

# METHOD, APPARATUS AND DEVICE FOR RECOGNITION OBJECT DETERMINATION, AND STORAGE MEDIUM

## CROSS-REFERENCE TO RELATED APPLICATIONS

5   **[0001]**    This application claims priority to Chinese Patent Application 202010983486.0 entitled “METHOD, APPARATUS AND DEVICE FOR RECOGNITION OBJECT DETERMINATION, AND STORAGE MEDIUM” filed on September 17, 2020, the entire contents of which are incorporated herein by reference for all purposes.

## 10   **TECHNICAL FIELD**

**[0002]**    The present disclosure relates to the field of computer vision technologies, and in particular, to a method, an apparatus and a device for recognition object determination, and a storage medium.

## 15   **BACKGROUND**

**[0003]**    Currently, human face recognition is widely used in fields such as production, finance, security, and transportation due to its many features such as accuracy, security, and convenience. For example, human face recognition is used in an attendance check machine, an unmanned retail machine, and an access control system.

20   **[0004]**    However, because a use environment for human face recognition is open, typically, a plurality of human faces appear during human face acquisition, especially in a queuing scenario, for example, a scenario such as face-scanning payment, gate-checking through, and punching in. Therefore, recognition object determination is likely to be incorrect, and the accuracy rate of recognition object determination is low.

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## **SUMMARY**

**[0005]**    Embodiments of the present disclosure provide a method, an apparatus and a device for recognition object determination, and a storage medium, which can improve the accuracy rate of recognition object determination.

30   **[0006]**    In a first aspect, an embodiment of the present disclosure provides a method for recognition object determination. The method includes:

acquiring a capture preview image, where the capture preview image includes at least two human faces;

extracting feature information of each of the at least two human faces in the capture preview image, where the feature information includes a human face size value;

determining, according to the human face size value of each of the at least two human faces, a human face whose human face size value satisfies a preset recognition condition as a recognition object.

**[0007]** In a second aspect, an embodiment of the present disclosure provides an apparatus for recognition object determination. The apparatus includes:

an acquiring module configured to acquire a capture preview image, where the capture preview image includes at least two human faces;

an extracting module configured to extract feature information of each of the at least two human faces in the capture preview image, where the feature information includes a human face size value;

a determining module configured to determine, according to the human face size value of each of the at least two human faces, a human face whose human face size value satisfies a preset recognition condition as a recognition object.

**[0008]** In a third aspect, an embodiment of the present disclosure provides a device for recognition object determination. The device includes a processor and a memory having computer program instructions stored thereon, where the computer program instructions, when executed by the processor, implement the method according to the first aspect or any one of the implementations of the first aspect.

**[0009]** In a fourth aspect, an embodiment of the present disclosure provides a computer-readable storage medium having computer program instructions stored thereon, where the computer program instructions, when executed by a processor, implement the method according to the first aspect or any one of the implementations of the first aspect.

**[0010]** According to the method, the apparatus and the device for determining the recognition object, and the storage medium, the human face size value of each human face in the capture preview image is extracted, and the human face whose human face size value satisfies the preset recognition condition is determined as the recognition object according to the human face size value of each human face. In a human face acquisition process, an appropriate object human face can be selected as a recognition object, thereby realizing accurate recognition object determination, and improving the accuracy rate of recognition object determination.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0011] In order to illustrate technical solutions of embodiments of the present disclosure more clearly, the drawings necessary for embodiments of the present application will be briefly described. For a person skilled in the art, other drawings can also be obtained from these drawings without any inventive effort.

[0012] Fig. 1 is a schematic architectural diagram of a system for recognition object determination according to an embodiment of a system for recognition object determination of a first aspect of the present disclosure.

[0013] Fig. 2 is a schematic flowchart of a method for recognition object determination according to an embodiment of a method for recognition object determination of the first aspect of the present disclosure.

[0014] Fig. 3 is a schematic flowchart of another method for recognition object determination according to an embodiment of a method for recognition object determination of the first aspect of the present disclosure.

[0015] Fig. 4 is a schematic diagram of regional division in an embodiment of a method for recognition object determination of the first aspect of the present disclosure.

[0016] Fig. 5 is a schematic diagram of a relative position in an embodiment of a method for recognition object determination of the first aspect of the present disclosure.

[0017] Fig. 6 is a schematic structural diagram of an apparatus for recognition object determination according to an embodiment of an apparatus for recognition object determination of a second aspect of the present disclosure.

[0018] Fig. 7 is a schematic structural diagram of a device for recognition object determination according to an embodiment of a device for recognition object determination of a third aspect of the present disclosure.

## DETAILED DESCRIPTION

[0019] Features and exemplary embodiments of various aspects of the present disclosure will be described in detail below. In order to make the objects, technical solutions and advantages of the present disclosure clearer, the present disclosure is further described in detail below with reference to the drawings and specific embodiments. It should be understood that, specific embodiments described herein are merely for the illustration of the present disclosure, not for limiting the present disclosure. For those skilled in the art, the present disclosure may be implemented without some of these specific details. The following description of the

embodiments is only for providing a better understanding of the present disclosure by illustrating examples of the present disclosure.

