determination unit, a speaker, and an indicating lamp. The behaving person detection unit detects a behaving person on the basis of image information captured by the monitoring camera and reference image information stored in the reference image storage unit. The detection area determination unit determines which detection area of the detection areas the behaving person has been detected, on the basis of the behaving person detected by the behaving person detection unit and the detection area stored in the detection area data base. The suspicious individual determination unit determines whether the behaving person is the suspicious individual or not on the basis of the detection area detected by the detection area determination unit. A speaker and an indicating lamp notify existence of the suspicious individual in a case where the behaving person is determined to be the suspicious individual.

SUMMARY

The guard apparatus described in Patent document 1 explained above cannot do things other than detection of simple behavior such as crossing of a prohibited line, entry into a prohibited area, and the like. On the other hand, in recent years, it is desired to detect more complicated behavior such as break-opening a key and then enter thereinto.

Embodiments of the present disclosure provide a video analysis technology capable of detecting complicated behavior from a video.

According to a first aspect of the present disclosure, there is provided a video monitoring apparatus including a first storage which stores a first condition for detecting a first event from a video, a second storage which stores a second condition for detecting a second event from the video, and a output circuit which outputs a signal indicating that a logical relationship designated in advance by the first event and the second event is satisfied, wherein the first event is an event that a person stays in front of a door for a predetermined time, the second event is an event that the person enters at the door, and the logical relationship is a relationship that the second event occurs after the first event occurs.

According to an aspect of the present disclosure, there is provided a video monitoring apparatus comprising:

a first storage which stores a first condition for detecting a first event from a video:

a second storage which stores a second condition for detecting a second event from the video; and

an output circuit which outputs a signal indicating that a logical relationship designated in advanceby the first event and the second event is satisfied,

wherein the first event is an event that a moving object passes through a road in a specific direction, the second event is an event that the moving object passes through the road in a direction opposite to the specific direction, and the logical relationship is a relationship that the second event occurs after the first event occurs.

According to an aspect of the present disclosure, there is provided a control apparatus including a first detection circuit which detects a first event which satisfies a first condition from a video, a second detection circuit which detects a second event which satisfies a second condition from the video, and a

determination circuit which determines whether the first event and the second event satisfy some logical relationship or not, based on a detected result of the first event and the second event wherein the first event is an event that a person stays in front of a door for a predetermined time, the second event is an event that the person enters at the door, and the logical relationship is a relationship that the second event occurs after the first event occurs.

According to an aspect of the present disclosure, there is provided a control method that includes the steps of detecting a first event which satisfies a first condition from a video, detecting a second event which satisfies a second condition from the video, and determining whether the first event and the second event satisfy some logical relationship or not, on basis of a detected result of the first event and the second event.

According to an aspect, there is provided a control apparatus comprising:

a first detection circuit which detects a first event which satisfies a first condition from a video:

a second detection circuit which detects a second event which satisfies a second condition from the video; and

a determination circuit which determines whether the first event and the second event satisfy a logical relationship or not, based on a detected result of the first event and the second event,

wherein the first event is an event that a moving object passes through a road in a specific direction, the second event is an event that the moving object passes through the road in a direction opposite to the specific direction, and the logical relationship is a relationship that the seond event occurs after the first event occurs.

According to an aspect, there is provided a control method comprising:

detecting a first event which satisfies a first condition from a video;

detecting a second event which satisfies a second condition from the video; and

determining whether the first event and the second event satisfy some logical relationship or not, based on a detected result of the first event and the second event,

wherein the first event is an event that a moving object passes through a road in a specific direction, the second event is an event that the moving object passes through the road in a direction opposite to the specific direction, and the logical relationship is a relationship that the second event occurs after the first event occurs.

According to an aspect of the present disclosure, there is provided a

non-transitory readable storage medium storing a control program that enables a computer to implement the steps of detecting a first event which satisfies a first condition from a video, detecting a second event which satisfies a second condition from the video, and determining whether the first event and the second event satisfy some logical relationship or not, on basis of a detected result of the first event and the second event wherein the first event is an event that a person stays in front of a door for a predetermined time, the second event is an event that the person enters at the door, and the logical relationship is a relationship that the second event occurs after the first event occurs.

According to an aspect of the disclosure, there is provided a non-transitory readable storage medium storing a control program enables a computer to implement, detecting a first event which satisfies a first condition from a video;

detecting a second event which satisfies a second condition from the video; and determining whether the first event and the second event satisfy a logical relationship or not, based on a detected result of the first event and the second event, wherein the first event is an event that a moving object passes through a road in a specific direction, the second event is an event the moving object passes through the road in a direction opposite to the specific direction, and the logical relationship is a relationship that the second event occurs after the first event occurs.

According to embodiments of the video analysis technology of the present invention, complicated behavior can be detected from a video.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a figure illustrating a configuration of a video monitoring apparatus according to a first embodiment of the present invention.

Fig. 2A is a figure for explaining "behavior information about a moving object in a monitoring area" which is an example of a first condition and a second condition according to the first embodiment of the present invention.

Fig. 2B is a figure for explaining "behavior information about a moving object in a monitoring area" which is an example of a first condition and a second condition according to the first embodiment of the present invention.

Fig. 3 is a figure illustrating a configuration of a output circuit according to the first embodiment of the present invention.

