 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.

[0152] 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 implementations in which multiple hardware components are configured or instantiated at different 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.

[0153] 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 **1604** that are temporarily configured (e.g., by software) or permanently configured to perform the relevant operations. Whether temporarily or permanently configured, such processors **1604** 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 **1604**. Similarly, the methods described herein may be at least partially processor-implemented, with a particular processor **1612**, **1614** or processors **1604** being an example of hardware. For example, at least some of the operations of a method may be performed by one or more processors **1604** or processor-implemented components. Moreover, the one or more processors **1604** 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 **1600** including processors **1604**), with these operations being accessible via a network **110** (e.g., the Internet) and via one or more appropriate interfaces (e.g., an API). The performance of certain of the operations may be distributed among the processors, not only residing within a single machine **1600**, but deployed across a number of machines. In some example implementations, the processors **1604** 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 implementations, the processors **1604** or processor-implemented components may be distributed across a number of geographic locations.

[0154] "PROCESSOR," in this context, refers to any circuit or virtual circuit (a physical circuit emulated by logic executing on an actual processor **1604**) 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 **1600**. A processor **1604** may, for example, be a CPU, a RISC processor, a CISC processor, a GPU, a DSP, an ASIC, a RFIC or any combination thereof. A processor **1608** may further be a multi-core processor having two or more independent processors **1604** (sometimes referred to as "cores") that may execute instructions **1602** contemporaneously.

[0155] "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.

[0156] Changes and modifications may be made to the disclosed implementations without departing from the scope of the present disclosure. These and other changes or modifications are intended to be included within the scope of the present disclosure, as expressed in the following claims.

What is claimed is:

1. A method comprising:

receiving, by one or more computing devices having one or more processors and memory, a request for content items corresponding to a classification;

determining, by the one or more computing devices, a number of content items having the classification;

causing, by the one or more computing devices, user interface data to be accessible to a client device in response to the request, the user interface data configured to generate one or more user interfaces that include a page having at least a subgroup of the number of content items and a user interface element that is selectable to add a content item to content items having the classification;

obtaining, by the one or more computing devices, content item data that includes an image captured by a camera of the client device and an identifier of the classification generated in response to selection of the user interface element; and

causing, by the one or more computing devices, the content item to be stored in association with the identifier of the classification.

2. The method of claim **1**, comprising:

causing, by the one or more computing devices, the camera of the client device to be activated in response to selection of the user interface element; and

causing, by the one or more computing devices, an additional user interface to be displayed by the client device, the additional user interface displaying a view of the camera.

3. The method of claim **1**, wherein:

the request includes at least one of one or more keywords corresponding to the classification or an identifier of the classification; and

the content item includes an overlay that indicates an identifier of the classification.

4. The method of claim **3**, wherein:

the overlay is produced using a creative tool of a client application; and

the one or more user interfaces are displayed within the client application.

5. The method of claim **4**, comprising:

determining, by the one or more computing devices, the classification of the content item based at least partly on an identifier of the creative tool.

6. The method of claim **1**, comprising:

determining, by the one or more computing devices, one or more first characteristics of a user of the client device;

determining, by the one or more computing devices, one or more second characteristics of a group of content items having the classification;

performing, by the one or more computing devices, an analysis of the one or more first characteristics with respect to the one or more second characteristics; and

determining, by the one or more computing devices, a level of interest for individual content items of the group of content items in relation to the user of the client device based on the analysis.

7. The method of claim **6**, comprising:

determining, by the one or more computing devices, rankings for the group of content items based on the level of interest for the individual content items of the group of content items in relation to the user of the client device, wherein the rankings indicate an order in which the individual content items are to be displayed in at least one user interface of the one or more user interfaces.

8. The method of claim **7**, wherein:

a first content item of the group of content items has a first ranking that corresponds to a first level of interest with respect to the user of the client device;

a second content item of the group of content items has a second ranking that is lower than the first ranking and that corresponds to a second level of interest with respect to the user of the client device that is less than the first level of interest; and

the first content item is presented before the second content item in the page that includes at least a portion of the subgroup of the number of content items.

