

Method and Device of Target Object Recognition on Machine Side in Human-Machine Interaction

This application is a continuation of International Application No. PCT/CN2012/076596, filed on June, 7, 2012, which claims priority to Chinese Patent Application No. 201110204966.3, entitled “method and apparatus for recognizing target object at machine side in human-machine interaction” and filed on July, 21, 2011, the entire contents of all of which are incorporated herein by reference in their entirety for all purposes.

Technical Field

The present disclosure relates to human-machine interaction technologies, and more particularly, to a method and apparatus for recognizing a target object at a machine side in human-machine interaction.

Background

Currently, in various Internet services providing human-machine interaction services, e.g. virtual community services, a target object is always identified by using pure characters at a machine side. The target object may be a certain person or a certain thing, and the certain person is taken as an example in the following descriptions. For example, a certain person may be identified by combining a specific symbol with a name or designation, so as to quickly locate an information page of the person or provide other human-machine interaction operations. However, the Internet provided by the machine side includes texts and a lot of picture data. The certain person or certain thing is increasingly represented by using a picture. The following problems are caused when the target object is still identified by using pure characters.

The characters for recognizing the target object cannot be associated with a picture including the target object. For example, when the user wants to recognize a person from a picture of the machine side, the user needs to search text introduction page related to the picture and then determine or presume who is the person in the picture. On the one hand, the information provided by the machine side is monotonous and it is not convenient for the user to recognize a certain target object from vast amounts of text data and picture data at the machine side. In most cases, the user cannot recognize the target object from

the pictures successfully, hence human-machine interaction experiences of the user is bad. On the other hand, the user has to perform more human-machine interaction operations to obtain more text information to recognize the target object from the pictures. Each human-machine interaction operation includes sending request information, triggering a compute procedure and generating response information, and thus a great deal of resources at the machine side, e.g. client resources, server resources and network bandwidth resources are occupied. Especially, when one picture includes multiple target objects, e.g. the picture includes multiple persons, the procedure of recognizing the person by using the pure characters is more complicated, and more human-machine interaction operations are needed and more resources at the machine side are occupied.

Summary

Examples of the present disclosure provide a method and apparatus for recognizing a target object at a machine side in human-machine interaction, so that it is convenient for a user to recognize a target object from a picture and reduce occupancy of resources at the machine side.

The technical solutions of the present disclosure are implemented as follows.

A method for recognizing a target object at a machine side in human-machine interaction, applied to recognize a target object in a target picture at a machine side includes: recognizing processing and displaying processing;

the recognizing processing comprises:

superimposing a graphic tag on a target object in a target picture according to an instruction sent by a user, determining a display parameter of the graphic tag;

adding identifier information for the graphic tag; and

storing the display parameter of the graphic tag and the identifier information of the graphic tag in a storage medium related to the target picture;

the displaying processing comprises:

displaying the target picture;

obtaining the display parameter of the graphic tag and the identifier information of the graphic tag from the storage medium related to the target picture;

displaying the graphic tag on the target object in the target picture according to the display parameter of the graphic tag; and

displaying the identifier information of the graphic tag.

An apparatus for recognizing a target object at a machine side in human-machine interaction includes:

a graphic tag superimposing module, configured to superimpose a graphic tag on a target object in a target picture according to an instruction sent by a user; and determine a display parameter of the graphic tag;

an identifier information adding module, configured to add identifier information for the graphic tag;

a storage controlling module, configured to store the display parameter of the graphic tag and the identifier information of the graphic tag in a storage medium related to the target picture;

a first displaying module, to display the target picture; and

a second displaying module, to configured obtain the display parameter of the graphic tag and the identifier information of the graphic tag from the storage medium related to the target picture; display the graphic tag on the target object in the target picture according to the display parameter of the graphic tag; and display the identifier information of the graphic tag.

A storage medium stores computer program for executing the above method.

According to the solutions of the present disclosure, the target object is recognized by using the graphic tag on the target picture displayed at the machine side, and the identifier information is added, so that the identifier information of the target object is associated with the picture including the target object, so as to make it convenient for the user to recognize the target object from the picture, reduce the number of human-machine interaction operations, thereby reducing occupancy of resources at the machine side and facilitating the operation of the user.

Brief Description of the Drawings

Figure 1 is a schematic flowchart illustrating a method according to various examples of the present invention.

