

IMAGE PROCESSING APPARATUS

INCORPORATION BY REFERENCE

This application is based upon and claims the benefit of priority from Japanese patent
5 application No. 2022-048165, filed on March 24, 2022, the disclosure of which is incorporated
herein in its entirety by reference.

TECHNICAL FIELD

[0001]

10 The present invention relates to an image processing apparatus, an image processing
method, and a recording medium.

BACKGROUND ART

[0002]

15 There is a case in which predetermined image processing such as pixelation and masking
is executed on image data.

[0003]

Such image processing is described in a document, for example, Patent Document 1. In
Patent Document 1, an image processing apparatus that includes a control unit and an image
20 processing unit is described. According to Patent Document 1, the control unit specifies a non-
processing target subject as a non-processing target on which predetermined image processing is
not executed from among a plurality of subjects in a frame composing a moving image based on

a positional relation between a plurality of subject areas respectively corresponding to the plurality of subjects and a specific area in the frame. Then, the image processing unit executes the predetermined image processing on a processing target area corresponding to a processing target subject other than the non-processing target subject among the plurality of subjects. In addition,

5 Patent Document 1 discloses that a subject area is a face area corresponding to a subject.

[0004]

Patent Document 1: Japanese Unexamined Patent Application Publication No. JP-A 2021-033573

[0005]

Depending on a condition such as the usage and content of image data, there is a case in
10 which execution of image processing on an area other than an area of a person, such as the environment around the person and an installed object, is desired. However, the technique described in Patent Document 1 targets only whether or not to execute image processing on a face area of a person. Therefore, it has been impossible to deal with the problem as described above. Thus, there has been a problem that it may be impossible to execute accurate image processing as
15 needed depending on a condition and so on.

SUMMARY OF THE INVENTION

[0006]

Accordingly, an object of the present invention is to provide an image processing
20 apparatus, an image processing method, and a recording medium that solve the problem that it may be impossible to execute accurate image processing as needed.

[0007]

In order to achieve the object, an image processing apparatus as an aspect of the present disclosure includes: an acquiring unit configured to acquire image data; a recognizing unit configured to estimate, based on the image data acquired by the acquiring unit, a skeleton position of a person in the image data; and a processing unit configured to execute image processing on an area which is different from an area of the person based on the skeleton position estimated by the recognizing unit.

[0008]

Further, an image processing method as another aspect of the present disclosure is an image processing method by an information processing apparatus. The image processing method includes: acquiring image data; estimating, based on the image data acquired by the acquiring unit, a skeleton position of a person in the image data; and executing image processing on an area which is different from an area of the person based on the skeleton position estimated by the recognizing unit.

[0009]

Further, a recording medium as another aspect of the present disclosure is a non-transitory computer-readable recording medium having a program recorded thereon. The program includes instructions for causing an image processing apparatus to implement processes to: acquire image data; estimate, based on the acquired image data, a skeleton position of a person in the image data; and execute image processing on an area which is different from an area of the person based on the estimated skeleton position.

[0010]

The respective configurations as described above enable execution of accurate image

processing as needed.

BRIEF DESCRIPTION OF DRAWINGS

[0011]

5 Fig. 1 is a figure for describing an overview of an image processing apparatus in a first example embodiment of the present disclosure;

 Fig. 2 is a block diagram showing an example of a configuration of the image processing apparatus;

 Fig. 3 is a figure showing an example of skeleton information;

10 Fig. 4 is a figure showing an example of skeleton detection by a skeleton recognizing unit;

 Fig. 5 is a flowchart showing an example of an operation of the image processing apparatus;

 Fig. 6 is a figure showing an example of a hardware configuration of an image processing
15 apparatus in a second example embodiment of the present disclosure; and

 Fig. 7 is a block diagram showing an example of a configuration of the image processing apparatus.

EXAMPLE EMBODIMENT

20 [0012]

[First Example Embodiment]

A first example embodiment of the present disclosure will be described with reference to

Figs. 1 to 5. Fig. 1 is a figure for describing an overview of an image processing apparatus 100.

Fig. 2 is a block diagram showing an example of a configuration of the image processing apparatus

100. Fig. 3 is a figure showing an example of skeleton information 143. Fig. 4 is a figure showing

an example of skeleton detection by a skeleton recognizing unit 152. Fig. 5 is a flowchart showing

5 an example of an operation of the information processing apparatus 100.

