

the analysis performance of a video analysis system. For example, when the quality of image data including a person as a subject is increased by using the abovementioned techniques, a portion corresponding to the shadow of the person is also shown sharply. As a result, a video analysis system may falsely detect the sharply shown portion corresponding to the shadow of the person as a moving object. Thus, for a video analysis system, simple increase or alteration of the quality of an image does not always lead to increase of the analysis performance.

[0010]

Thus, a video analysis system has a problem that change of the environment of installation of a monitoring camera and change of video data may affect the accuracy of detection of a moving object.

SUMMARY

[0011]

Accordingly, embodiments of the present invention provide a video analysis system which solves the problem that change of the environment of installation of a monitoring camera and change of video data may affect the accuracy of detection of a moving object.

[0012]

According to a first aspect, there is provided a video analysis system including: a video data acquiring means for acquiring video data; a moving object detecting means for detecting a moving object from video data by using a moving object detection parameter, the moving object moving in the video data, the video data having been acquired by the video data acquiring means, the moving object detection parameter being a parameter for detecting a moving object; an environment information collecting means for collecting environment information representing an external environment of a place where the video data acquiring means is installed; and a parameter changing means for changing the moving object detection parameter on a basis of the environment information collected by the environment information collecting means, the moving object detection parameter being used when the moving object detecting means detects the moving object, wherein the moving object detection means is configured to use a predetermined filter when detecting the moving object from the video data and includes a moving object distinction threshold as one of moving object detection parameters, the predetermined filter being for removing a moving object other than a detection target object from a detection target, the detection target object being a target to be detected, the moving object distinction threshold being a predetermined threshold used when the predetermined filter distinguishes the detection target object from the moving object other than the detection target object; the parameter changing means changes the moving object distinction threshold on a basis of the environment information of the place where the external device having acquired the video data is installed, the moving object distinction threshold being one of the moving object detection parameters, the moving object detection means configured to use a shadow removal filter when detecting the moving object from the video data and includes a shadow removal threshold as one of the moving object distinction parameters, the shadow removal filter being configured to regard a

predetermined shadow as the moving object other than the detection target object and remove the predetermined shadow from the detection target, the shadow removal threshold being a threshold used when the shadow removal filter distinguishes the detection target object from the predetermined shadow; and the parameter changing means changes the shadow removal threshold on a basis of the environment information including time of the place where the external device having acquired the video data is installed, the shadow removal threshold being one of the moving object detection parameters.

[0013]

According to a second aspect, there is provided a video analysis device including: a video data acquisition part configured to acquire video data from an external device, the video data having been acquired by the external device; a moving object detection part configured to detect a moving object from video data by using a moving object detection parameter, the moving object moving in the video data, the video data having been acquired by the video data acquisition part, the moving object detection parameter being a parameter for detecting a moving object; an environment information collection part configured to collect environment information representing an external environment of a place where the external device having acquired the video data is installed; and a parameter changing part configured to change the moving object detection parameter on a basis of the environment information collected by the environment information collection part, the moving object detection parameter being used when the moving object detection part detects the moving object, wherein: the moving object detection part is configured to use a predetermined filter when detecting the moving object from the video data and includes a moving object distinction threshold as one of moving object detection parameters, the predetermined filter being for removing a moving object other than a detection target object from a detection target, the detection target object being a target to be detected, the moving object distinction threshold being a predetermined threshold used when the predetermined filter distinguishes the detection target object from the moving object other than the detection target object; the parameter changing part changes the moving object distinction threshold on a basis of the environment information of the place where the external device having acquired the video data is installed, the moving object distinction threshold being one of the moving object detection parameters, the moving object detection part is configured to use a shadow removal filter when detecting the moving object from the video data and includes a shadow removal threshold as one of the moving object distinction parameters, the shadow removal filter being configured to regard a predetermined shadow as the moving object other than the detection target object and remove the predetermined shadow from the detection target, the shadow removal threshold being a threshold used when the shadow removal filter distinguishes the detection target object from the predetermined shadow; and the parameter changing part changes the shadow removal threshold on a basis of the environment information including time of the place where the external device having acquired the video data is installed, the shadow removal threshold being one of the moving object detection parameters.