Figures 2a to 2k are schematic diagrams illustrating interfaces of “circling a person”

according to various examples of the present invention.

Figure 3 is a schematic diagram illustrating an apparatus according to various examples of the present invention.

Figure 4 is a schematic diagram illustrating an apparatus according to various examples of the present invention.

Detailed Description

The following description is merely illustrative in nature and is in no way intended to limit the disclosure, its application, or uses. The broad teachings of the disclosure can be implemented in a variety of forms. Therefore, while this disclosure includes particular examples, the true scope of the disclosure should not be so limited since other modifications will become apparent upon a study of the drawings, the specification, and the following claims.

Figure 1 is a schematic flowchart illustrating a method according to various examples of the present invention. As shown in Figure 1, in the method, a target object is recognized in a target picture at a machine side, and recognizing processing and displaying processing are included.

The recognizing processing is as follows.

At 101, a graphic tag is superimposed on a target object in a target picture according to an instruction sent by a user. In the example, the graphic tag may be any graphic, e.g. a rectangle or a circle. A display parameter of the graphic tag is determined. In the example, the display parameter may include a size of the graphic tag and location coordinates of the graphic tag on the target picture.

At 102, identifier information is added for the graphic tag. The identifier information may be generated according to an instruction sent by the user. The identifier information may be an identifier of the target object, e.g. a name or a code name, or comment information corresponding to the target object, so as to implement a local comment function.

At 103, the display parameter of the graphic tag and the identifier information of the

graphic tag are stored in a storage medium related to the target picture.

The displaying processing is as follows.

At 104, the target picture is displayed.

At 105, the display parameter of the graphic tag and the identifier information of the graphic tag are obtained from the storage medium related to the target picture. The graphic tag is displayed on the target object in the target picture according to the display parameter of the graphic tag, and the identifier information of the graphic tag is also displayed.

For the purpose of improving interactivity, in an example of the present disclosure, the following operations are included in the displaying processing. A comment prompt box is displayed, and comment information submitted by a user having comment permission is received. The comment information is stored in the storage medium related to the target picture, and the comment information is displayed in a web page related to the target picture. The web page related to the target picture may be, e.g. a home information center interface of a user having permission to interact with the recognized target object or a details page of the target picture. The user having the comment permission includes the user sending the instruction in the recognizing processing at 101, an owner of the target picture, the target object recognized in the target picture, a friend of the target object, and etc.

For the purpose of implementing a function of obtaining pictures based on person information, in an example of the present disclosure, the method further includes the following processing. Whether at least two target pictures are superimposed with graphic tags and identifier information of the graphic tags are identical is determined. If at least two target pictures are superimposed with graphic tags and identifier information of the graphic tags are identical, e.g. the same name of a person is added for two graphic tags superimposed on two target pictures respectively, all of the target pictures corresponding to the same identifier information are stored or displayed as a category of target pictures, and the identifier information is taken as identifier information of the category of the target pictures. Therefore, it is convenient for the user to view the target pictures including the same target object.

According to an example, the graphic tag is a geometric pattern and thus may overlap with other graphic tag. Hence, when more than one target object (e.g. persons) are included in one picture, each target object may be recognized and identifier information may be added for each target object. When the target picture includes more than one target object, processing at 101, 102 and 103 are performed for the more than one target object according to instructions of the user respectively, and the graphic tags and the identifier information of the more than one target object are displayed on the target picture.

Further, for the purpose of leading the user to perform recognizing processing by using both the picture and the text, before receiving the instruction from the user, whether there is a face target object is recognized, and a graphic tag is superimposed on the face target object if there is the face target object.

In the following example, the method is implemented in an Internet virtual community at machine side. In the example, a target picture may be stored in any web page capable of displaying a picture in the Internet virtual community at the machine side, e.g. an album page, a “talk” page, a share page, picture content in a blog and etc. According to an example, the “talk” page is a web page for describing mood of a user and may include texts, pictures, video and etc. The target object in the target picture may be a person, e.g. a friend or a classmate of the current user, or a celebrity followed by the current user. The target object may be a thing, e.g. a certified space. The certified space may be a network space provides more specific functions for famous brands, agencies, media, and celebrities. In the example, the person in the target picture is recognized, and operations of recognizing the person in the target picture are called “circling a person”.

