IMAGE RECOGNITION METHOD AND APPARATUS BASED ON AUGMENTED REALITY

CLAIM OF PRIORITY

This application claims priority to Chinese Patent Application No. 201710018395.1 filed on January 11, 2017, and U.S. Patent Application No. 15/864,572, filed on January 8, 2018, the entire contents of which are hereby incorporated by reference.

Technical Field

The present application relates to the field of augmented reality, and in particular, to an image recognition method and apparatus based on augmented reality.

Background Art

Augmented Reality (AR) technology is a technology that superposes a corresponding picture, video, and 3D model on an image by calculating a location and an angle of the image in real time, to fuse a virtual world with a real world. An AR client terminal may recognize images in an offline environment of a user in real time by using picture recognition materials locally stored in the AR client terminal, and display, according to a pre-configured presentation effect, corresponding presentation data in an augmented manner on a location of a recognized specific offline target in a real sceanrio. However, as the AR technology developes continuously and AR scenes become increasingly abuandant, a computation amount of an AR client terminal also increases day by day. A large amount of computation causes the AR client terminal to consume power fast and abnormally heat up. Therefore, how to reduce the computation amount of the AR client terminal is one of problems to be urgently solved in this industry.

Summary of the Invention

The present application provides an image recognition method based on augmented reality, where the method is applied to an augmented reality server terminal, and includes:

gathering user information uploaded by an augmented reality client terminal;

screening out picture feature samples associated with the user information from a preset picture feature sample library; and

generating, on the basis of the screened-out picture feature samples, a picture feature sample sub-library corresponding to the user information, and pushing the picture feature sample sub-library to the augmented reality client terminal, so that during image scanning in an offline environment of the user, the augmented reality client terminal performs image recognition on the scanned image information on the basis of the picture feature sample sub-library.

The present application further provides an image recognition apparatus based on augmented reality, where the apparatus is applied to an augmented reality server terminal, and includes:

The present application further provides an image recognition apparatus based on augmented reality, where the apparatus is applied to an augmented reality server terminal, and includes:

a gathering module configured to gather user information uploaded by an augmented reality client terminal;

a screening module configured to screen out picture feature samples associated with the user information from a preset picture feature sample library, where the picture feature sample library includes an association relationship between the picture feature samples and the user information; and

a pushing module configured to generate, on the basis of the screened-out picture feature samples, a picture feature sample sub-library corresponding to the user information; and push the picture feature sample sub-library to the augmented reality client terminal, so that during image scanning in an offline environment of the user, the augmented reality client terminal performs image recognition on the scanned image information on the basis of the picture feature sample sub-library.

In the present application, an augmented reality server terminal gathers user information uploaded by an augmented reality client terminal, screens out picture feature samples associated with the user information from a preset picture feature sample library, generates a picture feature sample sub-library corresponding to the user information on the basis of the screened-out picture feature samples, and then pushes the picture feature sample sub-library to the augmented reality client terminal, so that during image scanning in an offline environment of a user, the augmented reality client

terminal performs image recognition on the scanned image information on the basis of the picture feature sample sub-library. Because the augmented reality server terminal screens the picture feature sample library on the basis of the user information, the number of picture recognition materials pushed by the augmented reality server terminal to the augmented reality client terminal and the number of picture recognition materials used when the augmented reality client terminal performs image recognition can be significantly reduced, thus reducing the computation amount of the augmented reality client terminal, and improving the image recognition efficiency of the augmented reality client terminal.

Brief Description of the Drawings

FIG. 1 is a processing flowchart of an image recognition method based on augmented reality according to an embodiment of the present application;

FIG. 2 is an architecture diagram of an AR server terminal according to an embodiment of the present application;

FIG. 3 is a logic block diagram of an image recognition apparatus based on augmented reality according to an embodiment of the present application; and

FIG. 4 is a structural diagram of hardware involved in an augmented reality server terminal carrying the image recognition apparatus based on augmented reality according to an embodiment of the present application.

Detailed Description

In the related art, in a process of scanning images in an offline environment of a user, an AR client terminal may usually perform image recognition on the scanned image information in real time by using a pre-configured picture recognition material library. The picture recognition material library includes picture feature samples extracted from a large number of picture samples of offline targets. After the image information is scanned from the offline environment of the user, the AR client terminal may extract a picture feature from the image information by using an image recognition algorithm carried in an AR engine, and then calculate degrees of similarity between the extracted picture feature and the picture feature samples in the picture recognition material library one by one to recognize an offline target in the scanned image information. After image recognition is completed, the AR client terminal may

further calculate a location of the recognized offline target in a real scenario, and then display corresponding presentation data in an augmented manner according to a pre-configured presentation effect.

Currently, during execution of image recognition, the picture recognition material library, presentation data, and a corresponding presentation effect (for example, an animation effect) that need to be used by the AR client terminal are generally pre-configured in an AR service platform, where the presentation data is pre-configured for each offline target in the picture recognition material library and needs to be presented in an associated manner. Before starting the image scanning, the AR client terminal needs to download the pre-configured picture recognition material library as well as the corresponding presentation data and presentation effects from the AR service platform entirely and save them locally.