[0013]

In a first example embodiment of the present disclosure, an image processing apparatus 100 that is an information processing apparatus executing image processing such as masking and pixelation on a predetermined area within acquired image data 200 will be described. As illustrated

10 in Fig. 1, when acquiring the image data 200, the image processing apparatus 100 executes image processing on an area which is different from an area of a person in the image data 200. For example, the image processing apparatus 100 determines an area corresponding to each person shown within the image data 200 based on the result of skeleton detection by the skeleton recognizing unit 152. Then, the image processing apparatus 100 executes image processing on a
15 range which is different from the determined area in the image data 200. For example, by such processing, the image processing apparatus 100 executes image processing on a background excluding the area of the person in the image data 200.

[0014]

Fig. 2 shows an example of a configuration of the image processing apparatus 100.

20 Referring to Fig. 2, the image processing apparatus 100 includes as major components, for example, an operation input unit 110, a screen display unit 120, a communication I/F unit 130, a storing unit, and an operation processing unit 150.

[0015]

Fig. 2 illustrates a case of realizing a function as the image processing apparatus 100 using one information processing apparatus. However, the image processing apparatus 100 may be realized using a plurality of information processing apparatuses, for example, may be realized on the cloud. For example, the image processing apparatus 100 may be realized by a plurality of information processing apparatuses having some of the functions illustrated in Fig. 2. In addition, the image processing apparatus 100 may not include part of the configuration illustrated above, for example, may not include the operation input unit 110, or the image processing apparatus 100 may include a configuration other than the illustrated above.

10 [0016]

The operation input unit 110 is composed of an operation input device such as a keyboard and a mouse. The operation input unit 110 detects an operation by a person operating the image processing apparatus 100 and outputs the operation to the operation processing unit 150.

[0017]

15 The screen display unit 120 is composed of a screen display device such as an LCD (Liquid Crystal Display). The screen display unit 120 can display on a screen various information stored in the storing unit 140 in response to an instruction from the operation processing unit 150.

[0018]

20 The communication I/F unit 130 is composed of a data communication circuit. The communication I/F unit 130 performs data communication with an external device such as an imaging device connected via a communication line.

[0019]

The storing unit 140 is a storage device such as a hard disk and a memory. In the storing unit 140, processing information necessary for various processing by the operation processing unit 150 and a program 144 are stored. The program 144 is loaded to and executed by the operation processing unit 150 to realize various processing units. The program 144 is loaded in advance from an external device or a recording medium via a data input/output function such as the communication I/F unit 130, and stored in the storing unit 140. Major information stored in the storing unit 140 are, for example, a learned model 141, image information 142, and skeleton information 143.

[0020]

The learned model 141 is a learned model to be used when the skeleton recognizing unit 152 performs skeleton detection. For example, the learned model 141 is learned beforehand so as to output the coordinates of a skeleton in response to input of the image data 200. As an example, the learned model 141 can be learned in advance by machine learning using teacher data such as image data including the coordinates of a skeleton in an external device or the like. For example, the learned model 141 is acquired from an external device or the like via the communication I/F unit 130 or the like, and stored into the storing unit 140. The learned model 141 may be updated by a relearning process using additional teacher data.

[0021]

The image information 142 includes the image data 200 acquired by an external imaging device such as a camera. The image information 142 may include the chronological image data 200. For example, the image information 142 is acquired in advance from an external device or the like via the communication I/F unit 130 or the like, and stored into the storing unit 140.

[0022]

As an example, in the image information 142, identification information for identifying the image data 200 is associated with the image data 200. The image information 142 may include information other than the illustrated above, such as information showing the time and date when the imaging device acquired the image data 200 and information showing the use of the image data 200.

[0023]

As will be described later, the image information 142 may include the image data 200 before image processing and the image data 200 after image processing. In a case where the image information 142 includes the image data 200 after image processing, the image data 200 included by the image information 142 may be configured so that masking can be removed, or may be configured so that masking cannot be removed.

[0024]

The skeleton information 143 includes information showing the coordinates (skeleton coordinates) of each part of a person in the image data 200 estimated by skeleton detection by the skeleton recognizing unit 152. For example, the skeleton information 143 includes, for each image data 200, information showing the coordinates of each part corresponding to each person in the image data 200. For example, the skeleton information 143 is generated and updated as a result of a skeleton detection process by the skeleton recognizing unit 152.

