PATENT DOCUMENT

[0005]

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SUMMARY OF THE INVENTION

TECHNICAL PROBLEM

[0006]

The present inventor has examined a new technique for identifying a person who cannot be identified in an original image by using image processing on other images. In other words, embodiments of this disclosure provide a technique for identifying a person who cannot be identified in an original image by using image processing on other images.

SOLUTION TO PROBLEM

[0007]

In each aspect of this disclosure, the following embodiments are employed to solve the above-described problem.

[0008]

According to a first aspect, there is provided an information processing apparatus including an acquisition unit that acquires a first image from which person region feature information regarding a region including other than a face of a retrieval target person is extracted, a second image in which a collation result with the person region feature information indicates a match, and a facial region is detected, and result information indicating a collation result between face information stored in a storage unit and face information extracted from the facial region; and a display processing unit that displays at least two of the first image, the second image, and the result information on an identical screen.

According to a second aspect, there is provided an information processing apparatus including an acquisition unit that acquires a second image in which a collation result with person region feature information regarding a region including other than a face of a retrieval target person indicates a match, and a facial region is detected, and result information indicating a collation result between face information stored in a storage unit and face information extracted from the facial region; and a display processing unit that displays the acquired second image and result information on an identical screen.

According to a third aspect, there is provided an information processing apparatus

including an acquisition unit that acquires a first image from which person region feature information regarding a region including other than a face of a retrieval target person is extracted, and result information indicating a collation result between face information extracted from a second image in which a collation result with the person region feature information indicates a match, and a face information stored in a storage unit; and a display processing unit that displays the acquired first image and result information on an identical screen.

[0009]

According to a fourth aspect, there is provided an information processing method executed by an information processing apparatus, the method including: acquiring a first image used to generate person region feature information indicating a feature of a retrieval target person, a second image in which a collation result with the person region feature information indicates a match, and a facial region is detected, and result information indicating a collation result between face information stored in a storage unit and face information extracted from the facial region; and displaying at least two of the first image, the second image, and the result information on an identical screen.

Disclosed herein is an information processing method executed by an information processing apparatus, the method including: acquiring a second image in which a collation result with person region feature information regarding a region including other than a face of a retrieval target person indicates a match, and a facial region is detected, and result information indicating a collation result between face information stored in a storage unit and face information extracted from the facial region; and displaying the acquired second image and result information on an identical screen.

Disclosed herein is an information processing method executed by an information processing apparatus, the method including: acquiring a first image from which person region feature information regarding a region including other than a face of a retrieval target person is extracted, and result information indicating a collation result between face information extracted from a second image in which a collation result with the person region feature information indicates a match, and a face information stored in a storage unit; and displaying the acquired first image and result information on an identical screen.

[0010]

According to a fifth aspect, there is provided a recording medium having recorded thereon a program causing a computer to execute: a procedure of acquiring a first image used to generate person region feature information indicating a feature of a retrieval target person, a second image in which a collation result with the person region feature information indicates a match, and a facial region is detected, and result information indicating a collation result

between face information stored in a storage unit and face information extracted from the facial region; and a procedure of displaying at least two of the first image, the second image, and the result information on an identical screen.

The recording medium includes a non-transitory medium.

Disclosed herein is a computer program including computer program codes causing a computer to execute the control method of the information processing apparatus on the information processing apparatus when the program is executed by the computer.

[0011]

It should be noted that any combination of the above-described constituent elements, and expressional conversion of this disclosure among a method, an apparatus, a system, a storage medium, a computer program, and the like is also effective as an aspect of this disclosure.

[0012]

Various constituent elements of this disclosure are not necessarily required to be individually independent elements. For example, a plurality of constituent elements may be configured as a single member, a single constituent element may be configured with a plurality of members, any constituent element may be a part of another constituent element, and a part of any constituent element may overlap a part of another constituent element.

[0013]

A plurality of procedures are sequentially described in the method and the computer program of this disclosure, but the order of description does not limit an order of executing the plurality of procedures. Thus, in a case where the method and the computer program of this disclosure are executed, the order of the plurality of procedures may be changed within the scope without contradiction to contents thereof.

