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(54) **DIGITAL CONTENT RECOMMENDATIONS BASED ON USER COMMENTS**

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(57) **ABSTRACT**

A method and system relate to receiving first comments, associated with first digital content, that are submitted by a first user, and determining an opinion of the first user with respect to the first digital content based on the one or more first comments. Determining the opinion of the first user with respect to the first digital content includes parsing the one or more first comments to determine a term included in the one or more first comments, and determining the opinion based on the term. The first user is clustered with second users who share the first users opinion regarding the first digital content. Second digital content, liked by at least one of the second users and have accessed by the first user, are identified, and a recommendation identifying the second digital content is presented for display to the first user.

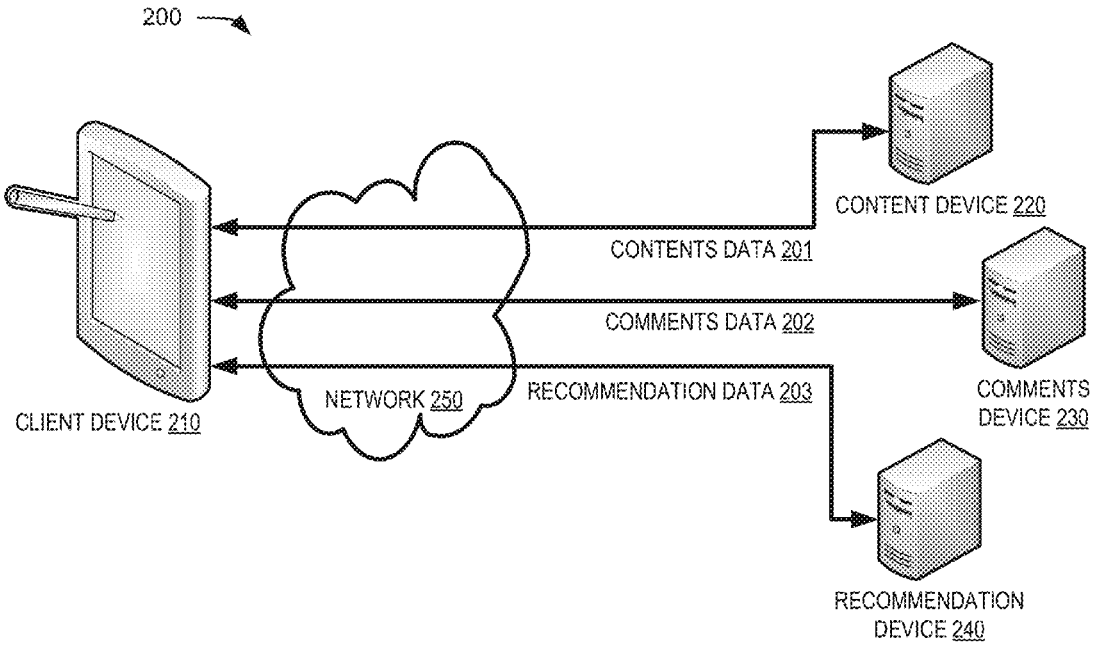


FIG. 1

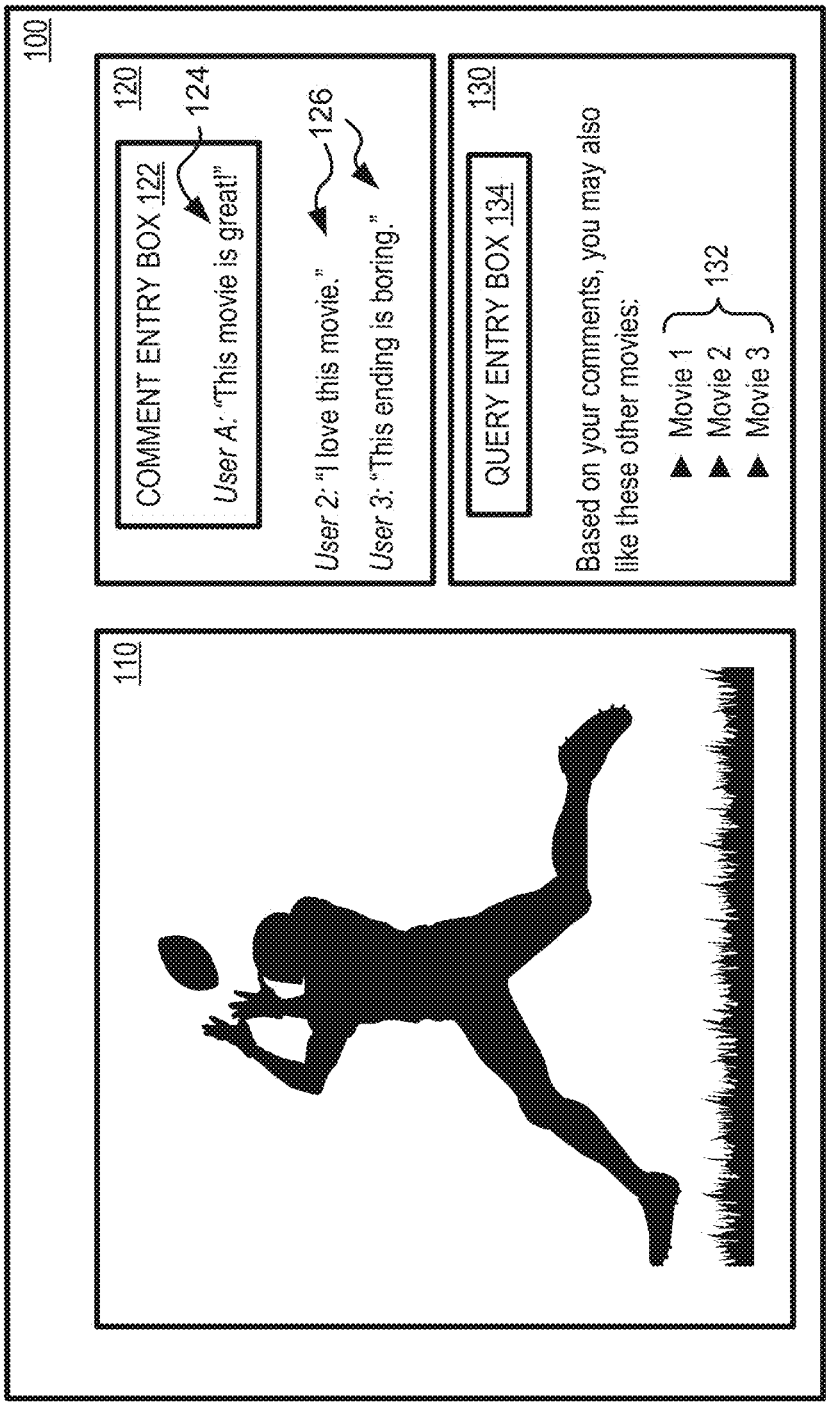

100
110
120
COMMENT ENTRY BOX 122
124
User A: "This movie is great!"
126
User 2: "I love this movie."
User 3: "This ending is boring."
130
QUERY ENTRY BOX 134
Based on your comments, you may also like these other movies:
Movie 1
Movie 2
Movie 3
132

FIG. 2

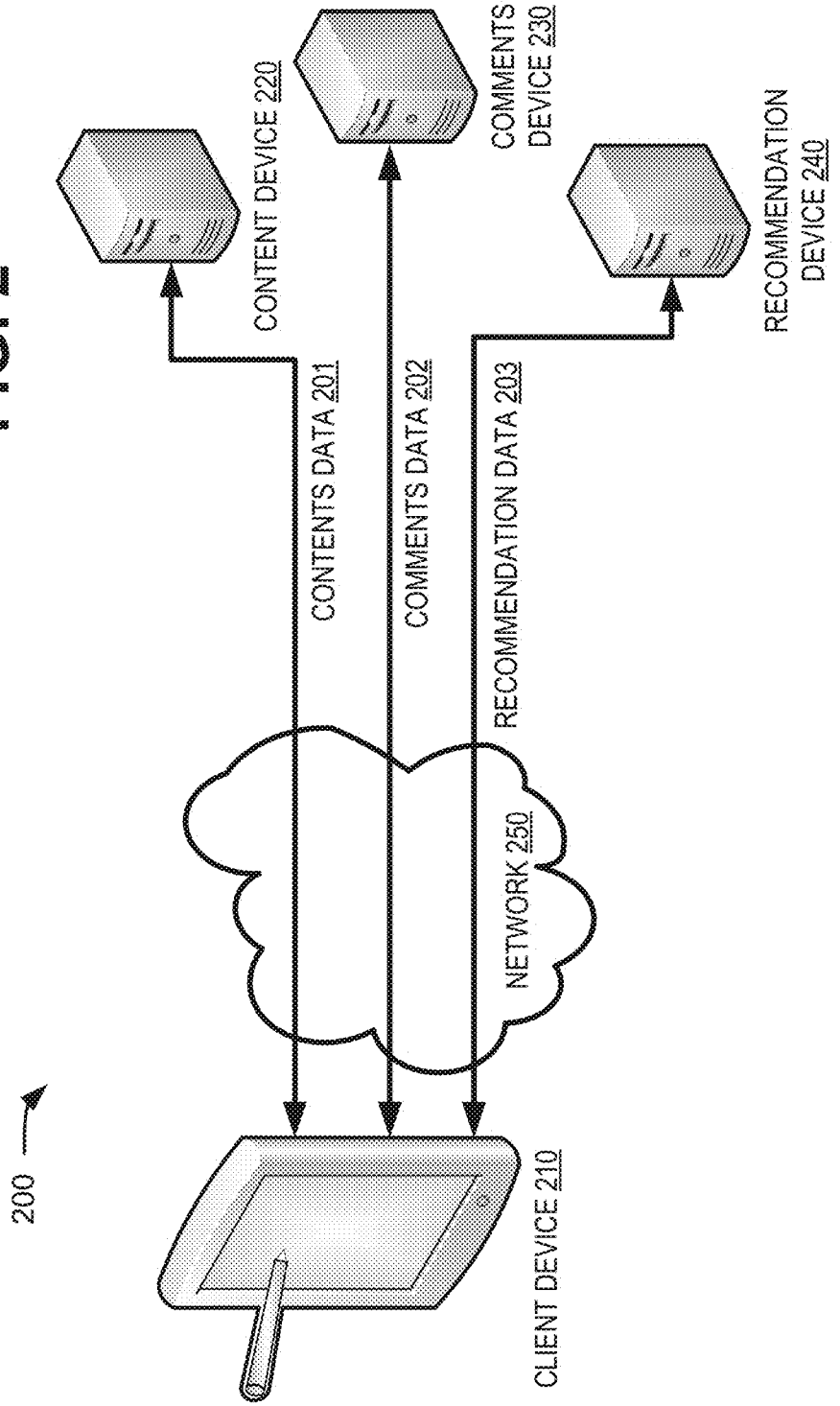

200
CLIENT DEVICE 210
NETWORK 250
CONTENTS DATA 201
COMMENTS DATA 202
RECOMMENDATION DATA 203
CONTENT DEVICE 220
COMMENTS DEVICE 230
RECOMMENDATION DEVICE 240