[0025]

Fig. 3 shows an example of the skeleton information 143. Referring to Fig. 3, in the skeleton information 143, for example, identification information is associated with position

information of each part. Herein, the identification information is, for example, information corresponding to a person in the image data 200. The position information of each part includes, for example, information showing the skeleton coordinates of each part in the image data 200, such as the position of the pelvis.

5 [0026]

The parts included in the position information of each part correspond to those of the learned model 141. For example, pelvis, middle of backbone, ..., right knee, left knee, ..., right ankle, left ankle, ... are illustrated in Fig. 3. The position information of each part can include about 30 parts, such as right shoulder, ..., left elbow, ..., and so on (may be those illustrated above). The parts included in the position information of each part may be other than those illustrated in Fig. 3 or the like.

[0027]

The operation processing unit 150 has an arithmetic logic unit of a CPU (Central Processing Unit) or the like and a peripheral circuit thereof. The operation processing unit 150 loads the program 144 from the storing unit 140 and executes the program 144 to cause the above hardware to cooperate with the program 144 and realize various processing units. Major processing units realized by the operation processing unit 150 are, for example, an image acquiring unit 151, a skeleton recognizing unit 152, an area determining unit 153, a processing unit 154, and an output unit 155.

20 [0028]

The image acquiring unit 151 acquires the image data 200 from an external device such as an imaging device via the communication I/F unit 130. The image acquiring unit 151 may

acquire the chronological image data 200. Moreover, the image acquiring unit 151 stores the acquired image data 200 as the image information 142 into the storing unit 140.

[0029]

The image acquiring unit 151 may acquire, in addition to the image data 200, information showing the use or the like of the image data 200. The image acquiring unit 151 can store the image data 200 and also the information showing the use or the like as the image information 142 into the storing unit 140.

[0030]

The skeleton recognizing unit 152 estimates the skeleton of a person in the image data 200 by using the learned model 141. For example, the skeleton recognizing unit 152 inputs the image data 200 into the learned model 141 to estimate the coordinates in the image data 200 of each part such as upper part of backbone, right shoulder, left shoulder, right elbow, left elbow, right wrist, left wrist, right hand and left hand of each person in the image data as illustrated in Fig. 4. Moreover, the skeleton recognizing unit 152 associates the result of the estimation with identification information for identifying the person, and the like, and stores as the skeleton information 143 into the storing unit 140.

[0031]

The parts estimated by the skeleton recognizing unit 152 correspond to those of the learned model 141. Therefore, the skeleton recognizing unit 152 may recognize a part other than the illustrated above in accordance with the learned model 141.

[0032]

The area determining unit 153 determines an area to execute image processing based on

the result of the recognition by the skeleton recognizing unit 152. For example, the area determining unit 153 determines an area of a person based on the result of the recognition by the skeleton recognizing unit 152. Moreover, the area determining unit 153 determines an area to execute image processing based on the result of the determination of the area of the person.

5 [0033]

For example, the area determining unit 153 can specify an area of a person by any method using the result of the recognition by the skeleton recognizing unit 152. As an example, by inputting the coordinates recognized by the skeleton recognizing unit 152 and the image data 200 into a previously learned model, the skeleton recognizing unit 152 can obtain output of information showing an area of a person. For example, the abovementioned model is learned beforehand in an external device or the like by machine learning using teacher data including skeleton coordinates, image data, and information showing an area of a person. The skeleton recognizing unit 152 may determine an area of a person by a method other than the illustrated above, such as using luminance gradient information.

15 [0034]

Further, the area determining unit 153 can determine an area to execute image processing based on the result of the determination of the area of the person. For example, the area determining unit 153 determines a range which is different from the area of the person in the image data 200 as an area to execute image processing. As an example, the area determining unit 153 determines the whole range excluding the area of the person in the image data 200 as an area to execute image processing. The area determining unit 153 may determine part of a range which is different from an area of an object as an area to execute image processing, for example, determining the inside

of a designated range designated in advance of a range which is different from the area of the person as an area to execute image processing. Moreover, the area determining unit 153 may determine an area obtained by excluding a predetermined range from the area of the person in the image data 200 as an area to execute image processing. The area determining unit 153 may include, for example, an area of a person satisfying a predetermined condition in an area to execute image processing.

[0035]

The area determining unit 153 may be configured to estimate a predetermined range from the coordinates of the skeleton estimated by the skeleton recognizing unit 152 as an area of a person. In other words, the area determining unit 153 may determine, for example, an area excluding a predetermined range from the coordinates of the skeleton estimated by the skeleton recognizing unit 152 as an area to execute image processing. The abovementioned range may be defined in any manner.