[0014]

The plurality of procedures of the method and the computer program of this disclosure are not limited to being respectively executed at different timings. Thus, another procedure may occur during execution of any procedure, and an execution timing of any procedure may partially or entirely overlap an execution timing of another procedure.

ADVANTAGEOUS EFFECTS OF INVENTION

[0015]

According to each aspect above, it is possible to provide a technique for identifying a person who cannot be identified in an original image by using image processing on other images.

BRIEF DESCRIPTION OF THE DRAWINGS

face, an iris, a pinna, a vein, and a fingerprint. Alternatively, the second portion may be a gait of a person instead of a region. The first portion may or not include the second portion. In the present example embodiment, the first portion is a region of the whole body of the person, and the second portion is a facial region. The first feature information (the first feature information 14a and the first feature information 14b) of the first portion is feature information indicating an appearance feature such as a size or a costume of a person. In the present specification, in some cases, the first feature information will be referred to as “person region feature information”, and the second feature information will be referred to as “face information”.

[0040]

The first feature information (the first feature information 14a and the first feature information 14b) includes information indicating features such as a height, a shoulder width, a body part ratio, a garment (a shape, a color, a material, or the like), a hair style (also including a hair color), an ornament (a cap, spectacles, an accessory, or the like), and a belonging (a bag, an umbrella, or a stick). The person region feature information may include information such as likelihood of the feature information.

[0041]

In the present example embodiment, the first feature information 14a of a retrieval target person is generated by using the second image 22 in which the retrieval target person is captured. The second image 22 may be an image captured by the camera 5, may be an image captured by other imaging means, and may be an image read by a scanner.

[0042]

The information processing apparatus 100 further includes a first feature information generation unit (not illustrated). The first feature information generation unit generates the first feature information 14a by using the second image 22 in which a retrieval target person is captured, and stores the first feature information 14a in the first feature information storage unit 112.

[0043]

Fig. 5 is a flowchart illustrating an example of procedures of a process of the information processing apparatus 100 generating the first feature information 14a. The first feature information generation unit acquires an image (second image 22) of a retrieval target person (step S10), generates the first feature information (person region feature information) by using the acquired image, and stores the second feature information in the first feature information storage unit 112 (step S20).

[0044]

Fig. 10 is a diagram illustrating an example of a data structure of the recognition information database 114. A recognition ID for identifying a specific person (hereinafter, referred to as a registered person) of which recognition information is registered, face feature information (second feature information) indicating a feature of a face of the registered person, face image data of the registered person, the name of the registered person, attribute information of the registered person are registered in association with each other in the recognition information database 114.

[0053]

The entity of the face image data may be registered in the recognition information database 114, and a path indicating a location where the face image data is stored and a file name may be registered. As will be described later, the face image data is used for screen display, and an operator may view a face picture displayed on a screen along a name and attribute information.

[0054]

In the example illustrated in Fig. 9, the recognition information database 114 is a part of the information processing apparatus 100. The recognition information database 114 may be integrated with a main body of the information processing apparatus 100, and may be separated therefrom. The recognition information database 114 may be included in the same apparatus as that of second feature information storage unit 110, and may be included in different apparatuses. The recognition information database 114 has a database structure, but may have other data structures.

[0055]

The collation unit 102 may have the function of the recognition unit 120 of the present example embodiment.

The information processing apparatus 100 may include an output processing unit (not illustrated) which reads identification information (recognition ID or a name) corresponding to face feature information stored in the recognition information database 114, and performs a process of outputting the identification information from an output unit, in a case where a recognition result in the recognition unit 120 indicates a match. An output process will be described later in detail.

[0056]

Fig. 11 is a flowchart illustrating an example of procedures of a recognition process in the information processing apparatus 100 of the present example embodiment.

First, the recognition unit 120 performs a collation process on the second feature

first feature information storage unit 112 may be implemented by a plurality of apparatuses. For example, a storage device storing second feature information extracted from a person included in the first image may be provided separately from a storage apparatus storing identification information and second feature information of a specific person.

(3) Among extraction processes performed by the extraction unit 104, a process of extracting feature information from the first image 10 and a process of extracting feature information from the second image 22 are performed by different apparatuses (computers 80). For example, the information processing system may include a plurality of terminal apparatuses having the extraction unit 104 and analyzing videos, and a server apparatus integrating information therefrom and performing a collation process. The plurality of terminal apparatuses may be disposed to be distributed to respective regions, and the extraction unit 104 may be implemented by a plurality of physical apparatuses.