FIG. 3

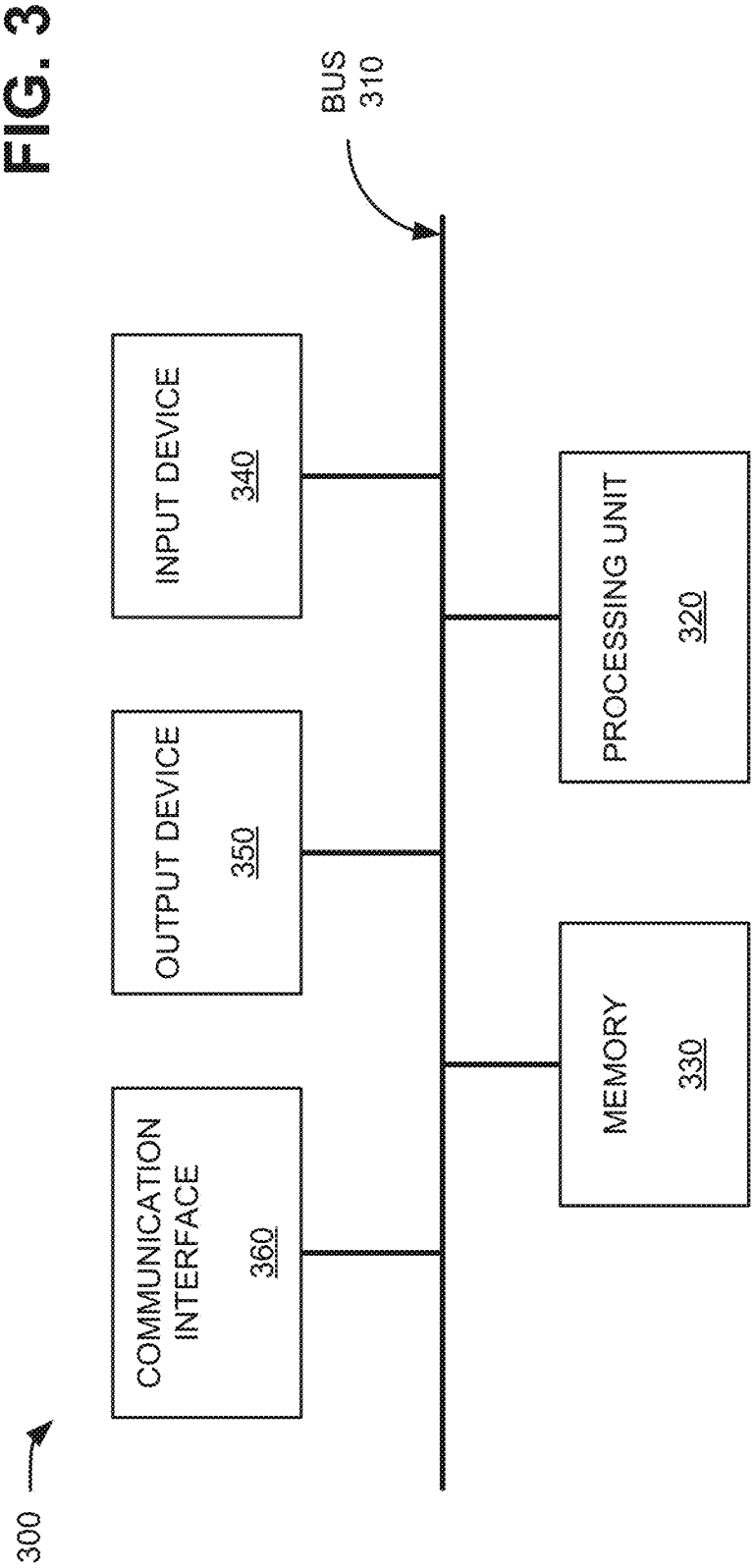

300
BUS
310
INPUT DEVICE
340
OUTPUT DEVICE
350
COMMUNICATION INTERFACE
360
PROCESSING UNIT
320
MEMORY
330

FIG. 4

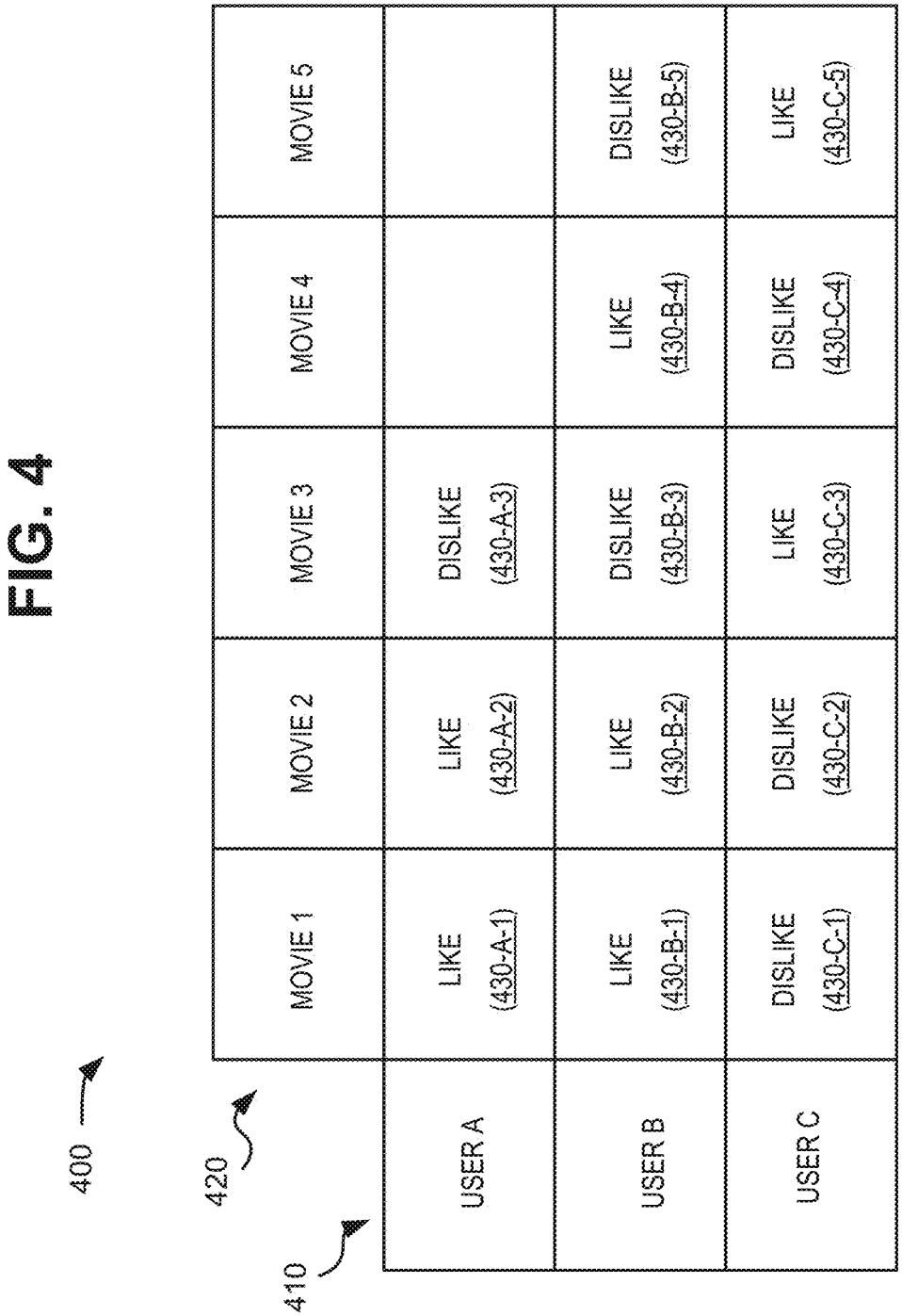
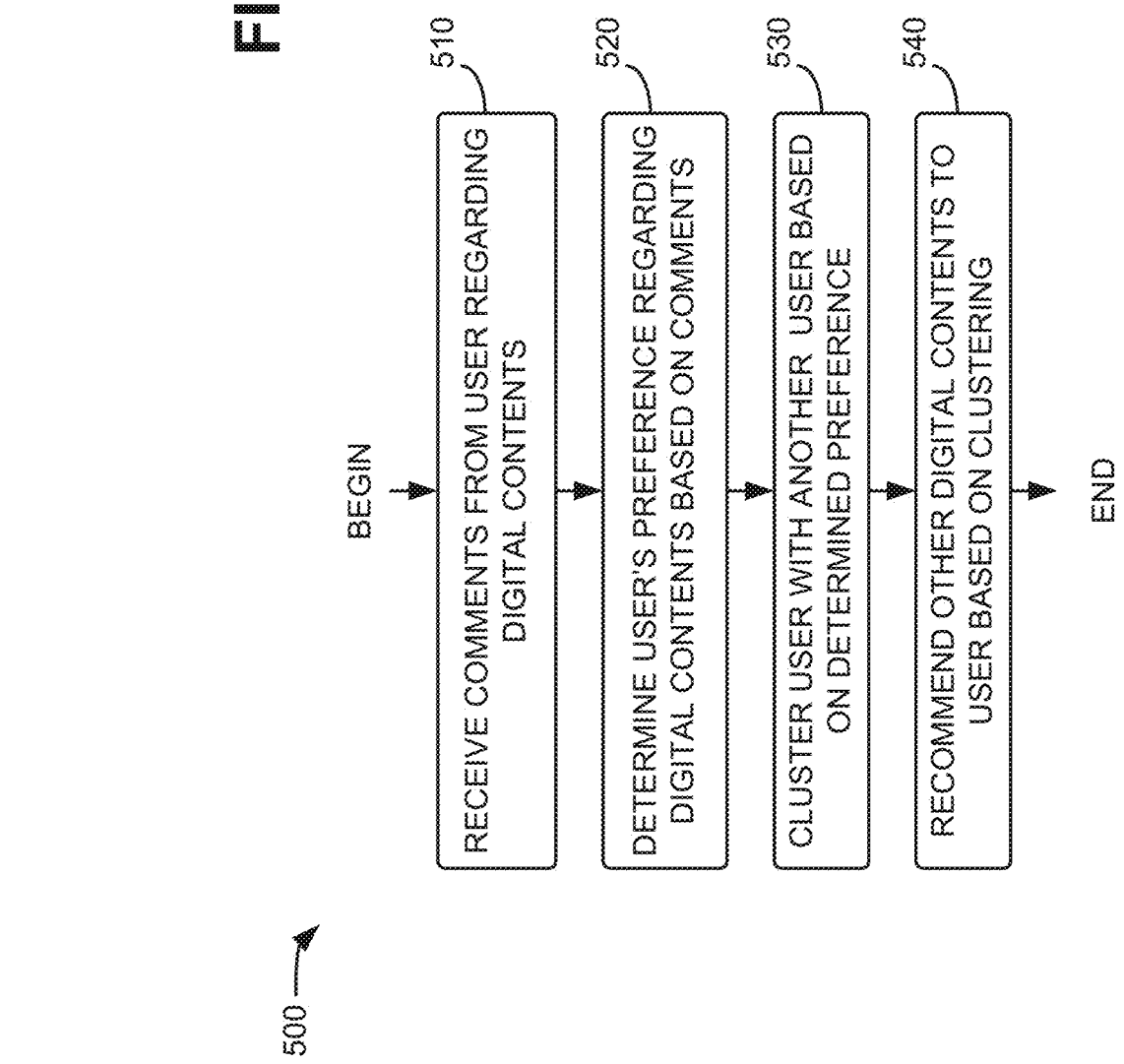

