Fig. 7 is a diagram illustrating a functional configuration example of a face authentication gate apparatus according to an example embodiment.

Fig. 8 is a flowchart illustrating an operation example of a gate opening-closing control unit in the face authentication gate apparatus according to the example embodiment.

Fig. 9 is a diagram illustrating a functional configuration example of a face authentication gate apparatus according to an example embodiment.

Figs. 10A and 10B are diagrams for each illustrating a method for controlling an LED lighting unit in the face authentication gate apparatus according to the example embodiment.

Figs. 11A and 11B are diagrams for each illustrating a method for controlling the LED lighting unit in the face authentication gate apparatus according to the example embodiment.

Fig. 12 is a diagram illustrating a conceptual configuration example of the face authentication gate system according to the example embodiment.

DESCRIPTION OF EMBODIMENTS

[0021]

Example embodiments of the present invention will be described below by using drawings. Note that in every drawing, similar components are given similar signs, and description thereof is omitted as appropriate.

[0022]

"Acquisition" in the example embodiment includes at least one of fetching (active acquisition), by an own apparatus, data or information stored in another apparatus or storage medium and inputting (passive acquisition), to an own apparatus, data or information output from another apparatus. Examples of active acquisition include requesting or inquiring another apparatus for data or information to receive a reply therefrom, accessing another apparatus or storage medium to read out data or information therefrom, and the like. Further, examples of passive acquisition include receiving delivered (transmitted, push-notified, or the like) information, and the like. Furthermore, "acquisition" may be selectively acquiring received data or information, or may be selectively receiving delivered data or information.

[0023]

(First Example Embodiment)

<System Configuration>

Fig. 1 is a diagram illustrating a conceptual configuration example of a face authentication gate system 1 according to an example embodiment.

The face authentication gate system 1 includes a face authentication apparatus 10 (not

illustrated in Fig. 1), a housing 14, and a camera unit 20.

[0024]

The face authentication apparatus 10 performs authentication processing of a person by checking a feature value of a facial image of a preregistered person against a feature value extracted from a facial image of the person. Note that authentication processing of a person performed by the face authentication apparatus 10 may be performed by collating using a feature value of an iris besides face collation using a feature value of a face. For example, information about a feature value of at least one of a face and an iris of a person is tied to identification information of a user and is registered in a database (unillustrated) or the like when performing preregistration for use of this system (or for example, an existing system such as a check-in system at an airport). Alternatively, a feature value of at least one of a face and an iris of a person included in a blacklist, whitelist, or the like may be registered in a database.

[0025]

While the face authentication apparatus 10 is provided by a computer as will be described later, a face authentication processing function may be provided by a computer separate from the face authentication apparatus 10, such as a cloud server. In that case, the face authentication apparatus 10 functions as an image processing apparatus (unillustrated). Further, a computer providing the face authentication apparatus 10 or the image processing apparatus may be included in a housing of the camera unit 20 or may be separate from the camera unit 20.

[0026]

For example, the face authentication apparatus 10 (including the housing 14 and the camera unit 20) in the face authentication gate system 1 according to the present example embodiment is installed at a boarding gate at an airport. The face authentication apparatus 10 may be installed at an entry/exit gate of a room in which entering and exiting persons are managed. Alternatively, the face authentication apparatus 10 may be combined with a payment terminal for cashless payment and be installed as a gate for the payment terminal at a store or the like. Alternatively, the face authentication apparatus 10 may be installed as a gate at an entrance of an unmanned store. In addition, the face authentication apparatus 10 is applicable in a case of occurrence of a change in a light environment based on an installation location of the face authentication apparatus 10 or a change in the light environment due to a change in outdoor light according to the time of the day.

[0027]

Fig. 2 is a plan view of the face authentication gate system 1 viewed from above. The housing 14 has a predetermined height and extends across a predetermined distance along an

[0045]

Alternatively, when a ratio of the mean brightness value of pixels belonging to the left half of the face to the mean brightness value of pixels belonging to the right half (or a ratio of the mean brightness value of pixels belonging to the right half of the face to the mean brightness value of pixels belonging to the left half) is greater than a predetermined value, the image may be determined to be an image unsuitable for collating (in other words, the image is determined not to satisfy the criterion for face collation) due to one side being too bright or too dark (light being oblique).

[0046]

Furthermore, when the first image is determined not to satisfy the criterion for face collation (NO in Step S103), the control unit 104 controls the LED lighting unit 26 (Step S105). Then, the control unit 104 causes the image generation unit 102 to generate a second image by capturing an image of the person again (Step S107). On the other hand, when the first image is determined to satisfy the criterion for face collation (YES in Step S103), the control unit 104 bypasses Step S105 to Step S107.

[0047]

Then, the face authentication unit 52 executes face authentication processing by using the first image or the second image (Step S109). When the first image is determined to satisfy the criterion (YES in Step S103), the face authentication unit 52 uses the first image for the face authentication processing. On the other hand, when the first image is determined not to satisfy the criterion (NO in Step S103), the face authentication unit 52 uses the second image generated in Step S107 for the face authentication processing. The face authentication unit 52 performs face authentication by detecting the face of the person from the first image or the second image and determining a feature value of the face of the person.

[0048]

According to the present example embodiment, when a first image is determined not to satisfy a criterion for face collation, the LED lighting unit 26 is controlled by the control unit 104 in such a way as to satisfy the criterion for the face collation. Then, a second image is generated by capturing an image of the person again, and face authentication can be executed by the face authentication unit 52.