**[0020]** It should be noted that, herein, relational terms such as “first” and “second” are used only for distinguishing one entity or operation from another entity or operation, and do not necessarily require or imply any such actual relationship or order between these entities or operations. Moreover, the terms “comprising”, “including”, or any other variation thereof, are intended to encompass a non-exclusive inclusion, such that a process, a method, an article or a device including a series of elements not only includes these elements, but also includes other elements not explicitly listed, or includes elements inherent to the process, the method, the article or the device. Without further limitation, an element preceded by “including...” does not exclude presence of additional similar elements in a process, a method, an article or a device including the element.

**[0021]** Currently, in a conventional solution of recognition object determination, situations where a plurality of human faces appear on a display screen are reduced mainly by policies such as optimizing a service process and adjusting a placement angle of a capturing device, and a human face first appearing on the screen is generally acquired as a recognition object for a subsequent service execution process. However, in a human face recognition scenario with heavy human traffic, for example, a scenario such as face-scanning payment, station-checking through, and gate-checking through, typically, a plurality of human faces appear on a display screen. Therefore, misrecognition may occur, that is, a “by-standing” or “behind-object” person’s human face is taken as the recognition object, which affects user experience.

**[0022]** Therefore, in order to solve the convention problems, embodiments of the present disclosure provide a method, an apparatus and a device for recognition object determination and a storage medium. A human face size value of each human face in a capture preview image is extracted, and a human face whose human face size value satisfies a preset recognition condition is determined as a recognition object according to the human face size value of each human face. In a human face acquisition process, an appropriate object human face can be selected as a recognition object, thereby realizing accurate recognition object determination, and improving the accuracy rate of recognition object determination.

**[0023]** A method, an apparatus and a device for recognition object determination, and a storage medium of embodiments of the present disclosure are described in detail below by using specific embodiments and application scenarios thereof with reference to the accompanying drawings.

**[0024]** Fig. 1 is a schematic architectural diagram of a system for recognition object determination according to an embodiment of a system for recognition object determination of a first aspect of the present disclosure. As shown in Fig. 1, the system for recognition object determination may include a capturing device 110 and an electronic device 120. An example of the capturing device 110 may be a camera, a device installed with a camera module, and the like. An example of the electronic device 120 may be a mobile electronic device, or a non-mobile electronic device. For example, the mobile electronic device may be a mobile phone, a tablet computer, a notebook computer, a palmtop computer, an ultra-mobile personal computer (UMPC), a netbook computer, a personal digital assistant (PDA) or the like. The non-mobile electronic device may be a server, a network attached storage (NAS), a personal computer (PC), a teller machine, a self-service machine, or the like. There is a communication connection between the capturing device 110 and the electronic device 120. For example, the capturing device 110 is in communication with the electronic device 120 through network, where the network may be a wired communication network or a wireless communication network. For example, the capturing device 110 may be integrated to the electronic device 120 as a module.

**[0025]** As an example, the system for recognition object determination may be applied to a scenario such as face-scanning payment, station-checking through, and gate-checking through. In these scenarios, a phenomenon that a plurality of human faces gather on a display screen is likely to occur because of rapid collection of human faces and heavy human traffic.

**[0026]** With reference to Fig. 1, the electronic device 120 may acquire a capture preview image for a user from the capturing device 110. The capture preview image includes at least two users, i.e., at least two human faces. Next, the electronic device 120 may extract feature information of each human face in the capture preview image. The feature information includes a human face size value. Then, the electronic device 120 may determine a human face whose human face size value satisfies a preset recognition condition as a recognition object according to the human face size value of each human face, for execution of subsequent human face recognition service.

**[0027]** A method for recognition object determination according to an embodiment of the present disclosure will be described below. In some embodiments, the executive subject of the method for recognition object determination may be the electronic device 120 in the system for recognition object determination shown in Fig. 1, or a module in the electronic device 120.

**[0028]** Fig. 2 is a schematic flowchart of a method for recognition object determination according to an embodiment of a method for recognition object determination of the first aspect

of the present disclosure. As shown in Fig. 2, the method for recognition object determination may include steps S210 to S230.

**[0029]** At S210, a capture preview image is acquired.

**[0030]** An example of the capture preview image may include at least two human faces, which may be collected on-site by a capturing device. For example, the capture preview image may be a preview of screen input frame, that is, an image displayed on the display screen when the capturing device captures a picture.

**[0031]** At S220, feature information of each human face of the at least two human faces in the capture preview image is extracted.

**[0032]** An example of the feature information may include a human face size value. For example, the human face size value may include a human face eye spacing value or a number of human face pixels. The human face size value being represented by the human face eye spacing value can reduce a noise of a human face size difference.

**[0033]** In some embodiments, a human face recognition algorithm may be used to perform preliminary human face recognition on the capture preview image to recognize human faces therein. Then, feature extraction is performed on the recognized human faces to obtain feature information of each human face.