400
420
410
MOVIE 1
MOVIE 2
MOVIE 3
MOVIE 4
MOVIE 5
USER A
LIKE (430-A-1)
LIKE (430-A-2)
DISLIKE (430-A-3)
USER B
LIKE (430-B-1)
LIKE (430-B-2)
DISLIKE (430-B-3)
LIKE (430-B-4)
DISLIKE (430-B-5)
USER C
DISLIKE (430-C-1)
DISLIKE (430-C-2)
LIKE (430-C-3)
DISLIKE (430-C-4)
LIKE (430-C-5)

FIG. 5


500
BEGIN
510
RECEIVE COMMENTS FROM USER REGARDING DIGITAL CONTENTS
520
DETERMINE USER'S PREFERENCE REGARDING DIGITAL CONTENTS BASED ON COMMENTS
530
CLUSTER USER WITH ANOTHER USER BASED ON DETERMINED PREFERENCE
540
RECOMMEND OTHER DIGITAL CONTENTS TO USER BASED ON CLUSTERING
END

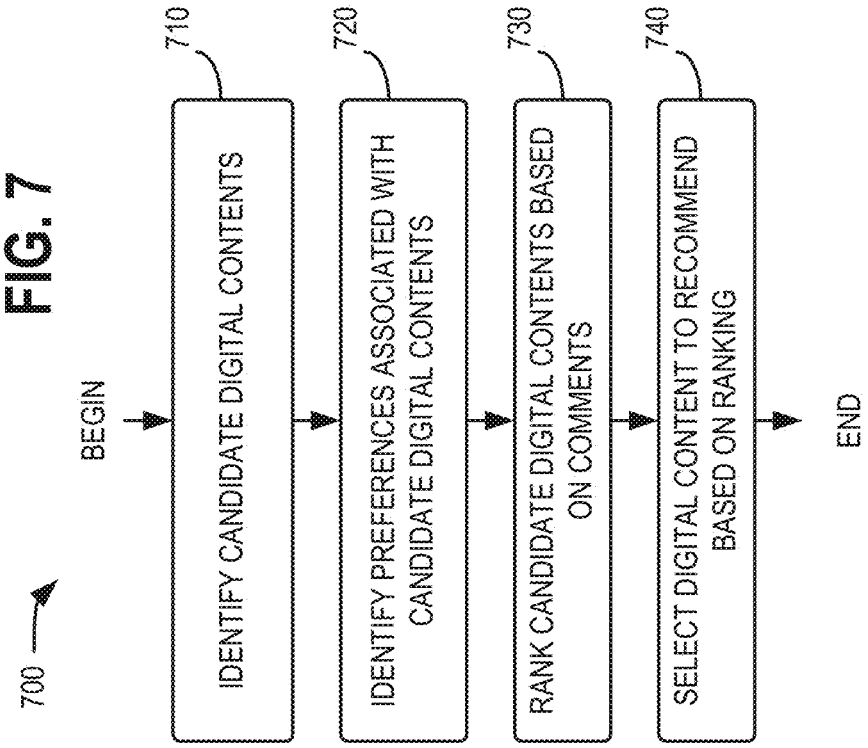

700
BEGIN
710
IDENTIFY CANDIDATE DIGITAL CONTENTS
720
IDENTIFY PREFERENCES ASSOCIATED WITH CANDIDATE DIGITAL CONTENTS
730
RANK CANDIDATE DIGITAL CONTENTS BASED ON COMMENTS
740
SELECT DIGITAL CONTENT TO RECOMMEND BASED ON RANKING
END

FIG. 7

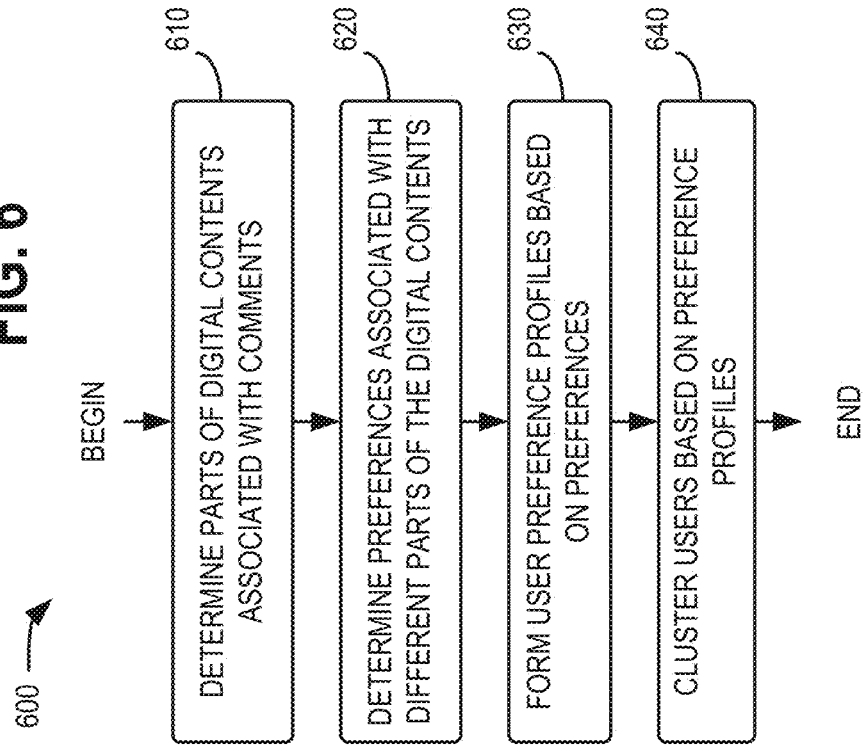

600
BEGIN
610
DETERMINE PARTS OF DIGITAL CONTENTS ASSOCIATED WITH COMMENTS
620
DETERMINE PREFERENCES ASSOCIATED WITH DIFFERENT PARTS OF THE DIGITAL CONTENTS
630
FORM USER PREFERENCE PROFILES BASED ON PREFERENCES
640
CLUSTER USERS BASED ON PREFERENCE PROFILES
END