However, in an actual application, if there are too many materials in the picture recognition material library, a data storage pressure of the AR client terminal will increase on the one hand, and on the other hand, the computation amount of the AR client terminal is rather large during image recognition, thus causing problems of fast power consumption, abnormal heating, and low image recognition efficiency of the AR client terminal.

In view of this, the present application provides an AR server terminal that can flexibly screen out picture recognition materials on the basis of user information uploaded by the AR client terminal and push the screened-out materials to the AR client terminal.

By gathering user information uploaded by the AR client terminal, the AR server terminal screens out picture feature samples associated with the user information from a preset picture feature sample library, generates a picture feature sample sub-library corresponding to the user information on the basis of the screened-out picture feature samples, and then pushes the picture feature sample sub-library to the AR client terminal, so that during image scanning in an offline environment of a user, the AR client terminal performs image recognition on the scanned image information on the basis of the picture feature sample sub-library.

In the whole solution, because the AR server terminal screens the picture feature sample library on the basis of the user information, the number of picture recognition materials pushed by the AR server terminal to the AR client terminal and the number

of picture recognition materials used when the AR client terminal performs image recognition can be significantly reduced, thus reducing the computation amount of the AR client terminal, and improving the image recognition efficiency of the AR client terminal.

The present application is described below by using specific embodiments and with reference to specific application scenarios.

Referring to FIG. 1, FIG. 1 shows an image recognition method based on augmented reality according to an embodiment of the present application. The method is applied to an AR server terminal, and includes the following steps:

Step 101: User information uploaded by an augmented reality client terminal is gathered.

Step 102: Picture feature samples associated with the user information are screened-out from a preset picture feature sample library.

Step 103: A picture feature sample sub-library corresponding to the user information is generated on the basis of the screened-out picture feature samples, and is pushed to the augmented reality client terminal, so that during image scanning in an offline environment of the user, the AR client terminal performs image recognition on the scanned image information on the basis of the picture feature sample sub-library.

The AR client terminal refers to client terminal software developed on the basis of an AR technology or integrated with an AR function. For example, the AR client terminal may be a third-party payment APP integrated with an AR service function. The AR client terminal may perform image scanning on a reality scene in an offline environment of a user by using a carried image scanning tool, and initiate image recognition for a scanned offline target. Further, the AR client terminal performs, by using a front-end AR engine of the AR client terminal, visualization rendering on presentation data which is corresponding to a recognized offline target and pushed by a back-end AR server terminal. The AR client terminal overlays and fuses the rendered presentation data with the reality scene (for example, a reality scene image), and displays, according to a pre-configured presentation effect, the presentation data in an augmented manner on a location corresponding to the recognized offline target in the reality scene.

The presentation data may generally include virtual data that needs to be presented in association with the recognized offline target. The presentation effect may generally include a presentation effect for presenting the presentation data in the reality scene.

For example, if the offline target is a LOGO picture of an offline shop, the presentation data is specifically label data that needs to be presented in association with the LOGO of the offline shop, for example, basic information and discount information of the shop. The presentation effect may specifically include a self-defined special presentation effect used when the label data is presented in association with the LOGO of the shop, for example, a self-defined animation effect, dynamic presentation template, presentation text, or the like.

The AR server terminal may specifically include a server, a server cluster, or a cloud service platform established on the basis of the server cluster, which provides a service for the AR client terminal. For example, when the AR client terminal is a third-party payment APP integrated with an AR service function, the AR server terminal may be a cloud service platform that provides a connection service for the third-party payment APP integrated with the AR service function. The AR server terminal may recognize, on the basis of a back-end AR engine, an image scanned by the AR client terminal (definitely, this image recognition process may also be completed by the AR client terminal by using the front-end AR engine); manage content of virtual data related to an offline service; and push, on the basis of an image recognition result, virtual data related to a recognized offline target to the AR client terminal.

The preset picture feature sample library is the aforementioned picture recognition material library, and generally includes picture feature samples extracted from a large number of sample pictures of offline targets.

The user information may specifically include user data that can be used as a screening dimension for screening the picture feature sample library.

For example, in one shown implementation, the user information may include a location of the user. In such a case, the AR client terminal may upload the location of the user to the AR server terminal in real time. The AR server terminal may screen out, from the picture feature sample library on the basis of the location of the user uploaded by the AR client terminal, picture feature samples from which distances to the user are within a certain range.

For another example, in another shown implementation, the user data may further be behavior logs of the user. In such a case, the AR server terminal may gather the behavior logs of the user uploaded by the AR client terminal, and perform big data analysis on the gathered behavior logs of the user to determine a behavioral preference of the user. Then, the AR server terminal further screens out picture feature samples satisfying the behavioral preference of the user from the picture feature sample library screened out on the basis of the location of the user.

The picture feature sample sub-library refers to a picture feature sample library created by the AR server terminal by using some picture feature samples that are screened-out from the foregoing picture feature sample library on the basis of the user information. The picture feature sample sub-library corresponds to the user information, and is a subset of the picture feature sample library.