**[0034]** At S230, a human face whose human face size value satisfies a preset recognition condition as a recognition object is determined according to the human face size value of each human face.

**[0035]** The recognition object is taken as a subject for execution of subsequent human face recognition service and is used for human face recognition.

**[0036]** The human face taken as the recognition object is generally closest to the capturing device compared with other captured human faces. Therefore, in some embodiments, a human face with a largest human face size value may be determined as the recognition object, thereby achieving accurate recognition object determination.

**[0037]** In addition, compared with other human faces, the human face taken as the recognition object has a size advantage. In other embodiments, a ratio of a human face size value of each of the at least two human faces except a human face with a largest human face size value to the largest human face size value is calculated. When each of the at least one ratio is less than or equal to a first preset ratio threshold, the human face corresponding to the largest human face size value is determined as the recognition object, thereby improving the accuracy of recognition object determination. It can be understood that the first preset ratio threshold

may be flexibly set according to an actual situation, for example, the first preset ratio threshold may be 60%.

**[0038]** It can be understood that the user typically does not leave the current position during the recognition and use process, and the human face appears on the screen from the beginning to the end of the process. Therefore, in an example, when each of the at least one ratio is less than or equal to the first preset ratio threshold, a duration of the human face corresponding to the largest human face size value being displayed on a display screen may be acquired. When the duration of the human face corresponding to the largest human face size value being displayed is greater than or equal to a preset duration threshold, the human face corresponding to the largest human face size value is determined as the recognition object. By using the display duration as a determination factor on the basis of the human face size value, the accuracy of recognition object determination can be further improved.

**[0039]** As a specific example, human face tracking of consecutive frames may be performed on the human face corresponding to the largest human face size value. In an example, a unique human face identifier may be allocated to the human face corresponding to the largest human face size value. In a human face tracking process of consecutive frames, in a case in which a same human face has not left, the human face identifier remains unchanged. Therefore, the continuous duration of the human face corresponding to the largest human face size value being displayed may be counted. In addition, when the continuous display duration is greater than or equal to  $T$ , the human face corresponding to the largest human face size value is taken as the recognition object.  $T$  represents a preset duration threshold, which may be an absolute duration such as 800 ms, or may be a relative duration such as a duration for which a service process is completed (for example, in a scene of station-checking through by face scanning, a duration for which a user passes through a designated capture area channel, that is, a duration from the user entering to leaving a specific capture area (or a duration for which the user does not leave a coverage area of a capturing device); for another example, a time length for which a certain number of consecutive frames of images are collected (for example, five frames of images); and for another example, a transaction response time length (or a time length for which a recognition transaction result is acquired), that is, a continuous duration from initiating of recognition to reception of response result when the human face corresponding to the largest human face size value starts to be tracked, where during this process, the human face corresponding to the largest human face size value is always displayed on the display screen.

**[0040]** In another embodiment, a first position of the human face corresponding to the

largest human face size value may be acquired. When the first position satisfies a preset position condition, the human face corresponding to the largest human face size value is determined as the recognition object. That is, a position is used as a determination factor on the basis of the human face size value, thereby improving the accuracy of recognition object determination. In some embodiments, the preset position condition may include: the first position matches a preset position, or the first position is located in a preset region. It can be understood that the preset position and the preset region can be flexibly set according to actual situations, for example, they can be selected in advance according to debugging experience when the scenario arrangement is implemented.

**[0041]** In an embodiment of the present disclosure, the human face size value of each human face in the capture preview image is extracted, and the human face whose human face size value satisfies the preset recognition condition is determined as the recognition object according to the human face size value of each human face. In a human face acquisition process, an appropriate object human face can be selected as a recognition object, thereby improving the accuracy rate of recognition object determination.

**[0042]** In an embodiment, when any one of the at least one ratio is greater than the first preset ratio threshold, the method may further include the following steps.

**[0043]** First, when each of the at least one ratio is less than or equal to a second preset ratio threshold, a first position of the human face corresponding to the largest human face size value is acquired. The second preset ratio threshold is greater than the first preset ratio threshold. For example, the first preset ratio threshold is 60% and the second preset ratio threshold is 80%. In addition, the first preset ratio threshold and the second preset ratio threshold may be adjusted after a period of time according to the accuracy rate of recognition object determination. In an example, a human face image for which a service process is completed (that is, the recognition object determination is correct) may be selected as a positive sample, and a human face image for which a user manually cancels a service flow (that is, the recognition object is incorrect) may be selected as a negative sample. By means of proportions of positive and negative samples to total samples, an accuracy rate of recognition object determination is counted. The first preset ratio threshold and the second preset ratio threshold are adjusted according to the accuracy rate, so as to realize dynamic adjustment of the thresholds.

**[0044]** Then, when the first position satisfies the preset position condition, the human face corresponding to the largest human face size value is determined as the recognition object. In the embodiments, the second preset ratio threshold and the position are used for further

determination, so as to refine a condition of recognition object determination, thereby further improving the accuracy of recognition object determination.