FIG. 6

FIG. 8A

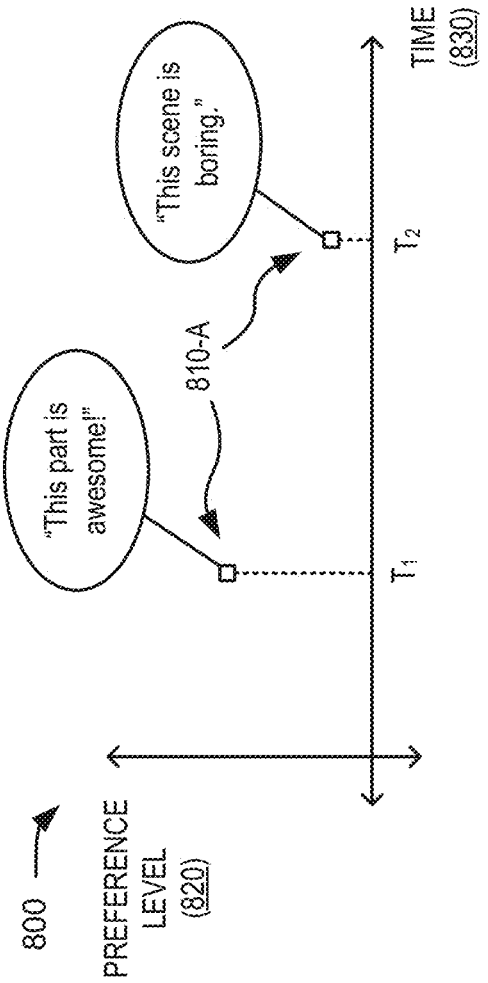

800
PREFERENCE LEVEL (820)
TIME (830)
"This part is awesome!"
"This scene is boring."
810-A
T1
T2

FIG. 8B

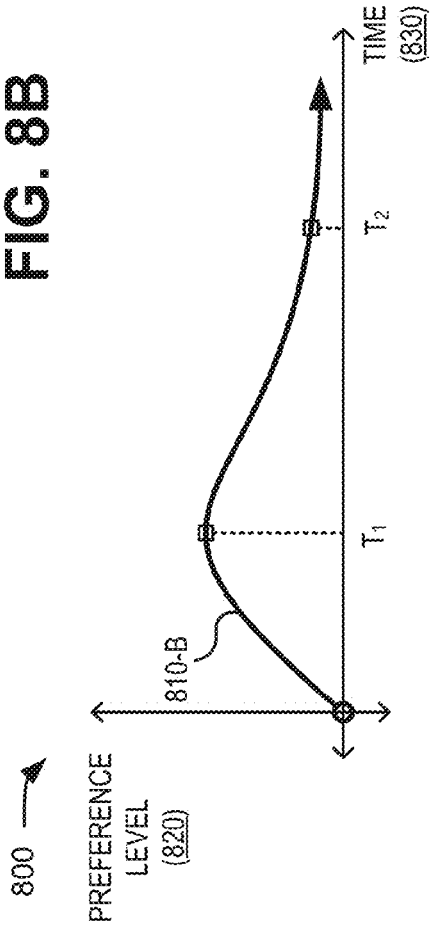
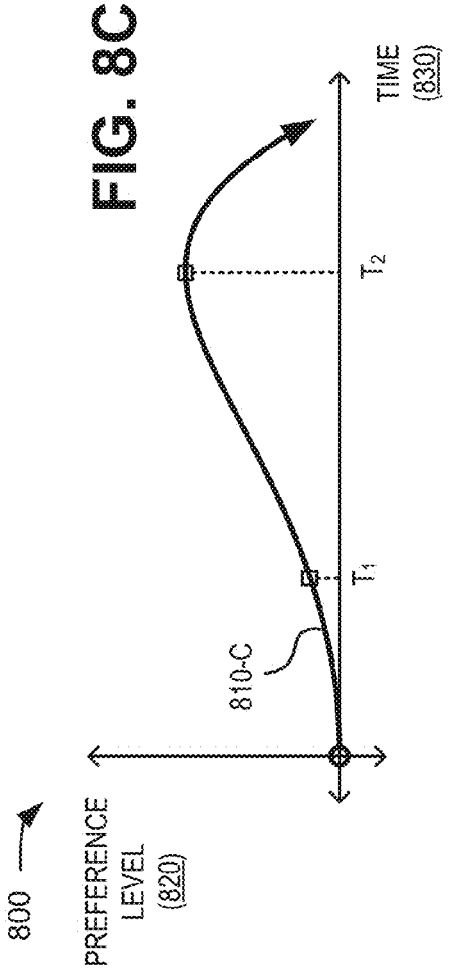

800
PREFERENCE LEVEL (820)
TIME (830)
810-B
T1
T2

FIG. 8C


800
PREFERENCE LEVEL (820)
TIME (830)
810-C
T1
T2

DIGITAL CONTENT RECOMMENDATIONS BASED ON USER COMMENTS

BACKGROUND

[0001] Modern communications enable a user to access a large quantity of digital content. To assist the user in selecting from the digital content, a service provider may provide a catalog identifying available digital content. The user may search the catalog by keyword(s) or browse the product list. In some instances, the catalog may also provide recommendations based on the user's profile, viewing history or purchase history.

BRIEF DESCRIPTION OF THE DRAWINGS

[0002] FIG. **1** shows an exemplary interface provided to a user;

[0003] FIG. **2** shows a schematic diagram of an exemplary system for presenting the interface of FIG. **1**;

[0004] FIG. **3** is a diagram of exemplary components of a device that may correspond to a component of the system of FIG. **2**;

[0005] FIG. **4** shows an exemplary table **400** that may be stored by a recommendation device included in the system of FIG. **2**;

[0006] FIG. **5** is a flow diagram of an exemplary process for recommending digital content based on user comments;

[0007] FIG. **6** is a flow diagram of an exemplary process for clustering users based on the determined preferences determined from user comments;

[0008] FIG. **7** is a flow diagram of an exemplary process for determining digital content to recommend to a user based on the user's comments; and

[0009] FIGS. **8**A-**8**C show graphs depicting different exemplary preference profiles reflecting a user's opinions regarding different portions of digital content.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0010] The following detailed description refers to the accompanying drawings. The same reference numbers in different drawings may identify the same or similar elements.

[0011] In accordance with an implementation described herein, comments regarding digital content may be received from users, and the comments may be processed to determine the users' opinion regarding the digital content (e.g., whether the users liked/disliked the digital content). Users having similar opinions (i.e., users submitting similar comments regarding a set of digital content) are identified, and digital content viewed or liked by (e.g., receiving favorable comments from) the one of the identified users are identified to another one of the identified users as a recommendation.

[0012] As used herein, the terms "user," "consumer," "subscriber," and/or "customer" may be used interchangeably. Also, the terms "user," "consumer," "subscriber," and/or "customer" are intended to be broadly interpreted to include a user device or a user of a user device. "Digital content," as referred to herein, includes one or more units of digital content that may be provided to a customer. The unit of digital content may include, for example, a segment of text, a defined set of graphics, a uniform resource locator (URL), a script, a program, an application or other unit of software, a media file (e.g., a movie, television content, music, etc.), a document, or an interconnected sequence of files (e.g., hypertext transfer protocol (HTTP) live streaming (HLS) media files).

[0013] FIG. **1** shows an exemplary interface **100** provided to a user by a device in one implementation. As shown in FIG. **1**, interface **100** may include, for example, a display region **110**, a comment region **120**, and a recommendation region **130**.

[0014] Interface **100** is generally provided for the benefit of a user of a client device via a client application program, process, or interface that is executed at the client device for enabling data communications with one or more other devices via a network. For example, interface **100** may be implemented on a client device executing a client application program to access a functionality of a web application. Interface **100** may be provided to the user of the client device through, for example, a web browser application executable at the client device. Alternatively, interface **100** may be a dedicated application program that is installed and executable at client device to enable the user to access relevant web application functionality.

[0015] Display region **110** may receive data associated with digital content (e.g., the digital content are downloaded or streamed to interface **100**) and may process the data to present a visual representation associated with the digital content. For example, display region **110** may present an image or a series of images (e.g., a movie) associated with the digital content. An associated audio representation, such as spoken dialog and/or music, may also be presented in connection with the visual representation presented in display region **110**.

[0016] Comment region **120** may display a comment received from the user, and the comment may relate to the digital content presented in display region **110**. For example, comment region **120** may include a comment entry box **122** through which the user may submit a comment **124**. Comment region **120** may display, for example, data related to other comments **126** received from other users (e.g., users associated with other client devices) in connection with the digital content presented in display region **110**. Comments **124** and **126** may be exchanged during the presentation of the digital content or may be received after the presentation of the digital content.

[0017] Comments **124** and/or **126** may include text expressing an opinion related to the digital content presented in display region **110** (e.g., whether a commenter liked or disliked the digital content). In the example show in FIG. **1**, the comment **124** ("This movie is great!") by User A, associated with interface **100**, indicates that User A liked the digital content. Continuing with the example of FIG. **1**, comments **126** indicate that User B liked the digital content ("I love this movie") and User C disliked the digital content ("This ending is boring").

[0018] A comment **124**/**126** may be associated with a particular portion of the digital content. For example, the comment **124**/**126** may be associated with a portion of the digital content being presented via display region **110** when the comment **124**/**126** is received. In another implementation, the comment **124**/**126** may be processed to determine a relevant portion of the digital content based on the contents of the comment **124**/**126**. In the example shown in FIG. **1** the comment **126** by User B ("This ending is boring.") indicates a dislike of the ending of the digital content.

[0019] In one implementation, comment region **120** may include a graphical interface that receives a rating of a portion of the digital content. For example, comment region **120** may

allow a user to click on or otherwise select between zero and five starts, with zero stars indicating a strong dislike and five stars indicating a strong positive preference (or like) for the digital content. Comment region **120** may also allow a user to submit a numerical rating (e.g., a number between zero and five).

[0020] Continuing with FIG. **1**, recommendation region **130** may present a recommendation **132** to the user. Recommendation **132** may be generated based on comments **124** and **126** associated with the digital content displayed in display region **110**. The recommendation **132** may identify one or more other digital content to the user. The recommendation **132** may be generated based on comparing comments **124** and **126** to identify a set of comments **126** that are similar to comments **124** by the user, and then identifying particular users associated with the identified set of comments **126**. In the example shown in FIG. **1**, it may be inferred that User A and User B have similar interests and/or tastes since User A and User B both submitted positive comments **124** and **126** with respect to the digital content presented via display region **110**. Similarly, it may be inferred that user A and User C have different interests and/or tastes since User C have submitted a negative comment **126** with respect to digital content liked by User A.

[0021] Continuing with the example shown in FIG. **1** (in which User A and User B submit similar comments and User A and User C submit dissimilar comments with respect to the particular digital content), recommendation **132** may identify digital content viewed and/or positively commented upon by User B. Due to the similarities in the comment **124** and the comment **126** submitted by User A, it may be inferred that User A and User B share similar preferences and likes regarding digital content.