Fig. 4A is a figure for explaining detection of a high-level condition according to the first embodiment of the present invention.

CLAIMS

1. A video monitoring apparatus comprising:

a first storage which stores a first condition for detecting a first event from a video;

a second storage which stores a second condition for detecting a second event from the video; and

an output circuit which outputs a signal indicating that a logical relationship designated in advance by the first event and the second event is satisfied, wherein the first event is an event that a person stays in front of a door for a predetermined time, the second event is an event that the person enters at the door, and the logical relationship is a relationship that the second event occurs after the first event occurs.

2. A video monitoring apparatus comprising:

a first storage which stores a first condition for detecting a first event from a video;

a second storage which stores a second condition for detecting a second event from the video; and

an output circuit which outputs a signal indicating that a logical relationship designated in advance by the first event and the second event is satisfied,

wherein the first event is an event that a moving object passes through a road in a specific direction, the second event is an event that the moving object passes through the road in a direction opposite to the specific direction, and the logical relationship is a relationship that the second event occurs after the first event occurs.

3. The video monitoring apparatus according to claim 1 or 2, further comprising:

a first input circuit which receives an input of the first condition;

a second input circuit which receives an input of the second condition; and

a conditional operator input circuit which receives an input of a conditional operator indicating the logical relationship.

4. The video monitoring apparatus according to claim 3,

wherein the output circuit includes determination circuit that receives a first signal indicating whether or not the video satisfies the first condition and a second signal indicating whether or not the video satisfies the second condition, and determines whether the logical relationship is satisfied or not by using true or false of the first signal and true or false of the second signal.

5. The video monitoring apparatus according to claim 3 or 4,

wherein the first condition or the second condition is information that can be obtained from the video.

6. The video monitoring apparatus according to claim 3 or 4,

wherein the first condition or the second condition is a fact that a moving object passes a line designated in advance in the video.

7. The video monitoring apparatus according to claim 3 or 4,

wherein the first condition or the second condition is a fact that a moving object passes a line designated in advance in a particular direction in the video.

8. The video monitoring apparatus according to claim 1,

wherein the first condition is related to a time for which a moving object stays in an area designated in advance in the video.

9. The video monitoring apparatus according to any one of claims 3 to 8, wherein the conditional operator input circuit includes an operation screen, and the operation screen includes an area displaying the conditional operator.

10. The video monitoring apparatus according to any one of claims 3 to 9, wherein the first input circuit, the second input circuit, and the conditional operator input circuit are integrally formed, whereby the received input content is switched by operation.

11. A control apparatus comprising:

a first detection circuit which detects a first event which satisfies a first condition from a video;

a second detection circuit which detects a second event which satisfies a second condition from the video; and

a determination circuit which determines whether the first event and the second event satisfy some logical relationship or not, based on a detected result of the first event and the second event, wherein the first event is an event that a person stays in front of a door for a predetermined time, the second event is an event that the person enters at the door, and the logical relationship is a relationship that the second event occurs after the first event occurs.

12. A control apparatus comprising:

a first detection circuit which detects a first event which satisfies a first condition from a video;

a second detection circuit which detects a second event which satisfies a second condition from the video; and

a determination circuit which determines whether the first event and the second event satisfy a logical relationship or not, based on a detected result of

the first event and the second event,

wherein the first event is an event that a moving object passes through a road in a specific direction, the second event is an event that the moving object passes through the road in a direction opposite to the specific direction, and the logical relationship is a relationship that the second event occurs after the first event occurs.

13. A control method comprising:

detecting a first event which satisfies a first condition from a video;

detecting a second event which satisfies a second condition from the video; and

determining whether the first event and the second event satisfy some logical relationship or not, based on a detected result of the first event and the second event, wherein the first event is an event that a person stays in front of a door for a predetermined time, the second event is an event that the person enters at the door, and the logical relationship is a relationship that the second event occurs after the first event occurs.

14. A control method comprising:

detecting a first event which satisfies a first condition from a video;

detecting a second event which satisfies a second condition from the video; and

determining whether the first event and the second event satisfy some logical relationship or not, based on a detected result of the first event and the second event,

wherein the first event is an event that a moving object passes through a road in a specific direction, the second event is an event that the moving object passes through the road in a direction opposite to the specific direction, and the logical relationship is a relationship that the second event occurs after the first event occurs.

15. A non-transitory readable storage medium storing a control program enables a computer to implement,

detecting a first event which satisfies a first condition from a video;

detecting a second event which satisfies a second condition from the video; and

determining whether the first event and the second event satisfy some logical relationship or not, based on a detected result of the first event and the second event, wherein the first event is an event that a person stays in front of a door for a predetermined time, the second event is an event that the person enters at the door, and the logical relationship is a relationship that the second event occurs after the first event occurs.

16. A non-transitory readable storage medium storing a control program enables a computer to implement,

detecting a first event which satisfies a first condition from a video;

detecting a second event which satisfies a second condition from the video; and

determining whether the first event and the second event satisfy a logical relationship or not, based on a detected result of the first event and the second event, wherein the first event is an event that a moving object passes through a road in a specific direction, the second event is an event the moving object passes through the road in a direction opposite to the specific direction, and the logical relationship is a relationship that the second event occurs after the first event occurs.