[0014]

According to a third aspect, there is provided a video analysis method including: collecting environment information and changing a moving object detection parameter on a basis of the collected environment information, the environment information representing an external environment of a place where an external device acquiring video data is installed, the moving object detection parameter being used when detecting a moving object from the video data; and detecting the moving object from the video data by using the changed moving object detection parameter, the moving object moving in the video data, the video data being acquired from the external device, using a predetermined filter when detecting the moving object from the video data and including detecting a moving object distinction threshold as one of moving object detection parameters, the predetermined filter being for removing a moving object other than a detection target object from a detection target, the detection target object being a target to be detected, the moving object distinction threshold being a predetermined threshold used when the predetermined filter distinguishes the detection target object from the moving object other than the detection target object; changing the moving object distinction threshold by a parameter changing part on a basis of the environment information of the place where the external device having acquired the video data is installed, the moving object distinction threshold being one of the moving object detection parameters, using a shadow removal filter when detecting the moving object from the video data and including a shadow removal threshold as one of the moving object distinction parameters, the shadow removal filter being configured to regard a predetermined shadow as the moving object other than the detection target object and remove the predetermined shadow from the detection target, the shadow removal threshold being a threshold used when the shadow removal filter distinguishes the detection target object from the predetermined shadow; and changing the shadow removal threshold by the parameter changing part on a basis of the environment information including time of the place where the external device having acquired the video data is installed, the shadow removal threshold being one of the moving object detection parameters.

[0015]

According to a fourth aspect, there is provided a computer program including instructions for causing a video analysis device to function as: a video data acquisition part configured to acquire video data from an external device, the video data being acquired by the external device; a moving object detection part configured to detect a moving object from video data by using a moving object detection parameter, the moving object moving in the video data, the video data being acquired by the video data acquisition part, the moving object detection parameter being a parameter for detecting a moving object; an environment information collection part configured to collect environment information representing an external environment of a place where the external device having acquired the video data is installed; and a parameter changing part configured to change the moving object detection parameter on a basis of the environment information acquired by the environment information collection part, the moving object detection parameter being used when the moving object detection part detects the

moving object, wherein the moving object detection part is configured to use a predetermined filter when detecting the moving object from the video data and includes a moving object distinction threshold as one of moving object detection parameters, the predetermined filter being for removing a moving object other than a detection target object from a detection target, the detection target object being a target to be detected, the moving object distinction threshold being a predetermined threshold used when the predetermined filter distinguishes the detection target object from the moving object other than the detection target object; the parameter changing part changes the moving object distinction threshold on a basis of the environment information of the place where the external device having acquired the video data is installed, the moving object distinction threshold being one of the moving object detection parameters, the moving object detection part is configured to use a shadow removal filter when detecting the moving object from the video data and includes a shadow removal threshold as one of the moving object distinction parameters, the shadow removal filter being configured to regard a predetermined shadow as the moving object other than the detection target object and remove the predetermined shadow from the detection target, the shadow removal threshold being a threshold used when the shadow removal filter distinguishes the detection target object from the predetermined shadow; and the parameter changing part changes the shadow removal threshold on a basis of the environment information including time of the place where the external device having acquired the video data is installed, the shadow removal threshold being one of the moving object detection parameters.

[0016]

With the configurations as described above, embodiments of the present invention enable provision of a video analysis system in which change of the environment of installation of a monitoring camera or change of video data do not affect the accuracy of detection of a moving object.

BRIEF DESCRIPTION OF DRAWINGS

[0017]

Fig. 1 is a view showing the configuration overview of a whole video analysis system according to a first exemplary embodiment of the present invention;

Fig. 2 is a block diagram showing the configuration of the video analysis system according to the first exemplary embodiment of the present invention;

Fig. 3 is a block diagram showing an example of the configuration of an environment information collecting means included by the video analysis system according to the first exemplary embodiment of the present invention;

Fig. 4 is a view for describing an example of a moving object detection parameter changed by a parameter changing means of a video analysis device shown in Fig. 2;