[0022] Recommendation **132** may identify multiple other digital contents (shown in FIG. **1** as "Movie **1**," "Movie **2**," and "Movie **3**"). The digital content, identified in recommendation **132**, may be ranked (or ordered) based on various criteria. For example, recommendation **132** may order the digital content alphabetically based on the respective identifiers or other metadata associated with the digital content (e.g., people, places, genres, awards, etc. associated with the digital content). Continuing with the example shown in the FIG. **1**, digital content liked by User B (and disliked by User C) may be ranked higher than digital content liked by User C (and disliked by User B) based on the similarities between User A and User B with respect to the digital content presented in display region **110**.

[0023] In another implementation, the digital content identified in recommendation **132** may be also be ranked based on other criteria. For example, as shown in FIG. **1**, recommendation region **130** may include a query entry box **134** to receive a query from the user. The query may include a character string specifying, for example, an identifier (e.g., a title or a portion of the title), people (e.g., actors, singers, or writers), places (e.g., settings), genres, awards, etc., associated with the digital content. The digital content identified in recommendation **132** may be ranked based or the query (i.e., digital content associated with or matching the query being ranked higher than other digital content).

[0024] Although FIG. **1** shows exemplary aspects of interface **100**, in other implementations, interface **100** may present less data, different data, differently arranged data, or additional data than depicted in FIG. **1**. As an example, display region **110** may be presented on a first device (e.g., on a television), and recommendation region **130** may be presented in a separate device (e.g., on a smart phone, remote control, tablet, laptop computer, etc.). In another implementation, comment region **120** and recommendations region **130** may be combined such that recommendations **132** may be presented proximate to a corresponding comment **124** or **126**. For example, different recommendations **132** may be determined based on different comments **126**, and the different recommendations **132** may be presented near the corresponding comments **126**.

[0025] FIG. **2** shows a schematic diagram of an exemplary system **200** for presenting interface **100** of FIG. **1** in one implementation. As shown in FIG. **2**, system **200** may include a client device **210** that presents interface **100** shown in FIG. **1**. In connection with presenting interface **100**, client device **210** may exchange, for example, contents data **201** with content device **220**, comments data **202** with comments device **230**, and recommendation data **203** with recommendation device **240** via network **250** when presenting interface **100**.

[0026] Client device **210** may include a device that is capable of communicating over network **250**. Client device **210** may include, for example, a telephone, a wireless device, a smart phone, a tablet, a personal digital assistant (PDA), a laptop computer, a global positioning system (GPS) or mapping device, a gaming device, or other types of computation or communication devices. Client device **210** may also include a set-top box (STB), a connected television, a laptop computer, a tablet computer, a personal computer, a game console, or other types of computation and/or communication devices. In one implementation, client device **210** may include a client application that allows a user to interact with content device **220** to order and/or receive broadcast content and special-order (e.g., VOD, pay-per-view event, etc.) content. In some implementations, client device **210** may also include a client application to allow video content to be presented on an associated display.

[0027] Client device **210** and content device **220** may exchange contents data **201** via network **250**. Contents data **201** may include, for example, the digital content to be displayed by client device **210** (e.g., in display region **110**). Contents data **201** may also include a listing of digital content available from content device **220** and/or pricing information regarding the available digital content. Contents data may also include a request from client device **210** for the digital content, such as a selection from recommendation **132**. In one implementation, contents data **201** may also include data or a program related to accessing digital content through content device **220**. For example, contents data **201** may identify an encoding scheme (e.g., a codec) used for the digital content and/or may include a program for handling the encoding scheme.

[0028] Client device **210** and comments device **230** may exchange comments data **202** via network **250**. Comments data **202** may include, for example, data associated with comments **124** received by client device **210** from an associated user. Comments device **230** may forward the comments **124** to other client devices. Comments data **202** may further include, for example, data associated with comments **126** received from other users (i.e., User B and User C in FIG. **1**). For example, comments data **202** may include contents of the comments **124** and **126**, and metadata associated with the comments, such as a time when the comments are submitted, data identifying person and/or device associated with the

comments, etc. Client device **210** may present comments region **120** based on the comments data **202**.

[0029] In one implementation, comments device **230** may be used in connection with a "chat room" in which different users interact with respect to a specific topic. In another implementation, comments device **230** may operate in connection with social media. For example, comments **124** and/or **126** may be collected from Internet forums, a user's blogs, social networks, podcasts, picture-sharing, wall-posting, music-sharing, etc.

[0030] Recommendation device **240** may receive comments data **202** and identify a commentator submitting comments **126** similar to comments **124** submitted by a user associated with client device **210**. For example, as described above with respect to recommendations region in FIG. **1**, recommendation device **240** may review comments **124** to determine particular digital content liked by the user, and review comments **126** to identify other users that like the same or similar digital content. For example, recommendation device **240** may identify comments **124** and **126** that include (1) positive language (e.g., "funny," "enjoy," great," "exciting," etc.) indicating that a user liked the particular digital content or (2) negative language (e.g., "boring," "bad," terrible," "awful," etc.) indicating that the user disliked the particular digital content. Recommendation device **240** may further identify other digital content liked and/or viewed by the identified commentator, and form recommendation data **203** based on the identified other digital content.

[0031] Network **250** may include any network or combination of networks. In one implementation, network **250** may include one or more networks including, for example, a wireless public land mobile network (PLMN) (e.g., a Code Division Multiple Access (CDMA) 2000 PLMN, a Global System for Mobile Communications (GSM) PLMN, a Long Term Evolution (LTE) PLMN and/or other types of PLMNs), a telecommunications network (e.g., Public Switched Telephone Networks (PSTNs)), a local area network (LAN), a wide area network (WAN), a metropolitan area network (MAN), an intranet, the Internet, or a cable network (e.g., an optical cable network). Alternatively or in addition, network **250** may include a contents delivery network having multiple nodes that exchange data with client device **210**. Although shown as a single element in FIG. **2**, network **250** may include a number of separate networks that function to provide communications and/or services to client device **210**.

[0032] In one implementation, network **250** may include a closed distribution network. The closed distribution network may include, for example, cable, optical fiber, satellite, or virtual private networks that restrict unauthorized alteration of contents delivered by a service provider. For example, network **250** may also include a network that distributes or makes available services, such as, for example, television services, mobile telephone services, and/or Internet services. Network **250** may be a satellite-based network and/or a terrestrial-based network. In implementations described herein, network **250** may support television services for a customer associated with client device **210**.

[0033] Although FIG. **2** shows exemplary components of system **200**, in other implementations, system **200** may include fewer components, different components, differently arranged components, or additional components than depicted in FIG. **2**. As an example, system **200** may include one or more intermediate devices, such as a router, firewall, etc. (not depicted), that connect client device **210** to network **250**.

[0034] Furthermore, although a single client device **210** is shown in FIG. **2**, system **200** may include several client devices **210**. For example, a single user may be associated with multiple client devices **210** such that comments by the single user may be received from the multiple client devices **210** and considered when determining recommendation data **203**. In another implementation, system **200** may include multiple client devices **210** associated with different users. Recommendation device **240** may then send different recommendations **132** to different client devices **210** based on comments associated with the associated different users.

[0035] Furthermore, it should be appreciated that tasks described as being performed by two or more other components of device system may be performed by a single component, and tasks described as being performed by a single component of system **200** may be performed by two or more components. For example, in a one implementation, recommendation device **240** may be a component of comments device **230**.

[0036] FIG. **3** is a diagram of exemplary components of a device **300** that may correspond, for example, to a component of system **200**. For example, a component of system **200** may be implemented and/or installed as software, hardware, or a combination of hardware and software in device **300**. In one implementation, device **300** may be configured as a network device. In another implementation, device **300** may be configured as a computing device. As shown in FIG. **3**, device **300** may include, for example, a bus **310**, a processing unit **320**, a memory **330**, an input device **340**, an output device **350**, and a communication interface **360**.

[0037] Bus **310** may permit communication among the components of device **300**. Processing unit **320** may include one or more processors or microprocessors that interpret and execute instructions. In other implementations, processing unit **320** may be implemented as or include one or more application specific integrated circuits (ASICs), field programmable gate arrays (FPGAs), and/or the like.

[0038] Memory **330** may include a random access memory (RAM) or another type of dynamic storage device that stores information and instructions for execution by processing unit **320**, a read only memory (ROM) or another type of static storage device that stores static information and instructions for the processing unit **320**, and/or some other type of magnetic or optical recording medium and its corresponding drive for storing information and/or instructions.

[0039] Input device **340** may include a device that permits an operator to input information to device **300**, such as a keyboard, a keypad, a mouse, a pen, a microphone, one or more biometric mechanisms, and the like. Output device **350** may include a device that outputs information to the operator, such as a display, a speaker, etc.

[0040] Communication interface **360** may include a transceiver that enables device **300** to communicate with other devices and/or systems. For example, communication interface **360** may include mechanisms for communicating with other devices, such as other devices of system **200**.

[0041] As described herein, device **300** may perform certain operations in response to processing unit **320** executing software instructions contained in a computer-readable medium, such as memory **330**. A computer-readable medium may include a tangible, non-transitory memory device. A

memory device may include space within a single physical memory device or spread across multiple physical memory devices. The software instructions may be read into memory **330** from another computer-readable medium or from another device via communication interface **360**. The software instructions contained in memory **330** may cause processing unit **320** to perform processes described herein. Alternatively, hardwired circuitry may be used in place of or in combination with software instructions to implement processes described herein. Thus, implementations described herein are not limited to any specific combination of hardware circuitry and software.

[0042] Although FIG. **3** shows exemplary components of device **300**, in other implementations, device **300** may include fewer components, different components, differently arranged components, or additional components than depicted in FIG. **3**. As an example, in some implementations, a display may not be included in device **300**. In these situations, device **300** may be a "headless" device that does not include an input device.

[0043] FIG. **4** shows an exemplary table **400** that may be stored by recommendation device **240** in one implementation. Table **400** may include, for example, user entries **410**, contents entries **420**, and preference entries **430**. While table **400** is displayed in FIG. **4** as including three user identifier entries **410**, five contents entries **420**, and thirteen preference entries **430** for purposes, it should be appreciated that any number of entries **410**, **420**, and **430** may be included in table **400**.