For example, in one shown implementation, the user information may include a location of the user and behavior logs of the user. The AR server terminal may preliminarily screen out, from the picture recognition material library on the basis of the location of the user, some picture feature samples from which distances to the location of the user are within a certain range. Meanwhile, the AR server terminal may further perform big data analysis on the gathered behavior logs of the user to determine a behavioral preference of the user, and further screen out, on the basis of the determined behavioral preference of the user, picture feature samples satisfying the behavioral preference of the user from these preliminarily screened-out picture feature samples. Then, the AR server terminal creates the picture feature sample sub-library by using the further screened-out picture feature samples.

By using an example in which the user information includes the location and the behavior logs of the user, the technical solution of the present application is described in detail below with reference to specific embodiments.

The user information being the location and the behavior logs of the user is merely an example herein. Definitely, in an actual application, the user information may further include other user data that can be used as screening dimensions for screening the picture feature sample library. Details are not enumerated one by one in the present application.

In this embodiment, in an initial state, the AR server terminal may actively collect, by using a carried data collection system, picture samples and locations associated with the picture samples, to create a picture recognition material library.

By logging in to a back-end management system carried in the AR server terminal, an operator may configure, for picture feature samples in the picture recognition material library, presentation data that needs to be presented in association with offline targets corresponding to the picture feature samples, and configure presentation effects for the presentation data. Moreover, the operator may further dynamically modify and update the configured presentation data and presentation effects by logging in to the back-end management system carried in the AR server terminal.

When the user uses the AR client terminal, the AR client terminal may collect a location and behavior logs of the user, and then upload them to the AR server terminal in real time. The AR server terminal may gather the location and the behavior logs of the user uploaded by the AR client terminal, and manage the picture recognition materials in the picture recognition material library more flexibly on the basis of the user information and the behavior logs uploaded by the AR client terminal.

On the one hand, the AR server terminal may preliminarily screen out, for the AR client terminal on the basis of the location uploaded by the client terminal, picture feature samples from which distances to the location of the user are less than a preset threshold from the picture recognition material library.

On the other hand, the AR server terminal may perform big data analysis on the gathered behavior logs by using a carried cloud computing system to determine a behavioral preference of the user. Then, the AR server terminal further screens out, on the basis of the determined behavioral preference, picture feature samples satisfying the behavioral preference of the user from the preliminarily screened-out picture feature samples, to create a picture feature sample sub-library for the user, and then pushes the picture feature sample sub-library to the AR client terminal.

This manner can significantly reduce the number of picture recognition materials pushed by the AR server terminal, decrease the computation amount of the AR client terminal during image recognition, and improve the image recognition efficiency of the AR client terminal.

Referring to FIG. 2, FIG. 2 is an architecture diagram of an AR server terminal according to this embodiment.

As shown in FIG. 2, the AR server terminal may specifically be a distributed architecture-based management platform for AR picture recognition materials (referred to as a management platform for short below). Function nodes carried in the management platform may specifically include a cloud service interface, a WEB back-end management portal, a distributed storage system, a back-end management system, a data collection system, a distributed retrieval system, a cloud computing system, an image recognition system, a user data analysis system, a material screening system, a content push system, and the like.

The cloud service interface is a service interface used by the management platform to provide services for an AR client terminal. The AR client terminal may request a corresponding cloud service from the management platform by accessing the service interface. The management platform may further return service data requested by the AR client terminal to the AR client terminal through the service interface.

For example, the cloud service interface may specifically be an HTTP interface. The AR client terminal may establish a corresponding HTTP service request, and submit the established HTTP service request to the management platform by accessing the HTTP interface. The management platform may further return corresponding service data to the AR client terminal on the basis of the HTTP interface.

The WEB back-end management portal is a management portal used by an operator to manually intervene in or update a picture recognition material library as well as related presentation data and presentation effects that are pre-configured in the management platform. The operator may log in to the back-end management system (for example, the operator accesses a portal URL address of the management platform, and then inputs a management account and password to remotely log in to the back-end management system) in a common WEB manner to manage content in the management platform.

The distributed storage system is a data basis of the whole management platform, and is used to store, in a distributed manner, the picture recognition material library as well as data such as presentation data and presentation effects that are pre-configured by the operator for picture feature samples in the picture recognition material library. The distributed storage manner can ensure data reliability. Therefore, the distributed storage system may server as a basis for the reliability of the whole management platform.

The back-end management system is a user platform used by the operator to directly manage the management platform. The back-end management system may provide the operator with visible user interfaces corresponding to various management operations. The operator may perform corresponding management operations in these visible user interfaces, for example, adding a picture feature sample serving as a picture recognition material to the picture recognition material library, deleting a picture feature sample serving as a picture recognition material from the picture recognition material library, updating a picture feature sample serving as a picture recognition material in the picture recognition material library, pre-configuring, for the AR client terminal, presentation data that needs to be presented in association with a recognized offline target and a presentation effect, dynamically updating the configured presentation data and presentation effect according to an actual requirement, and the like.

Definitely, in an actual application, in addition to managing content in the management platform by logging in to the back-end management system, the operator may further intervene in other systems in the management platform by using the back-end management system.

For example, the operator may manually edit and intervene in data analysis logic and parameters of the cloud computing system, and may further edit and adjust a user location stored in association with the picture feature samples in the picture recognition material library, and the like.

The data collection system is mainly used to actively collect data, such as "materials" required by the management platform, from the Internet or a connected third-party server terminal.