[0036]

The processing unit 154 executes image processing such as masking on the range determined by the area determining unit 153. Then, the processing unit 154 stores the result of the processing as the image information 142 or the like into the storing unit 140. The processing unit 154 may execute processing for hiding information within a predetermined range, such as pixelation, instead of masking.

[0037]

As described above, the area determining unit 153 determines a range which is different from an area of a person in the image data 200 as an area to execute image processing. Therefore,

the processing unit 154 executes image processing on an area which is different from the area of the person estimated as a result of skeleton recognition. In other words, the processing unit 154 executes image processing on a background excluding the area of the person in the image data 200.

[0038]

5 After image processing such as masking, the processing unit 154 may store the result of the processing into the storing unit 140 or the like so as to be able to restore, or may store the result of the processing into the storing unit 140 or the like so as to be unable to restore. For example, the processing unit 154 may separately store the image data 200 before masking and the image 200 after masking into the storing unit 140, or may update information of the image information 10 142 with the image data 200 after masking. In addition, the processing unit 154 may be configured to select in accordance with the use or the like of the image data 200 whether to store so as to be able to restore or unable to restore.

[0039]

The output unit 155 outputs the masked image data 200, and so on. For example, the 15 output unit 155 displays the masked image data 200 or the like on the screen display unit 120, or transmits to an external device via the communication I/F unit 130. The output unit 155 may display or output information other than the illustrated above.

[0040]

The above is an example of a configuration of the image processing apparatus 100. Next, 20 an operation of the image processing apparatus 100 will be described with reference to Fig. 5.

[0041]

Fig. 5 is a flowchart showing an example of an operation of the image processing

apparatus 100. Referring to Fig. 5, the image acquiring unit 151 acquires the image data 200 acquired by an external device such as an imaging device from the imaging device or the like via the communication I/F unit 130 (step S101).

[0042]

5 The skeleton recognizing unit 152 recognizes the skeleton of a person in the image data 200 using the learned model 141 (step S102). For example, the skeleton recognizing unit 152 inputs the image data 200 into the learned model 141 to acquire the coordinates of each part such as upper part of backbone, right shoulder, left shoulder, right elbow, left elbow, right wrist, left wrist, right hand, and left hand of each person in the image data 200 as illustrated in Fig. 4.

10 [0043]

 The area determining unit 153 determines an area to execute image processing based on the result of the recognition by the skeleton recognizing unit 152. For example, the area determining unit 153 determines an area of a person based on the result of the recognition by the skeleton recognizing unit 152. The area determining unit 153 also determines an area to execute
15 image processing based on the result of the determination of the area of the person. Moreover, the processing unit 154 executes image processing such as masking on a range determined by the area determining unit 153 (step S103).

[0044]

 The output unit 155 outputs the masked image data 200 or the like (step S104). For
20 example, the output unit 155 displays the masked image data 200 or the like on the screen display unit 120, or transmits to an external device via the communication I/F unit 130.

[0045]

As described above, the image processing apparatus 100 includes the area determining unit 153 and the processing unit 154. With such a configuration, the processing unit 154 can execute image processing on a range determined by the area determining unit 153. As a result, it is possible to accurately execute image processing on a range which is different from an area of a person determined as a result of skeleton recognition.

[0046]

[Second Example Embodiment]

Next, a second example embodiment of the present disclosure will be described with reference to Figs. 6 and 7. In the second example embodiment of the present disclosure, an overview of a configuration of an image processing apparatus 300, which is an information processing apparatus, will be described.

[0047]

Fig. 6 shows an example of a hardware configuration of the image processing apparatus 300. Referring to Fig. 6, as an example, the image processing apparatus 300 has a hardware configuration as shown below including;

a CPU (Central Processing Unit) 301 (arithmetic logic unit),

a ROM (Read Only Memory) 302 (memory unit),

a RAM (Random Access Memory) 303 (memory unit),

programs 304 loaded to the RAM 303,

a storage device 305 in which the programs 304 are stored,

a drive device 306 that reads from and writes into a recording medium 310 outside the information processing apparatus,

a communication interface 307 connected to a communication network 311 outside the information processing apparatus,

an input/output interface 308 that inputs and outputs data, and

a bus 309 connecting the respective components.