9. A system comprising:

one or more hardware processors; and

one or more non-transitory computer-readable storage media including computer-readable instructions that, when executed by the one or more hardware processors, cause the one or more hardware processors to perform operations comprising:

receiving a request for content items corresponding to a classification;

determining a number of content items having the classification;

causing user interface data to be accessible to a client device in response to the request, the user interface data configured to generate one or more user interfaces that include a page having at least a subgroup of the number of content items and a user interface element that is selectable to add a content item to content items having the classification;

obtaining content item data that includes an image captured by a camera of the client device and an identifier of the classification generated in response to selection of the user interface element; and

causing the content item to be stored in association with the identifier of the classification.

10. The system of claim **9**, wherein the one or more non-transitory computer-readable storage media include additional computer-readable instructions that, when executed by the one or more hardware processors, cause the one or more hardware processors to perform additional operations comprising:

causing an additional user interface to be displayed by the client device, the additional user interface including a first user interface element that is selectable to view one or more collections of content created by a user of the client device and a second user interface element that is selectable to view one or more content items created by the user of the client device that correspond to the classification.

11. The system of claim **10**, wherein the additional user interface includes a third user interface element that is selectable to view content created by a contact of the user of the client device.

12. The system of claim **10**, wherein:

the one or more collections of content that correspond to the first user interface element are accessible to contacts of the user within a client application that displays the one or more user interfaces; and

the one or more content items created by the user that correspond to the second user interface element are publicly accessible.

13. The system of claim **9**, wherein the one or more non-transitory computer-readable storage media include additional computer-readable instructions that, when executed by the one or more hardware processors, cause the one or more hardware processors to perform additional operations comprising:

determining rankings of individual content items of the number of content items, the rankings indicating respective levels of interest of the individual content items in relation to a user of the client device; and

determining an order in which to present the individual content items within the one or more user interfaces based on the rankings.

14. The system of claim **9**, wherein the page includes an additional user interface element to share the classification with one or more additional users of a client application.

15. One or more non-transitory computer-readable media storing computer-readable instructions that, when executed by one or more processors, cause the one or more processors to perform operations comprising:

receiving a request for content items corresponding to a classification;

determining a number of content items having the classification;

causing user interface data to be accessible to a client device in response to the request, the user interface data configured to generate one or more user interfaces that include a page having at least a subgroup of the number of content items and a user interface element that is selectable to add a content item to content items having the classification;

obtaining content item data that includes an image captured by a camera of the client device and an identifier of the classification generated in response to selection of the user interface element; and

causing the content item to be stored in association with the identifier of the classification.

16. The one or more non-transitory computer-readable media of claim **15**, storing additional computer-readable instructions that, when executed by the one or more

processors, cause the one or more processors to perform additional operations comprising:

receiving content item data from client device, the content item data including image data corresponding to an image of an additional content item and overlay data corresponding to an overlay of the image with the overlay being produced by a client application, wherein the overlay data includes text data that corresponds to first text content of the overlay;

performing an analysis of the first text content in relation to second text content of individual identifiers of a plurality of classifications;

determining a measure of similarity between a first portion of the first text content and at least a portion of the second text content that is related to an identifier of the classification, wherein a second portion of the first text content includes at least one of words, letters, symbols, or numbers that do not correspond to identifiers of classifications;

determining, based on the measure of similarity corresponding to at least a threshold level of similarity, that the classification corresponds to the additional content item based at least partly on the overlay data; and

adding the additional content item to the number of content items having the classification.

17. The one or more non-transitory computer-readable media of claim **16**, storing additional computer-readable instructions that, when executed by the one or more processors, cause the one or more processors to perform additional operations comprising:

analyzing the image data to determine an object included in the image;

determining an additional identifier of the object; and

determining that the additional identifier of the object has at least a threshold level of correspondence with the identifier of the classification; and

wherein the classification for the additional content item is based at least partly on the additional identifier of the object having at least the threshold level of correspondence with the identifier of the classification.

18. The one or more non-transitory computer-readable media of claim **16**, storing additional computer-readable instructions that, when executed by the one or more processors, cause the one or more processors to perform additional operations comprising:

causing an additional user interface to be displayed that includes an additional user interface element indicating one or more suggested classifications for the additional content item and including an option that is selectable to add the additional content item to content collections that correspond to the one or more suggested classifications.

19. The one or more non-transitory computer-readable media of claim **18**, wherein the one or more suggested classifications correspond to at least one of a location at which the image was captured, an identifier of one or more objects included in the image, or the first text content of the overlay.

20. The one or more non-transitory computer-readable media of claim **19**, wherein the additional user interface includes one or more selectable option to remove at least one suggested classification from the one or more suggested classifications.

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