[0044] User entries **410** may store character strings or other data, such as images, addresses telephone numbers, customer numbers, etc., identifying a user associated with client device **210** and other users submitting comments received by client device **210**. For example, in FIG. **4**, user entries **410** identify "User A," "User B," and "User C." User entries **410** may further include other information associated with the users, such as information identify corresponding client devices **210** (e.g., network addresses, serial numbers, customer numbers, etc.), geographic locations associated with the users, demographic information associated with the users, etc. The data in user entries **410** may be determined based on, for example, data associated with the comments (e.g., the identifying data may be included in comment data **202**), other data received from client devices **210** (e.g., registration information), or stored data identifying users associated with client devices **210**.

[0045] Continuing with table **400** in FIG. **4**, content entries **420** may store character strings identifying the digital content (e.g., identifying the title). In the example shown in FIG. **4**, table **400** includes content entries **420** associated with Movies **1**-**5**. The data in content entries **420** may be determined based on, for example, received comments (e.g., data in the comments identifying the relevant digital content). In another implementation, a comment **124** or **126** displayed in comment region **120** in FIG. **1** may be tagged with information identifying a time when the comment **124** or **126** is received and/or a corresponding portion of the particular digital content (e.g., a portion of the digital content being presented in display region **110** when the comment **124**/**126** is submitted), and this information may be stored in content entries **420**.

[0046] In another implementation, content entries **420** may be obtained from a third-party source. For example, recommendation device **240** may generate a query to an internet search engine to determine at least a portion of content entries **420**. The query may be generated based on data included in the comments and/or data included in user entries **410**.

[0047] Continuing with table **400**, preference entries **430** (shown in FIG. **4** as preference entries **430**-A-**1** through **430**-A-**3**, **430**-B-**1** through **430**-B-**5**, and **430**-C-**1** through **430**-C-**5**) may include an indication of whether users, identified in user entry **410**, liked or disliked digital content identified in contents entry **420**. For example, preference entries **430**-A-**1**, **430**-A-**2**, and **430**-A-**3** in table **400** indicate that User A liked Movie **1** and Movie **2**, but disliked Movie **3**.

[0048] Alternatively or in addition, preferences entries **430** may identify other opinions regarding the digital content (e.g., whether a movie was action-packed, serious, scary, interesting, funny, etc.). As described in greater detail below, a recommendation may also be generated based on these other opinions. For example, a recommendation may be determined by clustering users who submit comments categorizing correspond portions of digital content (e.g., users having similar senses of humor).

[0049] The information stored in preference entries **430** may be determined by processing comments by users identified in user entries **410** with respect to digital content identified in content entries **420**. For example, recommendation device **240** may store information associating particular words used in comments **124** and **126** with preferences. For example, recommendation device **240** may store information identifying a set of approving words that indicate a like of the digital content and a set of disapproving words that indicating a dislike of the digital content. To generate data preference entries **430**, recommendation device **240** may process comments from users identified in user entries **410** to determine the users' opinion by identifying the presence of approving and/or disapproving words within the comments.

[0050] Recommendation device **240** may also populate one or more of preference entries **430** based on other factors. For example, recommendation device **240** may infer that a user likes the digital content if, for example, the user consumes (i.e., reads, views, listens to, etc.) the entire digital content. Recommendation device **240** may also provide an interface (i.e., included in the interface **100**), such as a graphical user interface (GUI), that allows a user to directly indicate an opinion regarding the digital content. For example, comments region **120** of interface **100** may include an entry area that allowed a user to grade or submit a numerical score to the digital content (e.g., allow the user to rate a movie between 1 and 5, with "1" indicating a strong dislike of the digital content, and "5" reflecting a strong like of the digital content.

[0051] In the example shown in FIG. **4**, Users A and B share similar opinions about Movies **1**-**3** (as reflected in preference entries **430**-B-**1** through **430**-B-**3**), whereas Users A and C have different opinions with respect to Movies **1**-**3** (as reflected in preference entries **430**-C-**1** through **430**-C-**3**). As further shown in FIG. **4**, User B liked Movie **4** (as reflected in preference entry **430**-B-**4**) and disliked Movie **5** (as reflected in preference entry **430**-B-**5**), whereas User C disliked Movie **4** (as reflected in preference entry **430**-C-**4**) and liked Movie **5** (as reflected in preference entry **430**-C-**5**).

[0052] Continuing with the example of FIG. **4** and as described in greater detail below with respect to FIGS. **5**-**7**, recommendation **132** may identify digital content liked by User B and/or disliked by User C (i.e., Movie **4**). In another implementation, recommendation **132** may further identify Movie **5**, but rank it below Movie **4** based on User B disliking it and/or User C liking it.

[0053] Although FIG. **4** shows sample entries that may be included in table **400**. In other implementations, table **400** may include fewer entries, different entries, differently arranged entries, or additional entries than depicted in FIG. **4**. For example, table **400** may include entries associated with metadata associated with the digital content, such as information identifying genres, performers, settings, awards, etc. associated with the digital content. Preference entries **430** may further identify users' opinions with respect to the metadata (e.g., opinions regarding different genres, performers, etc.).

[0054] FIG. **5** is a flow diagram of an exemplary process **500** for recommending digital content based on user comments regarding other digital content. In one implementation, process **500** may be performed by recommendation device **240**. In other implementations, process **500** may be performed using recommendation device **240** and one or more other devices.

[0055] Process **500** may include receiving comments from a user regarding digital content (block **510**). For example, as described above with respect to FIGS. **1** and **2**, comments **124** from an associated user may be received via interface **100**. In another implementation, the comments may be obtained, for example, via Internet forums, a user's blogs, social networks, podcasts, picture-sharing, wall-posting, music-sharing, etc.

[0056] Continuing with process **500**, a user's preferences regarding digital content may be determined based on the comments (block **520**). In block **520**, recommendation device **240** may determine a first set of digital content liked by the user and a second set of digital content disliked by the user. To determine the user's preferences, recommendation device **240** may parse terms included in the comments and classify the digital content as liked or disliked based on the parsed terms. For example, recommendation device **240** may determine whether a comment includes an approving term indicating a like of the digital content or a disapproving term indicating a dislike of the digital content.

[0057] Recommendation device **240** may determine the extent of a user's like/dislike of digital content based on language used in the comments. For example, certain terms ("love," "hate," "terrible," etc.) may indicate stronger like/dislike than other terms ("okay," "all right," "so-so," etc.). The extent of a user's like/dislike of digital content may be also determined based on a number of comments generated by the user. For example, recommendation device **240** may determine that a user prefers a digital content receiving more positive comments and/or less negative comments from the user.

[0058] The recommendation device **240** may be trained to dynamically classify terms based on processing sample comments from a group of users having known preferences regarding particular digital content. For example, terms from comments from users liking the particular digital content may be processed to identify approving terms, and terms from comments from other users disliking the particular digital content may be processed to identify disapproving terms.

[0059] If the user's comments associated with a particular digital content include both approving and disapproving terms, recommendation device **240** may determine the user's preference regarding the particular digital content based on, for example, respective counts of the approving and disapproving terms. For example, recommendation device **240** may determine that the user liked the particular digital content when the comments include more approving terms than disapproving terms. Alternatively or in addition, if a user is associated with both approving comments (i.e., comments containing approving terms) and disapproving comments (i.e., comments containing disapproving terms), recommendation device **240** may determine that the user liked the particular digital content when there are more approving comments than disapproving comments.

[0060] Recommendation device **240** may further identify the user's preferences based on other information. Recommendation device **240** may infer that a user liked a particular digital content based on the user's use of the digital content. For example, recommendation device **240** may infer that a user liked a digital book if the user reads the entire digital book, or may infer that the user disliked the digital book if the user does not finish the digital book. Similarly, recommendation device **240** may infer that a user liked movie if the user watched the entire program one or more times and disliked the digital book if the user does not finish viewing the movie.

[0061] Returning to process **500** in FIG. **5**, recommendation device **240** may cluster the user with other users based on the determined preferences (block **530**). For example, recommendation device **240** may group a user with other users who have similar preferences. For example, recommendation device **240** may identify other users who like at least a threshold number of the digital content liked by the user and/or dislike at least a threshold number the digital content disliked by the user. For example, two users may be clustered if they like the same ten digital contents. Recommendation device **240** may also identify other users who like at least a threshold percentage of the digital content liked by the user and/or dislike at least a threshold percentage of the digital content disliked by the user. For example, a first user may be clustered with a second user if the first user likes at least half (50%) of the digital content liked by the second user.

[0062] Continuing with the example of table **400** in FIG. **4**, User A may be clustered with User B based on the similarities in the preferences entries **430** of User A and User B with respect to Movies **1-3**. Similarly, User A and User C may be grouped into different clusters based on the differences between the preferences entries **430** of User A and User C with respect to Movies **1-3**.

[0063] While a user's preferences with respect to particular digital content are generally discussed as being extracted from comments, it should be appreciated that a preference can also be determined based on additional data. For example, recommendation device **240** may provide an interface to receive an input that regarding user's opinion about digital content. For example, a user may submit a number, such as rating, or other information (e.g., selections of a graphical symbol such as a thumbs up or a thumbs down) indicating the user's opinion of the digital content.

[0064] FIG. **6** is a flow diagram of an exemplary process **600** for clustering the user with other users based on the determined preferences in block **530**. In one implementation, process **600** may be performed by recommendation device **240**. In other implementations, process **600** may be performed using recommendation device **240** and one or more other devices.

[0065] Process **600** include determining parts of digital content associated with a user's comments (block **610**). For example, a comment may be associated with a time that the comment is received (e.g., the comment is stored with data indicating the time), and recommendation device **240** may determine a part of the digital content associated with the

time. For example, recommendation device **240** may determine a portion of the digital content being presented via display region at the time.

[0066] In another implementation, recommendation device **240** may analyze contents of a comment to determine whether the comment relates to a particular portion of the digital content. For example, recommendation device **240** may determine whether the comment includes language that directly references a portion of the digital content (e.g., "beginning," "introduction," "middle," "ending," refrain," "chorus," etc.).