Figures 2a to 2k are schematic diagrams illustrating interfaces of “circling a person” according to various examples of the present invention.

Firstly, operations of “circling person” include processing at (11) to (14).

At (11), as shown in Figure 2a, on an information center page or a photo details page of the virtual community album, a “circling a person” button 201 is clicked by a user, and an instruction is sent to the machine side, so as to request an operation interface to perform the “circling a person” operations for a person in a target picture 200. According

to an example, permission to perform the “circling a person” operations may be configured on a specific permission configuration page. The user may configure whether the “circling a person” operation is allowed to be performed for the album, whether the “circling a person” operation needs a second confirmation, persons that will be shown the target picture, and etc.

At (12), as shown in Figure 2b, when the target picture is in a gray status, the user may drag the mouse on the target picture or click a location needed to be circled on the target picture, so as to send a recognizing instruction to the machine side for recognizing a certain target object by superimposing a graphic tag. As shown in Figure 2c, a graphic tag 202 of a rectangular shape is superimposed on the target picture 200, and a target object is recognized, i.e. the target object is a person in the middle of the picture. The graphic tag 202 of other shapes may be used, e.g. a circular shape, an elliptic shape and etc. The size and the location of the graphic tag 202 may be adjusted according to operation instructions of the user. After the adjustment is completed and confirmed, display parameter of the graphic tag 202 may be determined. According to an example, the display parameter may include the size of the graphic tag 202 and coordinates of the graphic tag 202 on the target picture 202.

At (13), as shown in Figure 2c, after the display parameter of the graphic tag 202 are determined, identifier information of the graphic tag is added. For example, the identifier information may be object identifier information, e.g. a name of a person, which may be configured by using a friend selector. In Figure 2c, a friend selector 203 of the user sending the recognizing instruction is shown. The friend selector 203 displays information of users having permission to interact with the user sending the recognizing instruction, e.g. friends, classmates, followed celebrities or certified space users. The friend selector 203 may display identifier information of these users, e.g. avatars, names, schools or company names, so as to facilitate selecting a certain user. The identifier information of the selected user may be taken as the identifier information of the graphic tag corresponding to target object.

In addition, according to an example, a leading function for adding friends is implemented. When a name input into the friend selector does not corresponding to any friend, classmate, or followed celebrity, the user is prompted to input an account of the

user. After the account of the user is verified by a system at the machine side, the user may perform operations for adding a friend.

At (14), as shown in Figure 2d, after adding the identifier information 204, e.g. the name of the friend, the operations of “circle a person” is finished. The user may send a finish instruction. At the machine side, the display parameter of the graphic tag 202 and the identifier information 204 are stored in a storage medium related to the target picture200. The storage medium related to the target picture200 may be a storage medium for storing the target picture, e.g. a local storage server, or may be a storage medium located at a network side. The storage medium located at the network side needs to be associated with the target picture.

Further, there is a procedure of displaying the target picture, and a procedure of notifying the “circling a person” operations is included. According to an example, at least one of the following processing at (21) and (22) may be included.

At (21), dynamic information is generated in the name of the recognized target object to indicate the recognizing processing. The dynamic information is displayed on a web page of a user having permission to interact with the target object, e.g. friends, classmates and followed users. For example, the dynamic information may be displayed on an information center page. The user having the permission to interact with the target object may view the dynamic information corresponding to the identified target object.

As show in Figure 2e, the dynamic information includes the name of the user performing the “circling a person” operation 205, the name of the target object 206, and a thumbnail of the target picture 207. After the thumbnail is clicked, a normal picture is displayed, as shown in Figure 2f. According to an example, the target picture 200 is displayed firstly. The display parameter of the graphic tag and the identifier information of the graphic tag are obtained from storage medium related to the target picture, and the graphic tag 202 is displayed on the target object in the target picture according to the display parameter of the graphic tag, and identifier information 204 of the graphic tag is also displayed. In an example, the identifier information 204 may be displayed near the graphic tag 202 on the target picture, e.g. the location of the identifier information 204 as shown in Figure 2d.