In a traditional management platform, picture recognition materials are generally input and edited manually by the operator. Therefore, the data is insufficient. However, in the present application, the management platform may actively collect picture recognition materials from the Internet or the connected third-party server terminal by carrying a data collection system, and store the collected materials in the distributed storage system of the management platform.

Moreover, in addition to actively collecting picture recognition materials, the data collection system may further actively gather behavior logs of the user uploaded by the

AR client terminal to facilitate subsequent big data analysis performed by the cloud computing platform.

The distributed retrieval system is mainly used to retrieve and query data stored in the distributed storage system. The management platform needs to manage a large number of picture recognition materials and data such as locations associated with the picture recognition materials, presentation data, and presentation effects. Therefore, for ease of data retrieval and query, the management platform may carry a distributed retrieval system connected to the distributed storage system. Data needing to be managed in the management platform is retrieved and queried by using the distributed retrieval system, thus ensuring flexibility and stability of data management.

The cloud computing system is used to undertake all data calculations in the management platform. In an actual application, the cloud computing system may be separately connected to the distributed storage system, the user data analysis system, the material screening system, and the image recognition system in the management platform, to undertake all data calculations of the distributed storage system, the user data analysis system, the material screening system, and the image recognition system, thus improving the data processing efficiency of the management platform.

The data analysis logic carried in the cloud computing system may be manually set by the operator by using the back-end management system, and is not particularly limited in the present application.

The image recognition system is used to provide a cloud image recognition service for the AR client terminal. The image recognition system may be connected to the cloud computing platform, extract, by using the cloud computing platform, a picture feature from image data uploaded by the AR client terminal, and calculate degrees of similarity between the extracted picture feature and the picture feature samples in the picture recognition material library one by one to complete image recognition for the image data.

The user data analysis system is used to perform big data analysis on the behavior logs of the user gathered by the collection system. The image recognition system may be connected to the cloud computing platform, and perform, by using a big data analysis algorithm carried in the cloud computing platform, the big data analysis on the behavior logs of the user gathered by the collection system, to obtain a behavioral preference of the user.

The big data analysis algorithm carried in the cloud computing platform may also be manually set by the operator by using the back-end management system, and is not particularly limited in the present application.

The material screening system is used to screen out, from the picture recognition material library stored in the distributed storage system, picture feature samples associated with user information uploaded by the AR client terminal. The material screening system may be connected to the cloud computing platform. The material screening system separately calculates, by using the cloud computing platform, distances between locations associated with the picture feature samples in the picture recognition material library and the location of the user, and preliminarily screens out, from the foregoing picture feature sample library, some picture feature samples from which the distances to the location of the user are less than a preset threshold.

After the big data analysis is performed on the gathered behavior logs of the user by using the cloud computing platform, the material screening system determines a behavioral preference of the user, further screens out picture feature samples satisfying the behavioral preference of the user from these preliminarily screened-out picture feature samples, and then creates the picture feature sample sub-library on the basis of the further screened-out picture feature samples.

The content push system is used to push, to the AR client terminal, the picture feature sample sub-library created by the material screening system on the basis of the screened-out picture feature samples.

When the AR client terminal successfully recognizes an offline target corresponding to any picture feature sample in the picture feature sample sub-library, the content push system pushes, to the AR client terminal, presentation data and a presentation effect that are stored in association with the picture feature sample in the distributed storage system. The AR client terminal displays, on the basis of the presentation effect, the presentation data in an augmented manner on a location corresponding to the recognized offline target in an AR scene.

The technical solution of the present application is described in detail below by using the foregoing function nodes shown in FIG. 2 as an example and with reference to three stages: creation of a picture feature sample library, screening of picture feature samples, and image recognition.

It should be noted that, the architecture of the AR server terminal shown in FIG. 2 is merely an example, and is not intended to limit the present application. Definitely, in an actual application, those skilled in the art may functionally integrate the function nodes shown in FIG. 2 according to an actual requirement (for example, combine multiple function nodes into one function node), or may further functionally subdivide the function nodes shown in FIG. 2 (for example, subdivide any function node into multiple function nodes). Details are not enumerated in the present application.

1) Creation of a picture feature sample library

In this embodiment, an operator may manually add corresponding picture feature samples and associated locations to a picture recognition material library by logging in to a back-end management system. In addition to this manner, a management platform may further actively collect picture samples and locations associated with the picture samples by using a carried data collection system.

In one shown implementation, the data collection system may actively collect picture samples and locations associated with the picture samples from numerous online service data on the Internet in a manner such as an Internet crawler.

In another shown implementation, in addition to actively collecting the picture samples from the numerous online service data, the data collection system may further directly collect picture samples and locations associated with the picture samples from a connected third-party server terminal that stores the picture samples and the locations. For example, the management platform may import picture samples and locations associated with the picture samples that are stored in a connected partner service platform.

It should be noted that, in an actual application, the management platform may use either of the two picture sample collection manners shown above, or may organically combine the foregoing two collection manners. This is not particularly limited in the present application.

In this embodiment, the collected picture samples and associated locations may be all stored in the distributed storage system. The cloud computing system may extract, by using a carried picture feature extraction algorithm, picture features from the picture samples stored in the distributed storage system, and then create the picture recognition material library in the distributed storage system on the basis of the extracted picture features and the locations associated with the picture samples. In this

case, information stored in the created picture recognition material library includes the extracted picture features corresponding to the picture samples and the locations associated with the picture samples.