**[0045]** It can be understood that, in a scenario of human face recognition, typically, a user taken as the recognition object will actively approach the capturing device, and a human face of the user directly faces the display screen and generally has features such as being clearly visible, being not blocked, and with no closed eyes. In some embodiments, the feature information may further include a human face angle, human face blocking information, human face eye information, and the like. In addition, the at least two human faces may be filtered according to the human face angle, the human face blocking information and the human face eye information. That is, the human faces in the capture preview image are filtered by using the human face angle, the human face blocking information and the human face eye information as determination factors, and human faces satisfying corresponding conditions are reserved.

**[0046]** Further, the at least two human faces may be filtered according to the human face size values, the human face angles, the human face blocking information and the human face eye information. The human face whose human face size value satisfies the preset recognition condition is determined as the recognition object based on a human face size value of a human face obtained after the filtering. In this example, the human faces are filtered in a plurality of dimensions, and an appropriate human face is selected from the human faces obtained after the filtering as the recognition object, so that the accuracy rate of recognition object determination can be improved.

**[0047]** The method for recognition object determination according to an embodiment of the present disclosure is describes in detail below by using an example in which the method for recognition object determination is applied to a scenario of face-scanning payment. As shown in Fig. 3, the method may include steps S301 to S303.

**[0048]** At S301, a capture preview image of a user captured on-site by a capturing device is acquired.

**[0049]** At S302, human faces in the capture preview image are recognized according to a human face recognition algorithm.

**[0050]** At S303, the human faces in the capture preview image are filtered.

**[0051]** Specifically, first, feature information of each human face may be extracted. The feature information includes a human face size value, a human face angle, human face blocking information, and human face eye information.

**[0052]** Second, a human face size value may be determined for each human face, and a human face with a human face size value greater than or equal to a preset size threshold is reserved. As an example, the human face size value is represented by a number of human face pixels, and the preset size threshold may be set to 100\*100 which indicates a human face pixel width and height.

**[0053]** Next, human face angles may be determined, and a human face whose human face angle is less than or equal to a preset angle threshold may be reserved. As an example, the human face angle include a roll, a pitch, and a yaw. Preset angle thresholds corresponding to the three types of angles may all be  $\pm 20$  degrees, and a human face whose all of the three types of angles are less than or equal to  $\pm 20$  degrees is reserved.

**[0054]** Then, human face blocking information may be determined, and a human face whose human face blocking information satisfies a human face blocking condition is reserved. As an example, the human face blocking condition may be flexibly set according to service requirements, such as no blocking at all, no blocking at key points, blocked area not exceeding a certain ratio, and the like.

**[0055]** Further, human face eye information may be determined so as to determine whether a human face is with closed eyes, and a human face with no closed eyes is reserved. It should be noted that, the above determination steps may be flexibly adjusted according to service requirements, for example, may be appropriately increased or decreased, or may be changed in order, which is not limited herein.

**[0056]** As shown in Fig. 3, the method for recognition object determination further includes step S304, where it is determined whether there is only one human face obtained after the filtering.

**[0057]** If so, step S305 is performed; and if not, step S308 is performed.

**[0058]** As shown in Fig. 3, the method for recognition object determination further includes step S305, where a duration of the only one human face being displayed on a display screen is acquired.

**[0059]** As shown in Fig. 3, the method for recognition object determination further includes step S306, where it is determined whether the display duration of the only one human face is greater than or equal to a preset duration threshold.

**[0060]** If so, step S307 is performed; and if not, step S317 is performed.

**[0061]** As shown in Fig. 3, the method for recognition object determination further includes

step S307, where the only one human face is determined as a recognition object.

**[0062]** As shown in Fig. 3, the method for recognition object determination further includes step S308, where a ratio of a human face size value of each human face except a human face with a largest human face size value to the largest human face size value is calculated.

5 **[0063]** As shown in Fig. 3, the method for recognition object determination further includes step S309, where it is determined whether each ratio is less than or equal to a first preset ratio threshold.

**[0064]** If so, step S310 is performed; and if not, step S313 is performed.

**[0065]** As shown in Fig. 3, the method for recognition object determination further includes  
10 step S310, where a duration of the human face corresponding to the largest human face size value being displayed on the display screen is acquired.

**[0066]** As shown in Fig. 3, the method for recognition object determination further includes step S311, where it is determined whether the display duration is greater than or equal to a preset duration threshold.

15 **[0067]** If so, step S312 is performed; and if not, step S317 is performed.

**[0068]** As shown in Fig. 3, the method for recognition object determination further includes step S312, where the human face corresponding to the largest human face size value is determined as the recognition object.

**[0069]** As shown in Fig. 3, the method for recognition object determination further includes  
20 step S313, where it is determined whether each ratio is less than or equal to a second preset ratio threshold.

**[0070]** If so, step S314 is performed; and if not, step S317 is performed.

**[0071]** As shown in Fig. 3, the method for recognition object determination further includes  
25 step S314, where a first position of the human face corresponding to the largest human face size value is acquired.