At (22), a dynamic notification is sent to the recognized target object, e.g. the circled person, and an owner of the target picture, e.g. an owner of the photo. The dynamic notification is a notification directly sent to the receiver and is displayed on a page window no matter whether the receiver wants to receive the notification, as shown in Figure 2g. The dynamic notification is used to indicate the recognizing processing. When a view button 208 of the dynamic notification is clicked, a normal picture is displayed, as shown in Figure 2f. According to the example, the target picture 200 is displayed firstly. The display parameter of the graphic tag and the identifier information of the graphic tag are obtained from storage medium related to the target picture, and the graphic tag 202 is displayed on the target object in the target picture according to the display parameter of the graphic tag, and identifier information 204 of the graphic tag is also displayed.

Finally, interaction comment may be provided for the recognized target object in the target picture.

A comment prompt box is displayed. Comment information submitted by a user having comment permission is received. The user having comment permission may be the user performing the “circling a person” operations, the owner of the photo, the target object or the friend of the target object. The comment information is stored in the storage medium related to the target picture and is displayed in a web page related to the target picture. The web page related to the target picture may be, e.g. a home information center interface of the user having permission to interact with the target person, or a details page of the target picture.

According to another example, when a certain user sends comment information, a message is triggered at the “talk” page, and all items of the comment information are stored in the details page of the target picture.

Further, since the target picture 200 includes more than one target object, i.e. three persons, the user may perform the “circling a person” operations described at (11) to (14) repeatedly, and two or three persons may be recognized. In the displaying processing, graphic tags corresponding to the more than one target object and identifier information of each of the graphic tags are displayed on the target picture 200, as shown in Figure 2h.

In addition, when more than one friend of the user are recognized on the same photo,

the dynamic information is sent in the name of the user recognized last, as shown in Figure 2e, and the object identifier information corresponding to other recognized friends is displayed together, as shown in Figure 2i.

Moreover, each time when the user recognizes the person, the system may store the target pictures corresponding to the same object identifier information together, that is, all of the photos in which the same user is recognized are display together, so that a function of obtaining pictures based on person information is implemented and better expansibility of community-based interaction is achieve.

According to the examples, the “circling a person” operations may be applied for many scenes. Besides the album of the user and the album of the friend of the user, the user may also perform the “circling a person” operations on the “talk” page, the blog page, or the shared picture.

According to an example, the “circling a person” operations may be applied for many objects. Besides the friend and classmate of the user, the “circling a person” operations may be performed for the celebrity followed by the user or certified space. If the user does not have the permission to recognize a person, the user may send a request for adding the person as a friend.

In addition, according to an example, when the user uploads a photo or views a photo, if the user does not trigger the “circling a person” operation directly, whether there is a face target object may be determined by recognizing a face of a person according to face recognition technologies. If the photo includes the face target object, a graphic tag is superimposed on the face target object in the photo, so as to lead the user to perform the “circling a person” operations. The face recognition technology may be any conventional technologies.

In the above example, the identifier information added for the graphic tag is the object identifier information, e.g. the name of the person.

According to another example, the identifier information may be comment information, as shown in Figure 2j. After the graphic tag 202 is superimposed on the target object, a comment input box 209 is directly displayed beside the graphic tag 202

and comment information may be input. After the comment information is input and a confirmation instruction is received, in the displaying procedure, comment information 210 is taken as the identifier information and is displayed beside the graphic tag 202, as shown in Figure 2k, or the comment information 210 may be displayed at another location of the web page. According to the example, the function of providing comment for part of the target picture is implemented.

After the user provides comments for a certain target picture, a dynamic notification similar with the dynamic notification at (22) is sent to the owner of the target picture. The dynamic notification is directly sent to the receiver in a one-to-one mode. The dynamic notification is used for indicate the operations of the recognizing process, i.e. the common operations for part of the target picture. The dynamic notification includes a thumbnail and comment information for part of the target picture. After the thumbnail is clicked, a normal picture is displayed.

According to an example, an apparatus for recognizing a target object at a machine side in human-machine interaction is provided. Figure 3 is a schematic diagram illustrating an apparatus according to various examples of the present invention. As shown in Figure 3, the apparatus includes a graphic tag superimposing module 301, an identifier information adding module 302 and a storage controlling module 303, a first displaying module 304 and a second displaying module 305.

The graphic tag superimposing module 301 is to superimpose a graphic tag on a target object in a target picture according to an instruction sent by a user, and determine a display parameter of the graphic tag.

The identifier information adding module 302 is to add identifier information for the graphic tag.