After the picture recognition material library is created, the operator may access a portal URL address of the management platform by using a WEB browser, and then input a management account and password to remotely log in to the back-end management system to manage content in the management platform.

Upon successfully logging in to the back-end management system, the operator may perform a corresponding management operation in a visible user interface provided by the back-end management system to configure, for each picture feature sample in the picture recognition material library, presentation data that needs to be presented in association with an offline target corresponding to the picture feature sample and configure a presentation effect for the presentation data.

The back-end management system may acquire the presentation data and the presentation effect that are configured by the operator, and store the acquired presentation data and presentation effect in association with corresponding picture feature sample in the picture recognition material library, to facilitate retrieval.

In addition, the operator may further perform a corresponding update operation on the configured presentation data and presentation effect in a visible user interface provided by the back-end management system to dynamically update the configured presentation data and presentation effect. In response to the update operation of the operator, the back-end management system may query the picture recognition material library for a corresponding picture feature sample by using the distributed retrieval system, and update, on the basis of presentation data and a presentation effect that are re-configured by the operator, the original presentation data and presentation effect that are stored in association with the picture feature sample.

In this manner, the operator may dynamically update, by logging in to the back-end management system, presentation data and presentation effects stored in association with the picture feature samples in the picture recognition material library at any time according to an actual requirement, thus improving management flexibility of the presentation data and the presentation effects.

2) Screening of picture feature samples

In this embodiment, when a user uses an AR client terminal, the AR client terminal may collect a location and behavior logs of the user, and then upload the collected location and behavior logs of the user to the management platform in real time by accessing the cloud service interface. The management platform may gather, by using the carried data collection system, the location and the behavior logs of the user uploaded by the AR client terminal, and more flexibly manage picture recognition materials in the picture recognition material library on the basis of the user information and behavior logs uploaded by the AR client terminal.

On the one hand, the material screening system may be connected to the cloud computing system, and the cloud computing system undertakes all data screening calculations. The cloud computing system may calculate in real time distances between the location of the user uploaded by the AR client terminal and locations associated with the picture feature samples in the picture recognition material library. After the cloud computing system completes the calculation, the material screening system may preliminarily screen out picture feature samples from which the distances to the location of the user are less than a preset threshold. In this case, a preliminary screening on the picture recognition material library is completed.

For example, an application scenario in which the picture recognition material library stores picture feature samples extracted from a large number of offline shop LOGOs and the user performs daily scanning in the offline shops by using the AR client terminal is used as an example. Before the user scans a LOGO of an offline shop by using the AR client terminal, the AR client terminal may upload a location of the user to the management platform in real time. The management platform may screen out, from the picture recognition material library on the basis of the location of the user, LOGO pictures of merchants in a particular range near the user to generate a picture feature sample sub-library for the user, thus reducing the number of LOGO pictures that need to be pushed to the AR client terminal.

On the other hand, the user data analysis system may also be connected to the cloud computing system. The cloud computing system undertakes all data analysis calculations. The cloud computing system may perform, on the basis of a carried big data analysis algorithm, big data analysis on the behavior logs of the user gathered by the data collection system to determine a behavioral preference of the user.

The behavioral preference specifically refers to a specific usage habit or usage rule formed during daily use of the AR client terminal by the user.

For example, the foregoing application scenario in which the picture recognition material library stores picture feature samples extracted from a large number of offline shop LOGOs and the user performs daily scanning in the offline shops by using the AR client terminal is still used as an example. The AR client terminal may locally record related behavior data generated each time when the user scans the offline shop, generate corresponding log files, and upload all the log files to the management platform. The management platform may perform big data analysis on the gathered log files by using the cloud computing platform to further analyze a preference of the user for the offline shops. For example, upon analysis, it is learned that in daily life, the user prefers an offline shop offering a coupon and an offline shop selling low-price commodities.

After the management platform determines the behavioral preference of the user by means of big data analysis on the behavior logs, in order to further reduce the number of the preliminarily screened-out picture feature samples and decrease the number of picture recognition materials to be pushed, the material screening system may further screen out picture feature samples satisfying the behavior preference of the user from the preliminarily screened-out picture feature samples.

For example, the foregoing application scenario in which the picture recognition material library stores picture feature samples extracted from a large number of offline shop LOGOs and the user performs daily scanning in the offline shops by using the AR client terminal is still used as an example. Assuming that the management platform learns by analysis that a daily behavioral preference of the user is "an offline shop offering a coupon" and "an offline shop selling low-price commodities", the material screening system may further search, by accessing related information of offline shops corresponding to these preliminarily screened-out picture feature samples, for an offline shop that can offer a coupon to the user and an offline shop selling low-price commodities. Then, the material screening system further screens out picture feature samples corresponding to these offline shops.

Upon screening out the picture feature samples satisfying the behavioral preference of the user from these preliminarily screened-out picture feature samples, the management platform may create a picture feature sample sub-library for the user on

the basis of these finally screened-out picture feature samples. Then, the management platform pushes the created picture feature sample sub-library to the AR client terminal by using the content push system.