(4) Different apparatuses (computers 80) may be used depending on the type (face feature information and person region feature information) of feature information which is a target of video analysis (the extraction unit 104 and the collation unit 102).

[0103]

As mentioned above, the example embodiments of this disclosure have been described with reference to the drawings, but these are examples of this disclosure, and various configurations other than the description may be employed.

For example, in the above-described example embodiment, a first collation process between feature information extracted from a person region of a person included in the first image 10 and the first feature information 14a of a retrieval target person, and a second collation process between second feature information extracted from a facial region of a person in the first image 10, indicating a match in the collation process, and face feature information of a registered person, are performed. In other example embodiments, the collation unit 102 may perform at least either one of the first collation process and the second collation process with respect to a third image which is different from the first image 10 and the second image 22 by using the first feature information 14a and the second feature information.

[0104]

In this configuration, in a case where a facial region can be detected from the third image, the second collation process with the second feature information may be performed instead of the first collation process with the first feature information 14a. In a case where a facial region cannot be detected from the third image, the first collation process with the first feature information 14a may be performed. New second feature information generated through the

CLAIMS

1. An information processing apparatus comprising:

an acquisition unit that acquires

a first image from which person region feature information regarding a region including other than a face of a retrieval target person is extracted,

a second image in which a collation result with the person region feature information indicates a match, and a facial region is detected, and

result information indicating a collation result between face information stored in a storage unit and face information extracted from the facial region; and

a display processing unit that displays at least two of the first image, the second image, and the result information on an identical screen.

2. An information processing apparatus comprising:

an acquisition unit that acquires

a second image in which a collation result with person region feature information regarding a region including other than a face of a retrieval target person indicates a match, and a facial region is detected, and

result information indicating a collation result between face information stored in a storage unit and face information extracted from the facial region; and

a display processing unit that displays the acquired second image and result information on an identical screen.

3. An information processing apparatus comprising:

an acquisition unit that acquires

a first image from which person region feature information regarding a region including other than a face of a retrieval target person is extracted, and

result information indicating a collation result between face information extracted from a second image in which a collation result with the person region feature information indicates a match, and a face information stored in a storage unit; and

a display processing unit that displays the acquired first image and result information on an identical screen.

4. The information processing apparatus according to any one of claims 1 to 3,

wherein the acquisition unit acquires a plurality of the second images, and

wherein the display processing unit displays the result information for each of the plurality of acquired second images.

5. The information processing apparatus according to any one of claims 1 to 4,

wherein the display processing unit displays the first image, the second image, the result information on an identical screen.

6. The information processing apparatus according to any one of claims 1 to 5,

wherein the display processing unit displays the first image and the second image on an identical screen.

7. The information processing apparatus according to claim 6,

wherein the acquisition unit acquires a plurality of the second images, and

wherein in a case where a selection operation of selecting at least one image from among the plurality of second images is received, the display processing unit displays the result information for the selected second image.

8. The information processing apparatus according to any one of claims 1 to 7,

wherein face feature information of a specific person is stored in a storage unit in association with information regarding the specific person, and

wherein the result information includes at least one of the matching degree with the face feature information stored in the storage unit and the information regarding the specific person.

9. An information processing method executed by an information processing apparatus, the method comprising:

acquiring

a first image used to generate person region feature information indicating a feature of a retrieval target person,

a second image in which a collation result with the person region feature information indicates a match, and a facial region is detected, and

result information indicating a collation result between face information stored in a storage unit and face information extracted from the facial region; and

displaying at least two of the first image, the second image, and the result information on an identical screen.

10. A recording medium having recorded thereon a program causing a computer to execute:

a procedure of acquiring

a first image used to generate person region feature information indicating a feature of a retrieval target person,

a second image in which a collation result with the person region feature information indicates a match, and a facial region is detected, and

result information indicating a collation result between face information stored in a storage unit and face information extracted from the facial region; and

a procedure of displaying at least two of the first image, the second image, and the result information on an identical screen.