The storage controlling module 303 is to store the display parameter of the graphic tag and the identifier information of the graphic tag in a storage medium related to the target picture.

The first displaying module 304 is to display the target picture.

The second displaying module 305 is to obtain the display parameter of the graphic

tag and the identifier information of the graphic tag from the storage medium related to the target picture, display the graphic tag on the target object in the target picture according to the display parameter of the graphic tag, and display the identifier information of the graphic tag.

Figure 4 is a schematic diagram illustrating an apparatus according to various examples of the present invention.

Besides the components in the example shown in Figure 3, the apparatus further includes a comment module 306. The comment module 306 is to display a comment prompt box, receive comment information submitted by a user having comment permission; store the comment information in the storage medium related to the target picture; and display the comment information in a web page related to the target picture.

The apparatus may further include a picture aggregating module 307. The picture aggregating module 307 is to determine whether at least two target pictures are superimposed with graphic tags and identifier information of the graphic tags are identical. If at least two target pictures are superimposed with graphic tags and identifier information of the graphic tags are identical, the picture aggregating module 307 is to store or display the at least two target pictures as a category of target pictures, and take the identifier information as identifier information of the category of the target pictures.

The graphic tag superimposition module 301 further includes a face recognizing module 308. The face recognizing module 308 is to recognize whether there is a face target object before the instruction sent by the user is received, superimposing a graphic tag on the face target object if there is the face target object.

Each example of the present disclosure may be implemented by data processing program executed by a data processing device, e.g. a computer. The data processing program is included in the examples of the present disclosure. Generally the data processing program stored in storage medium may directly read a program from the storage medium, or may install or copy the program to a storage device of the data processing device (e.g. a hard disk or memory). Thus, the storage medium is included in the examples of the present disclosure. The storage medium may use any recording mode, e.g. page storage medium (e.g. tape), magnetic storage media (e.g. floppy disks, hard

disks, flash), optical storage medium (e.g. CD-ROM), or magnetic-optical storage medium (e.g. MO).

According to an example, a storage medium is also provided, which is to store data processing program to cause a machine to execute a method as described herein.

According to the solutions of the present disclosure, the target object is recognized by using the graphic tag on the target picture displayed at the machine side, and the identifier information is added, so that the identifier information of the target object is associated with the picture including the target object, so as to make it convenient for the user to recognize the target object from the picture, reduce the number of human-machine interaction operations, thereby reducing occupancy of resources at the machine side and facilitating the operation of the user.

Further, comments may be provided after the target object of the target picture is recognized by using the graphic tag. The comment information input by the related user may be stored and displayed. In addition, the identifier information added for the graphic tag may be comment information, so that multiple comments from multiple users for the target object are gathered. Therefore, the user may provide comment information for part of the picture and interactivity is improved, related information of the target object is enriched, and the user may obtain more information of the target object from the same web page. In addition, all of the target pictures corresponding to the same identifier information are stored and display together, it is convenient for the user to view the target pictures corresponding to the same target object. According to the above solutions, the number of human-machine interaction operations for searching for related information of the target object is reduced, and occupancy of resources at the machine side is reduced.

Moreover, since the graphic tag may be overlap with other graphic tags, when the picture includes more than one target object, each target object may be recognized and descriptions are added respectively, so that it is easy for the user to recognize a certain target object from the picture including more than one target object, thereby further facilitating the operation of the user.

When the solutions of the present disclosure are applied for Internet services providing multiple human-machine services, e.g. the virtual community service,

interactivity between persons are improved, it is easy to the user to obtain more intuitive information, the pure text interaction is replaced by parallel text-graphic interaction, less resources are occupied to exchange more information.

The foregoing is only preferred examples of the present invention and is not used to limit the protection scope of the present invention. Any modification, equivalent substitution and improvement are within the protection scope of the present invention.

Claims

1. A method for recognizing a target object at a machine side in human-machine interaction, applied to recognize a target object in a target picture at a machine side, comprising: recognizing processing and displaying processing; wherein

the recognizing processing comprises:

superimposing a graphic tag on a target object in a target picture according to an instruction sent by a user, determining a display parameter of the graphic tag;

adding identifier information for the graphic tag; and

storing the display parameter of the graphic tag and the identifier information of the graphic tag in a storage medium related to the target picture;

the displaying processing comprises:

displaying the target picture;

obtaining the display parameter of the graphic tag and the identifier information of the graphic tag from the storage medium related to the target picture;

displaying the graphic tag on the target object in the target picture according to the display parameter of the graphic tag; and

displaying the identifier information of the graphic tag.