It should be noted that, when screening the picture features samples in the picture recognition material library, the material screening system performs preliminary screening based on the location of the user and then performs further screening based on the user preference obtained through analysis. However, in an actual application, the material screening system may also directly create the picture feature sample sub-library for the user on the basis of a preliminary screening result without performing further screening based on the user preference obtained through analysis. Details are not described in the present application.

3) Image recognition

In this embodiment, upon receiving the picture feature sample sub-library pushed by the management platform, the AR client terminal may load the picture feature sample sub-library locally. When the user uses the AR client terminal to scan images in an offline environment, the AR client terminal may extract a picture feature from the scanned image information on the basis of an image recognition algorithm carried in a front-end AR engine, and then perform similarity matching between the picture feature and the picture feature samples in the picture feature sample sub-library one by one to complete image recognition on the scanned image information. A specific calculation process in image recognition is not described in detail in this embodiment. Those skilled in the art may refer to the record in related art when carrying out the technical solution recorded in the present application.

In this case, the picture feature samples in the picture feature sample sub-library pushed by the management platform are screened out in a refined manner on the basis of the location and the behavioral preference of the user. Therefore, when performing image recognition on image data scanned from an offline environment of the user, the AR client terminal does not need to successively traverse all picture recognition materials in the picture recognition material library created in the management platform, thus significantly improving the image recognition efficiency of the AR client terminal.

Definitely, in addition to locally performing image recognition on the scanned image information, the AR client terminal may further upload the scanned image

information to the management platform in real time by accessing the cloud server terminal interface. An image recognition system carried in the management platform completes image recognition on the scanned image information on the basis of the picture feature sample sub-library screened-out and created for the user.

In this embodiment, when an offline target corresponding to any picture feature sample in the picture feature sample sub-library is finally recognized from the scanned image information through the image recognition process shown above, the distributed retrieval system may query the distributed storage system for presentation data and a presentation effect that are stored in association with the picture feature sample, and then push the found presentation data and presentation effect to the AR client terminal by using the content push system.

After receiving the presentation data and the presentation effect pushed thereto, the AR client terminal may display, on the basis of the presentation effect, the presentation data in an augmented manner on a location corresponding to the recognized offline target in an AR scene.

It should be noted that, in an actual application, the presentation data and the presentation effect that are stored in association with the picture feature samples in the picture feature sample sub-library may also be pushed by the content push system to the AR client terminal while the content push system pushes the created picture feature sample sub-library. That is, the presentation data and the presentation effect that are configured by the operator may be pushed to the AR client terminal together with the created picture feature sample sub-library, or may be separately pushed after completion of image recognition. This is not particularly limited in the present application.

It can be known from the foregoing embodiments that, the present application provides an AR server terminal that can flexibly screen out picture recognition materials for an AR client terminal on the basis of user information uploaded by the AR client terminal and push the screened-out materials to the AR client terminal.

The AR server terminal can gather the user information uploaded by the AR client terminal, screen out picture feature samples associated with the user information from a preset picture feature sample library, and generate, on the basis of the screened-out picture feature samples, a picture feature sample sub-library corresponding to the user information. Then, the AR server terminal pushes the picture feature sample sub-

library to the AR client terminal, so that during image scanning in an offline environment of a user, the AR client terminal performs image recognition on the scanned image information on the basis of the picture feature sample sub-library.

In the whole solution, because the AR server terminal screens the picture feature sample library on the basis of the user information, the number of picture recognition materials pushed by the AR server terminal to the AR client terminal and the number of picture recognition materials used when the AR client terminal performs image recognition can be significantly reduced, thus reducing the computation amount of the AR client terminal, and improving the image recognition efficiency of the AR client terminal.

The present application further provides an apparatus embodiment corresponding to the foregoing method embodiment.

Referring to FIG. 3, the present application provides an image recognition apparatus 30 based on augmented reality, the apparatus being applied to an AR server terminal. Referring to FIG. 4, a hardware architecture involved in an AR server terminal carrying the image recognition apparatus 30 based on augmented reality generally includes a CPU, a memory, a non-volatile storage device, a network interface, an internal bus, and the like. Using software implementation as an example, the image recognition apparatus 30 based on augmented reality may be generally construed as a software-hardware-combined logic apparatus which is formed after the CPU runs a computer program loaded in the memory. The apparatus 30 includes:

a gathering module 301 configured to gather user information uploaded by an augmented reality client terminal;

a screening module 302 configured to screen out picture feature samples associated with the user information from a preset picture feature sample library; and

a pushing module 303 configured to generate, on the basis of the screened-out picture feature samples, a picture feature sample sub-library corresponding to the user information; and push the picture feature sample sub-library to the augmented reality client terminal, so that during image scanning in an offline environment of the user, the augmented reality client terminal performs image recognition on the scanned image information on the basis of the picture feature sample sub-library.

In this embodiment, the user information includes a location of the user; and

the apparatus 30 further includes:

a collection module 304 (not shown in FIG. 3) configured to collect picture samples stored in a connected third-party server terminal, and locations associated with the picture samples; and/or collect picture samples from online service data on the basis of a preset data collection algorithm, and locations associated with the picture samples; and

a creation module 305 (not shown in FIG. 3) configured to extract picture feature samples from the collected picture samples, and locally create the picture feature sample library on the basis of the extracted picture feature samples and the locations associated with the picture samples.