Claims

1. A video analysis device comprising:

a video data acquisition part configured to acquire video data from an external device, the video data having been acquired by the external device;

a moving object detection part configured to detect a moving object from video data by using a moving object detection parameter, the video data having been acquired by the video data acquisition part, the moving object detection parameter being a parameter for detecting a moving object;

an environment information collection part configured to collect environment information representing an external environment of a place where the external device having acquired the video data is installed; and

a parameter changing part configured to change the moving object detection parameter on a basis of the environment information collected by the environment information collection part, the moving object detection parameter being used when the moving object detection part detects the moving object, wherein:

the moving object detection part is configured to use a predetermined filter when detecting the moving object from the video data and includes a moving object distinction threshold as one of moving object detection parameters, the predetermined filter being for removing a moving object other than a detection target object from a detection target, the detection target object being a target to be detected, the moving object distinction threshold being a predetermined threshold used when the predetermined filter distinguishes the detection target object from the moving object other than the detection target object;

the parameter changing part changes the moving object distinction threshold on a basis of the environment information of the place where the external device having acquired the video data is installed, the moving object distinction threshold being one of the moving object detection parameters,

the moving object detection part is configured to use a shadow removal filter when detecting the moving object from the video data and includes a shadow removal threshold as

one of the moving object distinction parameters, the shadow removal filter being configured to regard a predetermined shadow as the moving object other than the detection target object and remove the predetermined shadow from the detection target, the shadow removal threshold being a threshold used when the shadow removal filter distinguishes the detection target object from the predetermined shadow; and

the parameter changing part changes the shadow removal threshold on a basis of the environment information including time of the place where the external device having acquired the video data is installed, the shadow removal threshold being one of the moving object detection parameters.

2. The video analysis device according to Claim 1, wherein:

the moving object detection part is configured to detect the moving object by obtaining a difference of image data extracted from the video data and includes a sensitivity threshold as one of moving object detection parameters, the sensitivity threshold being a predetermined threshold to become a criterion for recognizing a disparity between image data of a previous frame and image data of a current frame; and

the parameter changing part is configured to change the sensitivity threshold on a basis of the environment information of the place where the external device having acquired the video data is installed, the sensitivity threshold being one of the moving object detection parameters.

3. The video analysis device according to Claim 1, wherein:

the moving object detection part is configured to use a reciprocating object removal filter when detecting the moving object from the video data and includes a reciprocating object removal threshold as one of the moving object distinction parameters, the reciprocating object removal filter being configured to regard a reciprocating object as the moving object other than the detection target object and remove the reciprocating object from the detection target, the reciprocating object performing predetermined reciprocation, the predetermined

reciprocation being a repetitive movement, the reciprocating object removal threshold being a threshold used when the reciprocating object removal filter distinguishes the detection target object from the reciprocating object; and

the parameter changing part changes the reciprocating object removal threshold on a basis of the environment information of the place where the external device having acquired the video data is installed, the reciprocating object removal threshold being one of the moving object detection parameters.

4. The video analysis device according to Claim 3, wherein:

the environment information collection part is configured to collect wind speed information as the environment information, the wind speed information representing a wind speed; and

the parameter changing part changes the reciprocating object removal threshold in accordance with the wind speed represented by the wind speed information collected by the environment information collection part, the reciprocating object removal threshold being one of the moving object detection parameters.

5. The video analysis device according to any of Claims 1 to 4, further comprising a parameter set storage part configured to store a predetermined set of the moving object detection parameters as a parameter set, the predetermined set of the moving object detection parameters being corresponding to a possible external environment,

wherein the parameter changing part changes the moving object detection parameters, on a basis of the environment information of the place where the external device having acquired the video data is installed, by using the parameter set corresponding to the external environment represented by the environment information.

6. A video analysis method comprising:

collecting environment information and changing a moving object detection

parameter on a basis of the collected environment information, the environment information representing an external environment of a place where an external device acquiring video data is installed, the moving object detection parameter being used when detecting a moving object from the video data; and

detecting the moving object from the video data by using the changed moving object detection parameter, the video data being acquired from the external device,

using a predetermined filter when detecting the moving object from the video data and including detecting a moving object distinction threshold as one of moving object detection parameters, the predetermined filter being for removing a moving object other than a detection target object from a detection target, the detection target object being a target to be detected, the moving object distinction threshold being a predetermined threshold used when the predetermined filter distinguishes the detection target object from the moving object other than the detection target object;