5 [0048]

Further, the image processing apparatus 300 can realize functions as an acquiring unit 321, a recognizing unit 322 and a processing unit 323 shown in Fig. 7 by acquisition and execution of the programs 304 by the CPU 301. The programs 304 are, for example, stored in the storage device 305 or the ROM 302 in advance, and loaded to the RAM or the like and executed by the CPU 301 as needed. The programs 304 may be supplied to the CPU 301 via the communication network 311, or may be stored in a recording medium 310 in advance to be retrieved by the drive device 306 and supplied to the CPU 301.

[0049]

Fig. 6 shows an example of a hardware configuration of the image processing apparatus 300. The hardware configuration of the image processing apparatus 300 is not limited to the abovementioned case. For example, the image processing apparatus 300 may be configured by part of the abovementioned configuration, such as excluding the drive device 306.

[0050]

The acquiring unit 321 acquires image data from an external device or the like.

20 [0051]

The recognizing unit 322 estimates the skeleton position of a person in the image data acquired by the acquiring unit 321 based on the image data. For example, the recognizing unit 322

may estimate the skeleton position using a previously learned model or the like.

[0052]

The processing unit 323 executes image processing on an area which is different from an area of a person based on the skeleton position estimated by the recognizing unit 322.

5 [0053]

As described above, the image processing apparatus 300 includes the recognizing unit 322 and the processing unit 323. With such a configuration, the processing unit 323 can execute image processing on an area which is different from an area of a person based on skeleton information estimated by the recognizing unit 322. As a result, it is possible to accurately execute
10 image processing on an area excluding a person.

[0054]

The image processing apparatus such as the image processing apparatus 300 described above can be realized by installation of a predetermined program in the image processing apparatus. Specifically, a program as another aspect of the present invention is a program for causing an
15 image processing apparatus to execute processes to acquire image data, estimate the skeleton position of a person in the acquired image data based on the image data, and execute image processing on an area which is different from an area of a person based on the estimated skeleton position.

[0055]

20 Further, an image processing method executed by the information processing apparatus described above is a method executed by the information processing apparatus. The method includes acquiring image data, estimating the skeleton position of a person in the acquired image

data based on the image data, and executing image processing on an area which is different from an area of a person based on the estimated skeleton position.

[0056]

An invention of a program (or a recording medium), an image processing method, or the like, having the abovementioned configuration has the same action and effect as in the above case, and therefore, can achieve the object of the present invention described above.

[0057]

<Supplementary Notes>

The whole or part of the example embodiments disclosed above can be described as the following supplementary notes. An overview of an image processing apparatus and so on according to the present invention will be described. However, the present invention is not limited to the following configurations.

[0058]

(Supplementary Note 1)

An image processing apparatus comprising:
an acquiring unit configured to acquire image data;
a recognizing unit configured to estimate, based on the image data acquired by the acquiring unit, a skeleton position of a person in the image data; and
a processing unit configured to execute image processing on an area which is different from an area of the person based on the skeleton position estimated by the recognizing unit.

(Supplementary Note 2)

The image processing apparatus according to Supplementary Note 1, comprising

a determining unit configured to determine an area to execute image processing based on the skeleton position estimated by the recognizing unit,

wherein the processing unit is configured to execute image processing on the area determined by the determining unit.

5 (Supplementary Note 3)

The image processing apparatus according to Supplementary Note 2, wherein

the determining unit is configured to determine an area of the person based on the skeleton position estimated by the recognizing unit, and determine a range which is different from the determined area of the person as an area to execute image processing.

10 (Supplementary Note 4)

The image processing apparatus according to Supplementary Note 2 or 3, wherein

the determining unit is configured to determine an area of the person based on the skeleton position estimated by the recognizing unit, and determine a range other than the determined area of the person in the image data as an area to execute image processing.

15 (Supplementary Note 5)

The image processing apparatus according to Supplementary Note 2, wherein

the determining unit is configured to determine an area of the person based on the skeleton position estimated by the recognizing unit, and determine part of a range which is different from the determined area of the person as an area to execute image processing.

20 (Supplementary Note 6)

The image processing apparatus according to any one of Supplementary Notes 2 to 5, wherein

the determining unit is configured to estimate a predetermined range from estimated skeleton coordinates as an area of the person.