In this embodiment, the apparatus further includes:

an acquisition module 306 (not shown in FIG. 3) configured to acquire presentation data configured by an operator for the picture feature samples in the picture feature sample library, and presentation effects configured for the presentation data; and

a storage module 307 (not shown in FIG. 3) configured to store the acquired presentation data and presentation effects in association with the picture feature samples in the picture feature sample library, and dynamically update the presentation data and the presentation effects in response to an update operation of the operator.

In this embodiment, the apparatus 30 further includes:

a recognition module 308 (not shown in FIG. 3) configured to receive the scanned image information uploaded by the augmented reality client terminal; and perform image recognition on the image information on the basis of the generated picture feature sample sub-library.

In this embodiment, the pushing module 303 is further configured to:

push, when an offline target corresponding to any picture feature sample in the picture feature sample sub-library is recognized from the image information, presentation data associated with the picture feature sample and a presentation effect associated with the presentation data to the augmented reality client terminal, so that the augmented reality client terminal displays, on the basis of the presentation effect, the presentation data in an augmented manner on a location corresponding to the offline target in an augmented reality scene.

In this embodiment, the screening module 302 is configured to:

calculate distances between the location of the user uploaded by the augmented reality client terminal and locations associated with the picture feature samples in the picture feature sample library; and

screen out, from the picture feature sample library, picture feature samples which have the distances less than a preset threshold.

In this embodiment, the user information further includes behavior logs of the user; and

the screening module 302 is further configured to:

perform big data analysis on the gathered behavior logs of the user to determine a behavioral preference of the user; and

further screen out picture feature samples satisfying the behavioral preference of the user from the picture feature samples which have the distances less than the preset threshold.

The apparatus embodiment basically corresponds to the method embodiment. Therefore, reference may be made to the description of the method embodiment for related portions. The apparatus embodiment described is merely an example, and units described as separate parts may or may not be physically separate. A part displayed as a unit may or may not be a physical unit, that is, the part may be located at one place or distributed on multiple network units. Some or all modules may be selected according to an actual requirement to implement the objective of the solution of the present application. Those of ordinary skill in the art may comprehend and implement the present application without paying creative efforts.

The apparatus, modules, or units illustrated in the foregoing embodiments may be implemented by a computer chip or entity, or a product having a particular function. A typical implementation device is a computer. A specific form of the computer may be a personal computer, a laptop computer, a cellular phone, a camera phone, a smart phone, a personal digital assistant, a media player, a navigation device, an e-mail sending and receiving device, a game console, a tablet computer, a wearable device, or a combination of several of these devices.

Those skilled in the art can easily conceive other implementation solutions of the present application after considering the specification and practicing the invention disclosed herein. The present application is intended to cover any variations, usages, or adaptations of the present application. These variations, usages, or adaptations abide

by general principles of the present application, and include common knowledge or conventional technical means in the art not disclosed in the present application. The specification and embodiments are regarded to be illustrative only, and the real scope and spirit of the present application are indicated by the following claims.

It should be understood that, the present application is not limited to the precise structure which is described above and shown in the accompanying drawings, and various modifications and changes may be made without departing from the scope of the present application. The scope of the present application is limited only by the appended claims.

Described above are merely preferred embodiments of the present application, which are not intended to limit the present application. Any modifications, equivalent replacements or improvements made within the spirit and principle of the present application shall fall within the protection scope of the present application.

CLAIMS

1. A method comprising:

receiving, at a server and from an augmented reality device, user information of a user using the augmented reality device;

generating, by the server, a picture feature sample sub-library corresponding to the user information, including screening out, from a preset picture feature sample library, picture feature samples associated with the user information; and

providing, to the augmented reality device, the picture feature sample sub-library, wherein the picture feature sample sub-library can be configured to be used by the augmented reality device to perform, during image scanning of an offline environment of the user, image recognition of images scanned from the offline environment by using the picture feature sample sub-library.

2. The method of claim 1, wherein the user information comprises a location of the user or behavior logs of the user.

3. The method of claim 2, wherein the user information comprises the location of the user, and wherein the method further comprises:

collecting, from a connected third-party server, first picture samples and first locations associated with the first picture samples;

collecting, from online service data and using a preset data collection algorithm, second picture samples and second locations associated with the second picture samples;

extracting picture feature samples from the first and second picture samples to obtain extracted picture feature samples; and

updating the preset picture feature sample library using the extracted picture feature samples.

4. The method of claim 3, further comprising:

acquiring, from an operator, presentation data and presentation effects configured for the picture feature samples in the preset picture feature sample library;

storing the presentation data and presentation effects in association with the picture feature samples in the preset picture feature sample library; and

dynamically updating the presentation data and the presentation effects in response to an update operation of the operator.

5. The method of claim 4, further comprising:

providing, when an offline target corresponding to any picture feature sample in the picture feature sample sub-library can be recognized from the images, presentation data associated with the picture feature sample and a presentation effect associated with the presentation data to the augmented reality device, so that the augmented reality device displays, based on the presentation effect, the presentation data in an augmented manner on a location corresponding to the offline target in an augmented reality scene.