[0067] Continuing with process **600**, recommendation device **240** may determine preferences associated with the different parts of the digital content (block **620**). For example, recommendation device **240** may parse terms included in a comment associated with a portion of the digital contents, and determine the user's opinion about the portion based on the parsed terms. For example, recommendation device **240** may determine whether a comment includes an approving term indicating a like of the corresponding portion of the digital content or a disapproving term indicating a dislike of the portion of the digital content. Recommendation device **240** may further identify the user's preferences based on the user's action with respect to the portion of the digital content. For example, recommendation device **240** may infer that a user disliked a portion of the digital content if the user skipped the portion.

[0068] Continuing with process **600** in FIG. **6**, recommendation device **240** may form user preference profiles (block **630**). A preference profile for a user may represent a user's opinion regarding different portions of the digital content.

[0069] FIGS. **8**A-**8**C show graphs **800** depicting different exemplary preference profiles **810**-A, **810**-B, and **810**-C (referred to collectively as preference profiles **810** and individually as preference profile **810**) that may be generated in block **630** in implementations of the present application. In FIGS. **8**A-**8**C, preference profiles **810** reflect different preference levels **820** (i.e., the extent that a user liked or disliked the digital content) at different times **830** (or portions of the digital content).

[0070] Preferences for a portion of digital content may be determined based on comments associated with that portion. A portion may reflect, for example, a particular time frame (e.g., a one minute section) of the digital content or may reflect a fraction (e.g., a tenth of the digital contents). As described above, a comment **124**/**126** may be associated with a corresponding portion of the digital content (e.g., a portion of the digital content being displayed in content region **110** when the comment is received).

[0071] A portion of the digital contents may be scored based on values assigned to associated comments, and comments **124** and **126** may be scored based on different levels of like/dislike (or other criteria being evaluated). For example, comments may be scored with scores between −10 and 10, with a value of −10 indicating an extremely strong dislike, a value of 0 indicating a neutral opinion, and a value of 10 indicating a strong like. A comment **124**/**126** may be scored based on the included terms used in the associated text. For example, a comment **124**/**126** including a strongly negative term, such as "abysmal," may be associated with a −10 value, and another comment including a strongly negative term, such "stupendous," may be associated with a 10 value. If the comment **124**/**126**

[0072] For example, profile **810**-A shown in FIG. **8**A indicates that the user had a first, high preference level with respect to a portion of digital content associated with time T_1 and had a second, lower preference level with respect to a portion of digital content associated with time T_2. Profile **810**-A may reflect, for example, that the user submitted a positive comment ("This part is awesome") at time T_1 and submitted a negative comment ("This part is boring") at time T_2.

[0073] FIG. **8**B shows a profile **810**-B that indicates, similar to profiled **810**-A, that the user liked the digital content with a first preference level at time T_1 and with a second, lower preference level at time T_2. Profile **810**-B may further include the user's preference level **820** at other times **830**. Profile **810**-B generally suggests, for example, that the associated user liked a beginning portion of the particular digital content more than an end portion.

[0074] FIG. **8**C shows a profile **810**-C that indicates that the user liked the digital content with a first preference level at time T_1 and with a second, higher preference level at time T_2. More specifically, profile **810**-C generally suggests, for example, that the associated user liked the beginning portion of the particular digital content less than the end portion.

[0075] Profiles **810**-B and **810**-C may be generated, based on multiple comments received from the user. Profiles **810**-B and **810**-C may also be generated by statistically analyzing comments associated with particular preference levels **820** and particular times **830** to generate a curve associated with profiles **810**-B and **810**-C. For example, curve fitting techniques may be used to construct a curve, or mathematical function, that has the best fit to a series of data points associated with the comments. Curve fitting may include, for example, performing interpolation to connect the data points, smoothing to construct a curve that best fits the data points, and/or extrapolation to determine a fitted curve beyond the range of the observed data (e.g., estimating preferences levels associated with portions of the digital content in which the user did not submit comments).

[0076] Profiles **810**-B and **810**-C may also be generated using other types of statistical techniques, such as regression analysis. For example, interface **100** may request the user to rank or judge different sections of the digital content.

[0077] Returning to process **600** in FIG. **6**, users may be clustered based on the preference profiles (block **640**). For example, users liking similar portions of the digital content may be clustered together. Similarly, users who like/dislike different portions of the same digital content may be separated into different clusters (even if the separated users generally like particular digital content). For example, a particular user who likes a beginning portion of the digital content and dislikes an end portion of the digital content may be clustered (or grouped) with the user associated with preference profile **810**-B depicted in FIG. **8**B. On the other hand, this particular user (who likes a beginning portion of the digital content and dislikes an end portion of the digital content) may not be clustered with the user associated with preference profile **810**-C depicted in FIG. **8**C (who liked the end portion of the digital content more than the beginning portion of the digital content).

[0078] Recommendation device **240** may compare two preference profiles **810** based on, for example, a difference between preference levels **820** of the two preference profiles **810** at similar times **830**. Recommendation device **240** may

cluster the two preference profiles **810** when the two preference profiles **810** differ by less than a threshold amount.

[0079] Thus, users liking particular digital content may be clustered into different groups if, for example, the user liked different portions of the particular digital content. In the example of an action/comedy movie, users positively commenting on comedic portions of the movie may be clustered in one group, and users positively commenting on action portion sections of the movie may be clustered in another group.

[0080] Clustering in block **640** may be further based on comparing preference profiles **810** associated with multiple digital contents. Recommendation device **240** may determine differences between first preference profiles **810** associated with a first user, and second preference profiles **810** associated with a second user. For example, preference scores for portions of the digital content may be determined for the first user and may be compared to preference scores determined for the second user. The first user and the second user may be clustered when the distance between the first and second preference profiles **810** (e.g., a total or average difference in the preference scores) is less than a threshold amount.

[0081] Referring again to process **500** in FIG. **5**, recommendation device **240** may recommend other digital content to the user based on the clustering (block **540**). For example, recommendation device **240** may identify digital content receiving positive comments from users included in a cluster.

[0082] In the example of table **400** in FIG. **4** (in which User A is clustered with User B based on the similarities in the preferences of User A and User B with respect to Movies **1-3**), Movie **4** may be recommended to User A based on User B's positive comments regarding this digital content.

[0083] FIG. **7** is a flow diagram of an exemplary process **700** for determining digital content to recommend to a user based on the user's comments regarding other digital content in block **540**. In one implementation, process **700** may be performed by recommendation device **240**. In other implementations, process **700** may be performed using recommendation device **240** and one or more other devices.

[0084] Process **700** may include identifying candidate digital contents that may be included in a recommendation to a user (block **710**). In block **710**, recommendation device **240** may identify, for example, digital content that have not been used, viewed, and/or commented upon by a user, but have been used and/or commented upon by other users in a cluster.

[0085] In the example of table **400** shown in FIG. **4**, Movie **4** and Movie **5** may be identified as possible candidate digital contents to recommend to User A, because no preference entries **430** are associated with User A with respect to these digital contents. Moreover, if User A and User B are grouped in a cluster (based on, for example, the similarities between User A and User B's preferences with respect to Movies **1-3** as reflected by preference entries **430**-A-**1** through **430**-A-**3** and preference entries **430**-B-**1** through **430**-B-**3**), Movie **4** and Movie **5** may be selected as candidate digital contents based on User B submitting comments related to Movie **4** and Movie **5** (as reflected by preference entries **430**-B-**4** and **430**-B-**5**).

[0086] In another implementation, the candidate digital contents identified in block **710** may correspond to digital content available through a service provider, a content provider, a merchant, etc. For example, recommendation device **240** may identify digital content that are available to a user and have not been previously accessed by the user. Referring to FIG. **2**, recommendation device **240** may interface with content device **220** to identify digital content that are available to but not previously accessed by client device **210**.

[0087] Continuing with FIG. **7**, process **700** may also include identifying preferences of other users with respect to the candidate digital contents (block **720**). In block **720**, recommendation device **240** may determine users that like the candidate digital contents and other users that dislike the candidate digital contents. For example, recommendation device **240** may evaluate comments from the other users regarding the candidate digital contents. Recommendation device **240** may evaluate the comments in similar manner to determining a user's preferences regarding digital content based on received comments in block **520** of FIG. **5** (e.g., by determining whether the comments include approving or disapproving words.

[0088] Continuing with process **700** in FIG. **7**, recommendation device **240** may rank candidate digital contents at least partially based on the preferences (block **730**). For example, recommendation device **240** may rank the candidate digital contents based on the number or percentage of members of a cluster that like or dislike the candidate digital contents.

[0089] In one implementation, recommendation device **240** may rank the candidate digital contents based on the degree of similarity between the preferences of the user and another user that liked or used the candidate digital contents. For example, returning to the example of table **400** in FIG. **4**, if User A and User B share similar opinions in 95% of the digital content, Movie **4** (liked by User B, as reflected by preference entry **430**-B-**4**) may be ranked based on a 95% weight. Similarly, if User A and User C share similar opinions in 65% of the digital content, Movie **5** (liked by User C as reflected by preference entry **430**-C-**5**) may be ranked based on a 65% weight. Continuing with this example, if User B and User C both like particular digital content (e.g., a Movie **6** this is not depicted in FIG. **4**), Movie **6** may be associated with a composite weight of 95%+65%, or 160%. Thus, Movie **4** may be ranked higher than Movie **5** (since User A appears to share User's B's tastes more than User C), and Movie **6** may be ranked higher than either Movie **4** or Movie **5** since Movie **6** is more universally liked.

[0090] In another implementation, candidate digital contents may be ranked in block **730** based on additional factors. For example, a user may submit a query (e.g., query entry box **134** in FIG. **1**), and the candidate digital contents may be further ranked based on their relative relevance to the query. For example, if a user submits a query identifying a particular performer, the candidate digital contents may be further weighted and ranked based on whether the performer appears within the digital content.