**[0072]** The first position may include an absolute position of the human face corresponding to the largest human face size value, and a relative position to a human face corresponding to a second largest human face size value which is taken a reference point.

**[0073]** Specifically, the capture preview image may be divided according to a preset region  
30 division rule, and a position mark of a human face is determined according to the divided regions. The absolute position of the human face is represented by the position mark. With reference to Fig. 4, the region division rule may be that the capture preview image is divided into four quadrants including a first quadrant, a second quadrant, a third quadrant, and a fourth

quadrant according to a mathematical plane coordinate system. At the same time, a central region C is taken by using the central point as the origin of the central region C, a half of the width of the capture preview image as the width of the central region C, and a half of the height of the capture preview image as the height of the central region C. The central region C is overlapped with the quadrant region.

**[0074]** As an example, a plane coordinate system may be constructed by taking the central point as an origin point (0, 0). For a human face in the capture preview image, coordinates (x, y) of a central point of the human face are calculated. A position mark of the human face is determined according to the coordinates and the divided region of the central point of the human face. The position mark may be LG. L represents a quadrant where the coordinates of the central point of the human face are located, of which a value is 1, 2, 3 or 4, where L being 1 indicates that the coordinates are located in the first quadrant. G indicates whether the coordinates of the central point of the human face are located in the central region C, of which a value is 0 or 1, where G being 0 indicates that the human face is not located in the central region C, and G being 1 indicates that the human face is located in the central region C. Herein, the “being located in” includes the situation where the coordinates of the central point is located on a boundary of a region. Specifically, the position mark may be the following: not located in central region C: first quadrant: 10, second quadrant: 20, third quadrant: 30, the fourth quadrant: 40; located in the central region C: first quadrant: 11, second quadrant: 21, third quadrant: 31, fourth quadrant: 41. Specifically, taking the position mark 10 as an example, it indicates that the coordinates of the central point of the human face are located in the first quadrant, and are not located in the central region. Taking the position mark 11 as an example, it indicates that the coordinates of the central point of the human face are located in the central region and the first quadrant. As shown in Fig. 4, central coordinates of a human face 1 are located in the third quadrant and are not located in the central region C, so the position mark is 30. Central coordinates of a human face 2 are located in the first quadrant and the second quadrant and are located in the central region C, so the position mark is 11 and 21. Central coordinates of a human face 3 are located in the first quadrant and are located in the central region C, so the position mark is 11. It can be understood that the region division rule may be flexibly adjusted according to an actual requirement, which is not limited herein.

**[0075]** In some embodiments, the relative position may be calculated using a relative position calculation formula. In conjunction with Fig. 5, the relative position calculation formula may be as follows:

$$A(X, Y) = O_1(x_1, y_1) - O_2(x_2, y_2) \quad (1),$$

where  $A(X, Y)$  represents a vector,  $O_1(x_1, y_1)$  represents coordinates of a human face central point of the second largest human face, and  $O_2(x_2, y_2)$  represents coordinates of a human face central point of the largest human face, where if  $X > 0$ , it is indicated that the largest human face is on the left side of the second largest human face along the horizontal axis direction, and otherwise, on the right side of the second largest human face; if  $Y > 0$ , it is indicated that the largest human face is below the second largest human face along the longitudinal axis direction, and otherwise, above the second largest human face.

**[0076]** As shown in Fig. 3, the method for recognition object determination further includes step S315, where it is determined whether the first position satisfies a preset position condition.

**[0077]** In some embodiments, the preset position condition includes: the first position matches a preset location, or the first position is located in a preset region. In a fixed scenario, the absolute position and the relative position of the recognition object in the display screen tend to have some degree of gathering. It can be understood that the gathering position varies depending on different scenarios or angle differences of the capturing device. In an application scenario, a certain number (for example, 100 thousand) of human face recognition scenario images having a plurality of human faces may be selected. Data processing is performed on these images, to mark recognition objects and second largest human faces. Statistics on relative positions and absolute positions of the recognition objects is collected. Therefore, each image is classified, statistics on the values of the absolute positions (LC) and the relative positions ( $A(X, Y)$ ) is collected. LC values or combinations of LC values appearing the most, and relative positions appearing the most in the scenario are selected according to the statistical result. An absolute position and a relative position where recognition objects frequently appear in the scenario are confirmed, and they are taken as preset positions. Alternatively, a preset region is determined according to a plurality of absolute positions and relative position where recognition objects frequently appear. The preset position or the preset region are set according to an actual application scenario, the accuracy rate of recognition object determination can be improved. On this basis, it is determined whether the first position satisfies the preset position condition, and if so, step S316 is performed; if not, step S317 is performed.

**[0078]** As shown in Fig. 3, the method for recognition object determination further includes step S316, where the human face corresponding to the largest human face size value is determined as the recognition object.

**[0079]** As shown in Fig. 3, the method for recognition object determination further includes

step S317, where it is prompted that the recognition object cannot be determined.

**[0080]** Specifically, a voice prompt such as “recognition object cannot be determined, standing-by users please step back” may be generated.

