CLAIMS

[Claim 1]

An image processing apparatus comprising:

detecting means for detecting a plurality of predetermined parts of a subject from an image;

estimating means for estimating a cause of failed detection if any of the plurality of predetermined parts is not detected in a result of the detection made by the detecting means, wherein the cause of the failed detection is either self-occlusion or the subject being partially outside the image; and

determining means for determining a state of the subject based on a part detected by the detecting means and the cause estimated by the estimating means,

wherein the state of the subject is determined based on whether the cause of the failed detection is self-occlusion or the subject being partially outside the image.

[Claim 2]

The image processing apparatus according to Claim 1, wherein the estimating means estimates the cause of the failed detection based on a position of the subject in the image.

[Claim 3]

The image processing apparatus according to Claim 2, wherein the estimating means estimates the cause of the

failed detection based on a distance between the position of the subject in the image and an end portion of the image.

[Claim 4]

The image processing apparatus according to Claim 1, wherein the estimating means estimates the cause of the failed detection based on a position of the subject and a position of an object not being the subject.

[Claim 5]

The image processing apparatus according to Claim 1, wherein the determining means determines the state of the subject based on a position of the detected part and the estimated cause.

[Claim 6]

The image processing apparatus according to Claim 5, wherein the position of the part is a position relative to a reference position of the subject.

[Claim 7]

The image processing apparatus according to Claim 1, wherein the determining means determines whether the state of the subject is normal or abnormal.

[Claim 8]

The image processing apparatus according to Claim 1, wherein the determining means determines a pose of the subject.

[Claim 9]

The image processing apparatus according to Claim 8, wherein the determining means determines whether the pose of the subject is abnormal.

[Claim 10]

The image processing apparatus according to Claim 1, wherein the subject is a human, and the predetermined parts are joints or regions of the human.

[Claim 11]

The image processing apparatus according to Claim 1, further comprising:

extracting means for extracting a feature quantity of the subject based on the part detected by the detecting means;

classifying means for classifying the feature quantity into one of a plurality of categories based on the state determined by the determining means; and

characteristic recognizing means for recognizing a characteristic of the subject based on a result of the classification performed by the classifying means.

[Claim 12]

The image processing apparatus according to Claim 11, wherein the characteristic recognizing means changes a method of recognition based on a result of the classification performed by the classifying means.

[Claim 13]

The image processing apparatus according to Claim 12, wherein the characteristic recognizing means excludes, from a target of recognition, a feature quantity classified into some of the categories.

[Claim 14]

The image processing apparatus according to Claim 12, wherein the characteristic recognizing means changes the method of recognition by changing a threshold used in the recognition.

[Claim 15]

The image processing apparatus according to Claim 12, wherein the characteristic recognizing means changes the method of recognition by changing a statistical model used in the recognition.

[Claim 16]

The image processing apparatus according to Claim 11, wherein the classifying means classifies the feature quantity for each of a plurality of images including the subject; and

the characteristic recognizing means recognizes the characteristic of the subject based on a result of the classification performed for the plurality of images by the classifying means.

[Claim 17]

The image processing apparatus according to Claim 11,

wherein the classifying means classifies the feature quantity of the subject using a plurality of chronological images.

[Claim 18]

The image processing apparatus according to Claim 11, further comprising tracking means for tracking the subject using the plurality of chronological images,

wherein the classifying means classifies the feature quantity of the subject based on a result of the tracking.

[Claim 19]

An image processing method comprising:

a detecting step of detecting a plurality of predetermined parts of a subject from an image;

an estimating step of estimating a cause of failed detection if any of the plurality of predetermined parts is not detected in a result of the detection made in the detecting step, wherein the cause of the failed detection is either self-occlusion or the subject being partially outside the image; and

a determining step of determining a state of the subject based on a part detected in the detecting step and the estimated cause,

wherein the state of the subject is determined based on whether the cause of the failed detection is self-occlusion or the subject being partially outside the image.

[Claim 20]

A program causing a computer to execute:

a detecting step of detecting a plurality of predetermined parts of a subject from an image;

an estimating step of estimating a cause of failed detection if any of the plurality of predetermined parts is not detected in a result of the detection made in the detecting step, wherein the cause of the failed detection is either self-occlusion or the subject being partially outside the image; and

a determining step of determining a state of the subject based on a part detected in the detecting step and the estimated cause,

wherein the state of the subject is determined based on whether the cause of the failed detection is self-occlusion or the subject being partially outside the image.