2. The method of claim 1, wherein the displaying processing further comprises:

displaying a comment prompt box;

receiving comment information submitted by a user having comment permission;

storing the comment information in the storage medium related to the target picture;

and

displaying the comment information in a web page related to the target picture.

3. The method of claim 2, wherein the user having comment permission comprises: the user sending the instruction in the recognizing processing, an owner of the target picture, the target object in the target picture, and a friend of the target object.

4. The method of claim 1, further comprising:

determining whether at least two target pictures are superimposed with graphic tags

and identifier information of the graphic tags are identical;

if at least two target pictures are superimposed with the graphic tags and the identifier information of the graphic tags are identical, storing or displaying the at least two target pictures as a category of target pictures, and taking the identifier information as identifier information of the category of the target pictures.

5. The method of claim 1, further comprising:

when the target picture comprises at least two target objects,

performing the recognizing processing for each of the at least two target objects according to instructions of the user respectively;

displaying graphic tags corresponding to the at least two target objects and identifier information of the graphic tags on the target picture, in the displaying processing.

6. The method of claim 1, further comprising:

before the instruction sent by the user is received in the recognizing processing,

recognizing whether there is a face target object;

superimposing a graphic tag on the face target object, if there is the face target object.

7. The method of any of claims 1-6, wherein the identifier information comprises object identifier information or comment information.

8. The method of claim 1, wherein the identifier information is the object identifier information; and

the method further comprises:

after the recognizing processing and before the displaying processing,

generating dynamic information in the name of the target object to indicate the recognizing processing; the dynamic information being displayed on a web page of a user having permission to interact with the target object; the dynamic information comprising a thumbnail of the target picture;

wherein the displaying processing is performed after the thumbnail is clicked.

9. The method of claim 1, wherein the identifier information is the object identifier

information; and

the method further comprises:

after the recognizing processing and before the displaying processing,

sending a dynamic notification to the target object and an owner of the target picture to indicate the recognizing processing;

wherein the displaying processing is performed after the dynamic notification is viewed.

10. The method of claim 1, wherein the identifier information is the comment information; and

the method further comprises:

after the recognizing processing and before the displaying processing, sending a dynamic notification in the name of an trigger of the recognizing processing to an owner of the target picture to indicate the recognizing processing; the dynamic notification comprising a thumbnail of the target picture and the comment information;

wherein the displaying processing is performed after the thumbnail is clicked.

11. An apparatus for recognizing a target object at a machine side in human-machine interaction, comprising:

a graphic tag superimposing module, configured to superimpose a graphic tag on a target object in a target picture according to an instruction sent by a user; and determine a display parameter of the graphic tag;

an identifier information adding module, configured to add identifier information for the graphic tag;

a storage controlling module, configured to store the display parameter of the graphic tag and the identifier information of the graphic tag in a storage medium related to the target picture;

a first displaying module, to display the target picture; and

a second displaying module, to configured obtain the display parameter of the graphic tag and the identifier information of the graphic tag from the storage medium related to the target picture; display the graphic tag on the target object in the target picture according to the display parameter of the graphic tag; and display the identifier information of the graphic tag.

12. The apparatus of claim 11, further comprising:

a comment module, configured to display a comment prompt box; receive comment information submitted by a user having comment permission; store the comment information in the storage medium related to the target picture; and display the comment information in a web page related to the target picture.

13. The apparatus of claim 11, further comprising:

a picture aggregating module, configured to determine whether at least two target pictures are superimposed with graphic tags and identifier information of the graphic tags are identical; if at least two target pictures are superimposed with graphic tags and identifier information of the graphic tags are identical, store or display the at least two target pictures as a category of target pictures, and take the identifier information as identifier information of the category of the target pictures.

14. The apparatus of claim 11, wherein the graphic tag superimposing module further comprises:

a face recognizing module, configured to recognize whether there is a face target object before the instruction sent by the user is received, superimposing a graphic tag on the face target object, if there is the face target object.

15. A storage medium, storing computer program for executing the method as claimed in any of claims 1 to 10.