6. The method of claim 1, further comprising:

receiving, from the augmented reality device, the images; and

performing, on the server, the image recognition on the images based on the picture feature sample sub-library.

7. The method of claim 3, wherein screening out picture feature samples associated with the user information from the preset picture feature sample library comprises:

calculating distances between the location of the user and locations associated with the picture feature samples; and

screening out, from the preset picture feature sample library, picture feature samples which have the distances less than a preset threshold.

8. The method of claim 7, wherein the user information further comprises the behavior logs of the user, and wherein the method further comprises:

performing data analysis on the behavior logs of the user to determine a behavioral preference of the user; and

further screening out picture feature samples satisfying the behavioral preference of the user from the picture feature samples which have the distances less than the preset threshold.

9. A non-transitory, computer-readable medium storing one or more instructions executable by a computer system to perform operations comprising:

receiving, at a server and from an augmented reality device, user information of a user using the augmented reality device;

generating, by the server, a picture feature sample sub-library corresponding to the user information, including screening out, from a preset picture feature sample library, picture feature samples associated with the user information; and

providing, to the augmented reality device, the picture feature sample sub-library, wherein the picture feature sample sub-library can be configured to be used by the augmented reality device to perform, during image scanning of an offline environment of the user, image recognition of images scanned from the offline environment by using the picture feature sample sub-library.

10. The non-transitory, computer-readable medium of claim 9, wherein the user information comprises a location of the user or behavior logs of the user.

11. The non-transitory, computer-readable medium of claim 10, wherein the user information comprises the location of the user, and wherein the operations further comprise:

collecting, from a connected third-party server, first picture samples and first locations associated with the first picture samples;

collecting, from online service data and using a preset data collection algorithm, second picture samples and second locations associated with the second picture samples;

extracting picture feature samples from the first and second picture samples to obtain extracted picture feature samples; and

updating the preset picture feature sample library using the extracted picture feature samples.

12. The non-transitory, computer-readable medium of claim 11, wherein the operations further comprise:

acquiring, from an operator, presentation data and presentation effects configured for the picture feature samples in the preset picture feature sample library;

storing the presentation data and presentation effects in association with the picture feature samples in the preset picture feature sample library; and

dynamically updating the presentation data and the presentation effects in response to an update operation of the operator.

13. The non-transitory, computer-readable medium of claim 12, wherein the operations further comprise:

providing, when an offline target corresponding to any picture feature sample in the picture feature sample sub-library can be recognized from the images, presentation data associated with the picture feature sample and a presentation effect associated with the presentation data to the augmented reality device, so that the augmented reality device displays, based on the presentation effect, the presentation data in an augmented manner on a location corresponding to the offline target in an augmented reality scene.

14. The non-transitory, computer-readable medium of claim 10, wherein the operations further comprise:

receiving, from the augmented reality device, the images; and

performing, on the server, the image recognition on the images based on the picture feature sample sub-library.

15. The non-transitory, computer-readable medium of claim 11, wherein screening out picture feature samples associated with the user information from the preset picture feature sample library comprises:

calculating distances between the location of the user and locations associated with the picture feature samples; and

screening out, from the preset picture feature sample library, picture feature samples which have the distances less than a preset threshold.

16. The non-transitory, computer-readable medium of claim 15, wherein the user information further comprises the behavior logs of the user, and wherein the operations further comprise:

performing data analysis on the behavior logs of the user to determine a behavioral preference of the user; and

further screening out picture feature samples satisfying the behavioral preference of the user from the picture feature samples which have the distances less than the preset threshold.

17. A computer-implemented system, comprising:

one or more computers; and

one or more computer memory devices interoperably coupled with the one or more computers and having tangible, non-transitory, machine-readable media storing one or more instructions that, when executed by the one or more computers, perform operations comprising:

receiving, at a server and from an augmented reality device, user information of a user using the augmented reality device;

generating, by the server, a picture feature sample sub-library corresponding to the user information, including screening out, from a preset picture feature sample library, picture feature samples associated with the user information; and

providing, to the augmented reality device, the picture feature sample sub-library, wherein the picture feature sample sub-library can be configured to be used by the augmented reality device to perform, during image scanning of an offline environment of the user, image recognition of images scanned from the offline environment by using the picture feature sample sub-library.

18. The computer-implemented system of claim 17, wherein the user information comprises a location of the user or behavior logs of the user.

19. The computer-implemented system of claim 18, wherein the user information comprises the location of the user, and wherein the operations further comprise:

collecting, from a connected third-party server, first picture samples and first locations associated with the first picture samples;

collecting, from online service data and using a preset data collection algorithm, second picture samples and second locations associated with the second picture samples;

extracting picture feature samples from the first and second picture samples to obtain extracted picture feature samples; and

updating the preset picture feature sample library using the extracted picture feature samples.

20. The computer-implemented system of claim 19, wherein the operations further comprise:

acquiring, from an operator, presentation data and presentation effects configured for the picture feature samples in the preset picture feature sample library;

storing the presentation data and presentation effects in association with the picture feature samples in the preset picture feature sample library; and

dynamically updating the presentation data and the presentation effects in response to an update operation of the operator.