changing the moving object distinction threshold by a parameter changing part on a basis of the environment information of the place where the external device having acquired the video data is installed, the moving object distinction threshold being one of the moving object detection parameters,

using a shadow removal filter when detecting the moving object from the video data and including a shadow removal threshold as one of the moving object distinction parameters, the shadow removal filter being configured to regard a predetermined shadow as the moving object other than the detection target object and remove the predetermined shadow from the detection target, the shadow removal threshold being a threshold used when the shadow removal filter distinguishes the detection target object from the predetermined shadow; and

changing the shadow removal threshold by the parameter changing part on a basis of the environment information including time of the place where the external device having acquired the video data is installed, the shadow removal threshold being one of the moving object detection parameters.

7. A computer-readable recording medium storing a program comprising instructions for causing a video analysis device to function as:

a video data acquisition part configured to acquire video data from an external device, the video data being acquired by the external device;

a moving object detection part configured to detect a moving object from video data by using a moving object detection parameter, the video data being acquired by the video data acquisition part, the moving object detection parameter being a parameter for detecting a moving object;

an environment information collection part configured to collect environment information representing an external environment of a place where the external device having acquired the video data is installed; and

a parameter changing part configured to change the moving object detection parameter on a basis of the environment information acquired by the environment information collection part, the moving object detection parameter being used when the moving object detection part detects the moving object, wherein

the moving object detection part is configured to use a predetermined filter when detecting the moving object from the video data and includes a moving object distinction threshold as one of moving object detection parameters, the predetermined filter being for removing a moving object other than a detection target object from a detection target, the detection target object being a target to be detected, the moving object distinction threshold being a predetermined threshold used when the predetermined filter distinguishes the detection target object from the moving object other than the detection target object;

the parameter changing part changes the moving object distinction threshold on a basis of the environment information of the place where the external device having acquired the video data is installed, the moving object distinction threshold being one of the moving object detection parameters,

the moving object detection part is configured to use a shadow removal filter when detecting the moving object from the video data and includes a shadow removal threshold as

one of the moving object distinction parameters, the shadow removal filter being configured to regard a predetermined shadow as the moving object other than the detection target object and remove the predetermined shadow from the detection target, the shadow removal threshold being a threshold used when the shadow removal filter distinguishes the detection target object from the predetermined shadow; and

the parameter changing part changes the shadow removal threshold on a basis of the environment information including time of the place where the external device having acquired the video data is installed, the shadow removal threshold being one of the moving object detection parameters.

8. A video analysis system comprising:

a video data acquiring means for acquiring video data;

a moving object detecting means for detecting a moving object from video data by using a moving object detection parameter, the video data having been acquired by the video data acquiring means, the moving object detection parameter being a parameter for detecting a moving object;

an environment information collecting means for collecting environment information representing an external environment of a place where the video data acquiring means is installed; and

a parameter changing means for changing the moving object detection parameter on a basis of the environment information collected by the environment information collecting means, the moving object detection parameter being used when the moving object detecting means detects the moving object, wherein

the moving object detection means is configured to use a predetermined filter when detecting the moving object from the video data and includes a moving object distinction threshold as one of moving object detection parameters, the predetermined filter being for removing a moving object other than a detection target object from a detection target, the detection target object being a target to be detected, the moving object distinction threshold

being a predetermined threshold used when the predetermined filter distinguishes the detection target object from the moving object other than the detection target object;

the parameter changing means changes the moving object distinction threshold on a basis of the environment information of the place where the external device having acquired the video data is installed, the moving object distinction threshold being one of the moving object detection parameters,

the moving object detection means configured to use a shadow removal filter when detecting the moving object from the video data and includes a shadow removal threshold as one of the moving object distinction parameters, the shadow removal filter being configured to regard a predetermined shadow as the moving object other than the detection target object and remove the predetermined shadow from the detection target, the shadow removal threshold being a threshold used when the shadow removal filter distinguishes the detection target object from the predetermined shadow; and

the parameter changing means changes the shadow removal threshold on a basis of the environment information including time of the place where the external device having acquired the video data is installed, the shadow removal threshold being one of the moving object detection parameters.