(Supplementary Note 7)

5 An image processing method by an information processing apparatus, the method comprising:

acquiring image data;

estimating, based on the acquired image data, a skeleton position of a person in the image data; and

10 executing image processing on an area which is different from an area of the person based on the estimated skeleton position.

(Supplementary Note 8)

The image processing method according to Supplementary Note 7, comprising:

determining an area to execute image processing based on the estimated skeleton position;

and

15 executing image processing on the determined area.

(Supplementary Note 9)

A computer program recorded thereon, comprising instructions for causing an information processing apparatus to implement processes to:

acquire image data;

20 estimate, based on the acquired image data, a skeleton position of a person in the image data; and

execute image processing on an area which is different from an area of the person based

on the estimated skeleton position.

(Supplementary Note 10)

The computer program according to Supplementary Note 9, comprising instructions for causing the information processing apparatus to implement processes to:

- 5 determine an area to execute image processing based on the estimated skeleton position;
and
execute image processing on the determined area.

[0059]

The program described in the above example embodiments and supplementary notes is
10 stored in a storage device or recorded on a computer-readable recording medium. For example,
the recording medium is a portable medium such as a flexible disk, an optical disk, a
magneto-optical disk, and a semiconductor memory.

[0060]

Although the present invention has been described with reference to the above example
15 embodiments, the present invention is not limited to the above example embodiments. The
configurations and details of the present invention can be changed in various manners that can be
understood by one skilled in the art within the scope of the present invention.

DESCRIPTION OF NUMERALS

20 [0061]

100 image processing apparatus

110 operation input unit

	120	screen display unit
	130	communication I/F unit
	140	storing unit
	141	learned model
5	142	image information
	143	skeleton information
	144	program
	150	operation processing unit
	151	image acquiring unit
10	152	skeleton recognizing unit
	153	area determining unit
	154	processing unit
	155	output unit
	200	image data
15	300	image processing apparatus
	301	CPU
	302	ROM
	303	RAM
	304	programs
20	305	storage device
	306	drive device
	307	communication interface

	308	input/output interface
	309	bus
	310	recording medium
	311	communication network
5	321	acquiring unit
	322	recognizing unit
	323	processing unit

CLAIMS

1. An image processing apparatus comprising:

an acquiring unit configured to acquire image data;

5 a recognizing unit configured to estimate, based on the image data acquired by the acquiring unit, a skeleton position of a person in the image data; and

a processing unit configured to execute image processing on an area which is different from an area of the person based on the skeleton position estimated by the recognizing unit.

10 2. The image processing apparatus according to Claim 1, comprising

a determining unit configured to determine an area to execute image processing based on the skeleton position estimated by the recognizing unit,

wherein the processing unit is configured to execute image processing on the area determined by the determining unit.

15

3. The image processing apparatus according to Claim 2, wherein

the determining unit is configured to determine an area of the person based on the skeleton position estimated by the recognizing unit, and determine a range which is different from the determined area of the person as an area to execute image processing.

20

4. The image processing apparatus according to Claim 2 or 3, wherein

the determining unit is configured to determine an area of the person based on the skeleton

position estimated by the recognizing unit, and determine a range other than the determined area of the person in the image data as an area to execute image processing.

5. The image processing apparatus according to Claim 2, wherein

5 the determining unit is configured to determine an area of the person based on the skeleton position estimated by the recognizing unit, and determine part of a range which is different from the determined area of the person as an area to execute image processing.

6. The image processing apparatus according to any one of Claims 2 to 5, wherein

10 the determining unit is configured to estimate a predetermined range from estimated skeleton coordinates as an area of the person.

7. An image processing method by an information processing apparatus, the method comprising:

15 acquiring image data;

estimating, based on the acquired image data, a skeleton position of a person in the image data; and

executing image processing on an area which is different from an area of the person based on the estimated skeleton position.

20

8. The image processing method according to Claim 7, comprising:

determining an area to execute image processing based on the estimated skeleton position;

and

executing image processing on the determined area.

9. A non-transitory computer-readable recording medium having a program recorded
5 thereon, the program comprising instructions for causing an information processing apparatus to
implement processes to:

acquire image data;

estimate, based on the acquired image data, a skeleton position of a person in the image
data; and

10 execute image processing on an area which is different from an area of the person based
on the estimated skeleton position.

10. The recording medium according to Claim 9,

wherein the program comprises instructions for causing the information processing

15 apparatus to implement processes to:

determine an area to execute image processing based on the estimated skeleton position;

and

execute image processing on the determined area.