**[0081]** In other examples, at step S308, a first product of the largest human face size value and the first preset ratio threshold may be calculated, and the first product may be taken as the first size threshold.

**[0082]** At step S309, it may be determined whether the human face size value of each human face except the human face with the largest human face size value is each less than or equal to the first size threshold. If so, step S310 is performed; and if not, step S313 is performed.

**[0083]** At S313, a second product of the largest human face size value and the second preset ratio threshold may be calculated, the second product may be taken as the second size threshold, and it may be determined whether the human face size value of each human face except the human face with the largest human face size value is each less than or equal to the second size threshold. If so, step S314 is performed; and if not, step S317 is performed.

**[0084]** Based on the method for recognition object determination according to embodiments of the present disclosure, embodiments of the present disclosure further provide an apparatus for recognition object determination. Fig. 6 is a schematic structural diagram of an apparatus for recognition object determination according to an embodiment of an apparatus for recognition object determination of a second aspect of the present disclosure.

**[0085]** As shown in Fig. 6, the apparatus for recognition object determination 600 may include an acquiring module 610, an extracting module 620 and a determining module 630.

**[0086]** The acquiring module 610 is configured to acquire a capture preview image, where the capture preview image includes at least two human faces.

**[0087]** The extracting module 620 is configured to extract feature information of each of the at least two human faces in the capture preview image, where the feature information includes a human face size value.

**[0088]** The determining module 630 is configured to determine, according to the human face size value of each of the at least two human faces, a human face whose human face size value satisfies a preset recognition condition as a recognition object.

**[0089]** In some embodiments, the determining module includes a first determining unit configured to determine a human face with a largest human face size value as the recognition object.

**[0090]** In some embodiments, the determining module includes: a calculating unit

configured to calculate a ratio of a human face size value of each of the at least two human faces except a human face with a largest human face size value to the largest human face size value to obtain at least one ratio; and

a second determining unit configured to determine the human face corresponding to the largest human face size value as the recognition object when each of the at least one ratio is less than or equal to a first preset ratio threshold.

**[0091]** In some embodiments, the second determining unit includes: an acquiring subunit configured to acquire a duration of the human face corresponding to the largest human face size value being displayed on a display screen when each of the at least one ratio is less than or equal to the first preset ratio threshold; and

a determining subunit configured to determine the human face corresponding to the largest human face size value as the recognition object when the duration of the human face corresponding to the largest human face size value being displayed is greater than or equal to a preset duration threshold.

**[0092]** In some embodiments, the acquiring module is further configured to acquire a first position of the human face corresponding to the largest human face size value when any one of the at least one ratio is greater than the first preset ratio threshold and when each of the at least one ratio is less than or equal to a second preset ratio threshold, where the second preset ratio threshold is greater than the first preset ratio threshold.

**[0093]** The determining module is further configured to determine the human face corresponding to the largest human face size value as the recognition object when the first position satisfies a preset position condition.

**[0094]** In some embodiments, the determining module includes: an acquiring unit configured to acquire a first position of a human face corresponding to a largest human face size value; and

a third determining unit configured to determine the human face corresponding to the largest human face size value as the recognition object when the first position satisfies a preset position condition.

**[0095]** In some embodiments, the preset position condition includes: the first position matches a preset position, or the first position is located in a preset region.

**[0096]** In some embodiments, the feature information further includes a human face angle, human face blocking information, and human face eye information.

**[0097]** The determining module includes: a filtering unit configured to filter the at least

two human faces according to the human face angle, the human face blocking information and the human face eye information; and

a fourth determining unit configured to determine, based on a human face size value of a human face obtained after the filtering, the human face whose human face size value satisfies the preset recognition condition as the recognition object.

**[0098]** In some embodiments, the human face size value includes a human face eye spacing value or a number of human face pixels.

**[0099]** It should be understood that, each module/unit in the apparatus for recognition object determination 600 shown in Fig. 6 has a function of implementing a corresponding step in the method for recognition object determination of embodiment of the present disclosure, and can achieve a corresponding technical effect, which will not be repeated for the sake of brevity.

**[00100]** Fig. 7 is a schematic structural diagram of a device for recognition object determination according to an embodiment of a device for recognition object determination of a third aspect of the present disclosure.

**[00101]** As shown in Fig. 7, a device for recognition object determination 700 of the embodiments includes an input device 701, an input interface 702, a central processor 703, a memory 704, an output interface 705, and an output device 706. The input interface 702, the central processor 703, the memory 704, and the output interface 705 are connected to one another through a bus 710. The input device 701 and the output device 706 are connected to the bus 710 through the input interface 702 and the output interface 705 respectively, and are thus connected to other components of the device for recognition object determination 700.

**[00102]** Specifically, the input device 701 receives input information from the outside, and transmits the input information to the central processor 703 through the input interface 702. The central processor 703 processes the input information based on computer executable instructions stored in the memory 704 so as to generate output information, temporarily or permanently stores the output information in the memory 704, and then transmits the output information to the output device 706 through the output interface 705. The output device 706 outputs the output information to the outside of the device for recognition object determination 700 for use by the user.