[0091] Candidate digital contents may be ranked in block **730** also based on relationships between the users. For example, a user may define a relationship with another user, and the ranking of candidate digital contents associated with the other user may be adjusted based on the relationship. For example, a user may manually designate another user as a reliable source whose recommendations should be boosted in the rankings, or as an unreliable source whose recommendations should be lowered in the rankings. Recommendation devices **240** may also determine the relationships between the users dynamically. For example, the ranking of candidate digital contents associated with another user that is an acquaintance (e.g., connected to the user via social media,

included as a stored contact, etc.) may be boosted relative to other candidate digital contents associated with another user who is not an acquaintance.

[0092] In another implementation, candidate digital contents may be ranked in block **730** further based on demographic information or other information associated with the commenting users. For example, if recommendation device **240** is generating a recommendation for a user in a certain age group and living in a particular geographic region, candidate digital contents associated with other users in the age group and the particular geographic region may be ranked higher than other candidate digital contents associated users in other age groups and/or other geographic regions. In another example, a topic of interest associated with the user may be determined (e.g., based on the user's prior purchases of digital content), and the candidate digital contents may be ranked such that digital content associated with the topic of interest are ranked higher relative to other candidate digital contents.

[0093] In another implementation, recommendation device **240** may rank the candidate digital contents in block **730** further based on other factors. For example, if a service provider is promoting a particular digital content (e.g., digital content from a particular content provider), recommendation device **240** may rank the promoted digital content higher relative to other candidate digital contents.

[0094] Continuing with process **700** in FIG. **7**, recommendation device **240** may select a subset of the candidate digital contents based on the ranking (block **740**). For example, recommendation device **240** may forward to client device **210**, a recommendation **132** identifying a particular quantity of the top-ranked candidate digital contents.

[0095] While a series of blocks has been described with respect to FIGS. **5-7**, the order of the blocks in FIGS. **5-7** may be modified in other implementations. Further, non-dependent blocks may be performed in parallel. Furthermore, FIGS. **5-7** show exemplary blocks of processes **500-700**, and in other implementations, processes **500-700** may include fewer blocks, different blocks, differently arranged blocks, or additional blocks than depicted in FIGS. **5-7**.

[0096] It will be apparent that different aspects of the description provided above may be implemented in many different forms of software, firmware, and hardware in the implementations illustrated in the figures. The actual software code or specialized control hardware used to implement these aspects is not limiting of the implementations. Thus, the operation and behavior of these aspects were described without reference to the specific software code—it being understood that software and control hardware can be designed to implement these aspects based on the description herein.

[0097] Even though particular combinations of features are recited in the claims and/or disclosed in the specification, these combinations are not intended to limit the disclosure of the possible implementations. In fact, many of these features may be combined in ways not specifically recited in the claims and/or disclosed in the specification. Although each dependent claim listed below may directly depend on only one other claim, the disclosure of the implementations includes each dependent claim in combination with every other claim in the claim set.

[0098] In the preceding specification, various preferred embodiments have been described with reference to the accompanying drawings. It will, however, be evident that various modifications and changes may be made thereto, and additional embodiments may be implemented, without departing from the broader scope of the invention as set forth in the claims that follow. The specification and drawings are accordingly to be regarded in an illustrative rather than restrictive sense.

[0099] No element, act, or instruction used in the present application should be construed as critical or essential unless explicitly described as such. Also, as used herein, the article "a" is intended to include one or more items. Where only one item is intended, the term "one" or similar language is used. Further, the phrase "based on" is intended to mean "based, at least in part, on" unless explicitly stated otherwise.

What is claimed is:

1. A method comprising:

receiving, by a processor, one or more first comments associated with first digital content, wherein the one or more first comments are submitted by a first user;

determining, by the processor, an opinion of the first user with respect to the first digital content based on the one or more first comments, wherein the opinion indicates whether the first user likes or dislikes the first digital content, and wherein determining the opinion of the first user with respect to the first digital content includes:

parsing the one or more first comments to determine a term included in the one or more first comments, and

determining the opinion based on the term;

clustering, by the processor, the first user and a plurality of second users, wherein the plurality of second user share the first user's opinion regarding the first digital content;

identifying, by the processor, second digital content, wherein the second digital content are liked by at least one of the plurality of second users and have not been accessed by the first user; and

providing, by the processor and for presentation to the first user, a recommendation identifying the second digital content.

2. The method of claim **1**, wherein determining the opinion of the first user includes:

determining portions of the first digital content associated with the one or more first comments, and

determining opinions of the first user with respect to the portions of the first digital content.

3. The method of claim **2**, wherein determining the portions of the first digital content includes:

determining times when the one or more first comments are received; and

determining the portions of the first digital content based on the times.

4. The method of claim **2**, wherein a second user, of the plurality of second users, has a similar opinion as the first user with respect to at least one of the portions of the first digital content.

5. The method of claim **2**, wherein identifying the second digital content includes:

identifying a plurality of candidate digital contents, wherein the plurality of candidate digital contents are associated with at least one of the plurality of second users and have not been accessed by the first user; and

selecting the second digital content from the plurality of candidate digital contents based on a comparison of the opinions of the first user with respect to the portions of the first digital content and respective opinions of the plurality of second users with respect to the portions of the first digital content.

6. The method of claim 1, wherein identifying the second digital content includes:
identifying a plurality of candidate digital contents, wherein the plurality of candidate digital contents are liked by at least one of the plurality of second users and have not been accessed by the first user; and
selecting the second digital content from the plurality of candidate digital contents based on a respective quantity of the plurality of second users that like each of the plurality of candidate digital contents.

7. The method of claim 1, further comprising:
receiving one or more second comments associated with the first digital content, wherein the one or more second comments are submitted by the plurality of second users; and
determining opinions of the plurality of second users with respect to the first digital content based on the one or more second comments.

8. A device comprising:
a memory configured to store one or more first comments associated with first digital content, wherein the one or more first comments are submitted by a first user; and
a processor configured to:
parse the one or more first comments to determine a term included in the one or more first comments,
determine an opinion of the first user with respect to the first digital content based on the term,
cluster the first user and a plurality of second users, wherein the plurality of second user share the first user's opinion regarding the first digital content,
identify second digital content, wherein the second digital content are accessed by at least one of the plurality of second users and have not been accessed by the first user, and
provide, for presentation to the first user, a recommendation identifying the second digital content.

9. The device of claim 8, wherein the processor, when determining the opinion of the first user, is further configured to:
identify portions of the first digital content associated with the one or more first comments, and
determine opinions of the first user with respect to the portions of the first digital content.

10. The device of claim 9, wherein the processor, when determining the portions of the first digital content, is further configured to:
determine times when the one or more first comments are received, and
determine the portions of the first digital content based on the times.

11. The device of claim 9, wherein a second user, of the plurality of second users, has a similar opinion as the first user with respect to at least one of the portions of the first digital content.

12. The device of claim 9, wherein the processor, when identifying the second digital content, is further configured to:
identify a plurality of candidate digital contents, wherein the plurality of candidate digital contents are associated with at least one of the plurality of second users and have not been accessed by the first user, and
select the second digital content from the plurality of candidate digital contents based on a comparison of the opinions of the first user with respect to the portions of the first digital content and respective opinions of the plurality of second users with respect to the portions of the first digital content.

13. The device of claim 8, wherein the processor, when identifying the second digital content, is further configured to:
identify a plurality of candidate digital contents, wherein the plurality of candidate digital contents are liked by at least one of the plurality of second users and have not been accessed by the first user, and
select the second digital content from the plurality of candidate digital contents based on a respective quantity of the plurality of second users that like each of the plurality of candidate digital contents.

14. The device of claim 8, wherein the processor is further configured to:
receive one or more second comments associated with first digital content, wherein the one or more second comments are submitted by the plurality of second users, and
determine opinions of the plurality of second users with respect to the first digital content based on the one or more second comments.

15. A non-transitory computer-readable medium to store instructions comprising:
one or more instructions that, when executed by a processor, cause the processor to:
identify one or more first comments associated with first digital content, wherein the one or more first comments are submitted by a first user,
parse the one or more first comments to determine an opinion of the first user with respect to the first digital content,
cluster the first user and a plurality of second users, wherein the plurality of second user share the first user's opinion regarding the first digital content,
identify second digital content, wherein the second digital content are accessed by at least one of the plurality of second users and have not been accessed by the first user, and
provide, for presentation to the first user, a recommendation identifying the second digital content.

16. The non-transitory computer-readable medium of claim 15, wherein the one or more instructions to determine the opinion of the first user further include:
one or more instructions to:
determine portions of the first digital content associated with the one or more first comments, and
determine opinions of the first user with respect to the portions of the first digital content.

17. The non-transitory computer-readable medium of claim 16, wherein the one or more instructions to determine the portions of the first digital content further include:
one or more instructions to:
determine times when the one or more first comments are received, and
determine the portions of the first digital content based on the times.

18. The non-transitory computer-readable medium of claim 16, wherein the one or more instructions to identify the second digital content further include:
one or more instructions to:
identify a plurality of candidate digital contents, wherein the plurality of candidate digital contents are

associated with at least one of the plurality of second users and have not been accessed by the first user, and

select the second digital content from the plurality of candidate digital contents based on a comparison of the opinions of the first user with respect to the portions of the first digital content and respective opinions of the plurality of second users with respect to the portions of the first digital content.

19. The non-transitory computer-readable medium of claim **15**, wherein the one or more instructions to identify the second digital content further include:

one or more instructions to:

identify a plurality of candidate digital contents, wherein the plurality of candidate digital contents are liked by at least one of the plurality of second users and have not been accessed by the first user, and

select the second digital content from the plurality of candidate digital contents based on a respective quantity of the plurality of second users that like each of the plurality of candidate digital contents.

20. The non-transitory computer-readable medium of claim **15**, wherein the instructions further include:

one or more instructions to:

receive one or more second comments associated with first digital content, wherein the one or more second comments are submitted by the plurality of second users, and

determine opinions of the plurality of second users with respect to the first digital content based on the one or more second comments.

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