**[00103]** In some embodiments, the device for recognition object determination 700 shown in Fig. 7 includes: the memory 704 configured to store a program; the processor 703 configured to execute the program stored in the memory, so as to implement the method for recognition

object determination according to an embodiment of the present disclosure.

**[00104]** An embodiment of the present disclosure further provides a computer-readable storage medium. The computer-readable storage medium has computer program instructions stored thereon. The computer program instructions, when executed by the processor,  
5 implement the method for recognition object determination of an embodiment of the present disclosure. An example of computer-readable storage medium as shown includes a non-transitory computer-readable storage medium, such as read-only memory (ROM), random access memory (RAM), magnetic disk, or optical disk.

**[00105]** It should be noted that embodiments in the present description are described in a  
10 progressive manner, and the same or similar parts of the embodiments may be referred to one another, which are not repeated for brevity. The present disclosure is not limited to the specific configuration and processes described above and shown in the figures. For brevity, the detail descriptions for the known method are omitted here. In the above embodiments, some specific steps are described and shown as examples. However, the method process of the present  
15 disclosure is not limited to the described and shown specific steps, and after understanding the gist of the present disclosure, those skilled in the art may implement various changes, modifications and additions or changes of the sequences of the steps.

**[00106]** The functional block shown in the above-described structure block diagrams may be implemented as a hardware, a software, a firmware, or a combination thereof. When  
20 implemented in a hardware, it may be, for example, an electronic circuit, an application specific integrated circuit (ASIC), a suitable firmware, a plug-in, a function card, and the like. When implemented in a software, elements of the present disclosure are programs or code segments used for performing required tasks. The programs or code segments may be stored in a machine-readable medium or transmitted over a transmission medium or communication link  
25 by a data signal carried in a carrier wave. A “machine-readable medium” may include any medium that may store or transmit information. Examples of machine-readable medium include an electronic circuit, a semiconductor memory device, a Read-Only Memory (ROM), a flash memory, an erasable ROM (EROM), a floppy disk, a CD-ROM, an optical disk, a hard disk, a fiber optic medium, a radio frequency (RF) link, or the like. The code segments may be  
30 downloaded via a computer network such as an internet, an intranet, or the like.

**[00107]** It should also be noted that the exemplary embodiments mentioned in this disclosure describe some methods or systems based on a series of steps or devices. However, the present disclosure is not limited to the order of the above steps, that is, the steps may be

performed in the order mentioned in the embodiments, or in an order different from the order in the embodiments, or several steps may be performed simultaneously.

**[00108]** Aspects of the present disclosure are described above with reference to flowcharts and/or block diagrams of methods, apparatus (systems) and computer program products according to the embodiments of the disclosure. It will be understood that each block of the flowchart and/or block diagrams and a combination of the blocks in the flowchart and/or block diagrams may be implemented by computer program instructions. These computer program instructions may be provided to a processor of a general purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine which enables the instructions executed via the processor of the computer or other programmable data processing apparatus to implement the functions/acts specified in one or more blocks of the flowcharts and/or block diagrams. Such processor may be, but not limited to, a general purpose processor, a special purpose processor, an application specific processor, or a field programmable logic circuit. It will further be understood that each block of the block diagrams and/or flowcharts and a combination of blocks in the block diagrams and/or flowchart may also be implemented by a special purpose hardware for performing specified functions or actions, or by a combination of a special purpose hardware and computer instructions.

**[00109]** The above are only specific implementations of the present disclosure. Those skilled in the art may clearly understand that, for the convenience and brevity of description, the specific operation processes of the above-described systems, modules and units may refer to the foregoing method embodiments, which are not repeated herein. It should be understood that the protection scope of the present disclosure is not limited to this. Any person skilled in the art may easily conceive of various equivalent modifications or replacements within the technical scope disclosed in the present disclosure, and these modifications or replacements should all fall within the protection scope of this disclosure.

What is claimed is:

1. A method for recognition object determination, comprising:

acquiring a capture preview image, wherein the capture preview image comprises at least two human faces;

5 extracting feature information of each of the at least two human faces in the capture preview image, wherein the feature information comprises a human face size value;

determining, according to the human face size value of each of the at least two human faces, a human face whose human face size value satisfies a preset recognition condition as a recognition object.

10 2. The method according to claim 1, wherein the determining, according to the human face size value of each of the at least two human faces, a human face whose human face size value satisfies a preset recognition condition as a recognition object comprises:

determining a human face with a largest human face size value as the recognition object.

15 3. The method according to claim 1, wherein the determining, according to the human face size value of each of the at least two human faces, a human face whose human face size value satisfies a preset recognition condition as a recognition object comprises:

calculating a ratio of a human face size value of each of the at least two human faces except a human face with a largest human face size value to the largest human face size value to obtain at least one ratio;

20 determining the human face corresponding to the largest human face size value as the recognition object when each of the at least one ratio is less than or equal to a first preset ratio threshold.

25 4. The method according to claim 3, wherein the determining the human face corresponding to the largest human face size value as the recognition object, when each of the at least one ratio is less than or equal to a first preset ratio threshold comprises:

30 acquiring a duration of the human face corresponding to the largest human face size value being displayed on a display screen when each of the at least one ratio is less than or equal to the first preset ratio threshold;

determining the human face corresponding to the largest human face size value as the recognition object when the duration of the human face corresponding to the largest human

face size value being displayed is greater than or equal to a preset duration threshold.

5. The method according to claim 3, wherein when any one of the at least one ratio is greater than the first preset ratio threshold, the method further comprises:

5 acquiring a first position of the human face corresponding to the largest human face size value when each of the at least one ratio is less than or equal to a second preset ratio threshold, wherein the second preset ratio threshold is greater than the first preset ratio threshold;

determining the human face corresponding to the largest human face size value as the recognition object when the first position satisfies a preset position condition.

10 6. The method according to claim 1, wherein the determining, according to the human face size value of each of the at least two human faces, a human face whose human face size value satisfies a preset recognition condition as a recognition object comprises:

acquiring a first position of a human face corresponding to a largest human face size value;

15 determining the human face corresponding to the largest human face size value as the recognition object when the first position satisfies a preset position condition.

7. The method according to claim 5 or 6, wherein the preset position condition comprises: the first position matches a preset position, or the first position is located in a preset region.

20 8. The method according to claim 1, wherein the feature information further comprises a human face angle, human face blocking information, and human face eye information;

the determining, according to the human face size value of each of the at least two human faces, a human face whose human face size value satisfies a preset recognition condition as a recognition object comprises:

25 filtering the at least two human faces according to the human face angle, the human face blocking information and the human face eye information;

determining, based on a human face size value of a human face obtained after the filtering, the human face whose human face size value satisfies the preset recognition condition as the recognition object.

30 9. The method according to claim 1, wherein the human face size value comprises a human face eye spacing value or a number of human face pixels.

10 An apparatus for recognition object determination a comprising:

an acquiring module configured to acquire a capture preview image, wherein the capture preview image comprises at least two human faces;

5 an extracting module configured to extract feature information of each of the at least two human faces in the capture preview image, wherein the feature information comprises a human face size value;

a determining module configured to determine, according to the human face size value of each of the at least two human faces, a human face whose human face size value satisfies a  
10 preset recognition condition as a recognition object.

11 The apparatus according to claim 10, wherein the determining module comprises:

a first determining unit configured to determine a human face with a largest human face size value as the recognition object.

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12 The apparatus according to claim 10, wherein the determining module comprises:

a calculating unit configured to calculate a ratio of a human face size value of each of the at least two human faces except a human face with a largest human face size value to the largest human face size value to obtain at least one ratio;

20 a second determining unit configured to determine the human face corresponding to the largest human face size value as the recognition object when each of the at least one ratio is less than or equal to a first preset ratio threshold.

13 The apparatus according to claim 12, wherein the second determining unit comprises:

25 an acquiring subunit configured to acquire a duration of the human face corresponding to the largest human face size value being displayed on a display screen when each of the at least one ratio is less than or equal to the first preset ratio threshold;

a determining subunit configured to determine the human face corresponding to the largest human face size value as the recognition object when the duration of the human face  
30 corresponding to the largest human face size value being displayed is greater than or equal to a preset duration threshold.

14. The apparatus according to claim 12, wherein

the acquiring module is further configured to acquire a first position of the human face corresponding to the largest human face size value when any one of the at least one ratio is greater than the first preset ratio threshold and when each of the at least one ratio is less than or equal to a second preset ratio threshold, wherein the second preset ratio threshold is greater than the first preset ratio threshold;

the determining module is further configured to determine the human face corresponding to the largest human face size value as the recognition object when the first position satisfies a preset position condition.

15 The apparatus according to claim 10, wherein the determining module comprises:  
an acquiring unit configured to acquire a first position of a human face corresponding to a largest human face size value;  
a third determining unit configured to determine the human face corresponding to the largest human face size value as the recognition object when the first position satisfies a preset position condition.

16 The apparatus according to claim 14 or 15, wherein the preset position condition comprises:  
the first position matches a preset position, or the first position is located in a preset region.

17 The apparatus according to claim 10, wherein the feature information further comprises a human face angle, human face blocking information, and human face eye information;  
the determining module comprises:  
a filtering unit configured to filter the at least two human faces according to the human face angle, the human face blocking information and the human face eye information; and  
a fourth determining unit configured to determine, based on a human face size value of a human face obtained after the filtering, the human face whose human face size value satisfies the preset recognition condition as the recognition object.

18 The apparatus according to claim 10, wherein the human face size value comprises a human face eye spacing value or a number of human face pixels.

19. A device for recognition object determination, comprising a processor and a memory

having computer program instructions stored thereon, wherein the computer program instructions, when executed by the processor, implement the method according to any one of claims 1 to 9.

- 5           20. A computer-readable storage medium, having computer program instructions stored thereon, wherein the computer program instructions, when executed by a processor, implement the method according to any one of claims 1 to 9.