[0049]

When a gate for performing face authentication is introduced, an existing facility in particular does not originally assume image capture, and therefore an environment for an installation location of a camera may not be suitable for image capture. For example,

around the person (such as the background and a space on both sides of the person). Alternatively, as another example, the determination unit 110 may make determination on a light environment, based on observed values of illuminometers (unillustrated) installed inside a gate and in an area around the gate in addition to the color information.

[0066]

The determination unit 110 makes the following determination on a light environment, based on the difference between acquired color information of the face of a person and acquired color information of an ambient environment.

(a1) When the brightness of the face is equal to or greater than a certain value and the brightness difference between the face and the ambient environment is small, the light environment is determined to be follow light.

(a2) When the brightness of the face is less than the certain value and the brightness difference between the face and the ambient environment is small, the light environment is determined to be a dark place.

(a3) When the brightness of the face is less than the certain value and the brightness difference between the face and the ambient environment is large, the light environment is determined to be backlight.

(a4) When only part of the brightness of the face is high and the brightness difference between the face and the ambient environment is small, the light environment is determined to be oblique light.

The control unit 104 controls the intensity of the LED lighting unit 26, based on the determination result by the determination unit 110.

[0067]

For example, the control unit 104 controls the intensity of the LED lighting unit 26 as follows, based on the aforementioned determination result by the determination unit 110.

(b1) When the light environment is follow light, the entire lighting is turned off.

(b2) When the light environment is a dark place, lighting is turned on, and the intensity of the lighting is set in such a way that the brightness of the face is equal to or greater than a certain value.

(b3) When the light environment is backlight, lighting is turned on, and the intensity of the lighting is set in such a way that the brightness of the face is equal to or greater than the certain value.

(b4) When the light environment is oblique light, lighting is turned on and the intensity of the lighting is set in such a way that the brightness of the face is equal to or greater than the certain

value and is uniform.

[0068]

Setting of the intensity of the LED lighting unit 26 will be described.

An optimum value of an LED for the brightness difference between the face and the ambient environment when the LED is turned off is preregistered in a storage apparatus (unillustrated). The intensity of each LED in the LED lighting unit 26 can be set based on the registered optimum value of the LED. Alternatively, image capture may be performed again with the camera 5 after the intensity of an LED is changed by a specified amount, and when color information of the face in the generated facial image is inappropriate, the intensity of the LED may be changed again. Optimization may be performed by repeating the processing described above.

[0069]

Further, an upper limit may be provided in such a way that the intensity of an LED is set in a range good for visual observation and in a range not causing blown-out highlights of the face.

As for oblique light, in order to brighten an area around a dark part of the face, only part of the plurality of LEDs in the LED lighting unit 26 may be turned on.

[0070]

When a surrounding light environment exceeds a limit of ability of an LED to make a correction, for example, the control unit 104 may include a mechanism for giving an instruction for or automatically controlling lowering of a curtain or a blind around the face authentication gate apparatus 100 and lighting of a ceiling light. Alternatively, the control unit 104 may additionally implement parameter control of the camera 5 (such as exposure control).

[0071]

The present example embodiment provides effects similar to those provided by the aforementioned example embodiments.

[0072]

While the example embodiments of the present invention have been described above with reference to the drawings, the example embodiments are exemplifications of the present invention, and various configurations other than those described above may be employed.

[0073]

For example, the LED lighting units 26 each extending in the height direction of the camera unit 20 are arranged on both sides of the display unit 7 and the camera 5 in Fig. 3. Aside from this configuration, the LED lighting unit 26 may be placed in such a way as to

a procedure for turning on the lighting and setting the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value when a result of the determination indicates that the light environment is the dark place;

a procedure for turning on the lighting and setting the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value when a result of the determination indicates that the light environment is the backlight; and

a procedure for turning on the lighting and setting the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value and is uniform when a result of the determination indicates that the light environment is the oblique light.

[0082]

19. A face authentication system including:

a face authentication apparatus; and

an image processing apparatus, wherein

the image processing apparatus includes:

an image generation means for generating a first image by capturing an image of a person;

a control means for, when the first image does not satisfy a criterion for face collation, controlling lighting and causing the image generation means to generate a second image by capturing an image of the person again; and

a face authentication processing means for causing the face authentication apparatus to execute face authentication by using the first image or the second image.

20. The face authentication system according to 19., wherein

the face authentication processing means in the image processing apparatus causes the face authentication apparatus to perform the face authentication by detecting a face of the person from the first image or the second image and determining a feature value of the face of the person, and

the criterion is that the feature value of the face of the person detected from the first image is determinable by the face authentication apparatus.

21. The face authentication system according to 19. or 20., wherein

the lighting includes a plurality of light sources being arranged in a height direction, and

the control means in the image processing apparatus controls intensity of at least part of the plurality of light sources according to a position of the face of the person.

22. The face authentication system according to any one of 19. to 21., wherein

The face authentication processing unit in the image processing apparatus acquires color information of the face of the person and color information of an ambient

environment from the face authentication apparatus, and

the control means in the image processing apparatus controls the lighting by using acquired color information of the face of the person and acquired color information of the ambient environment.

23. The face authentication system according to 22., wherein

the image processing apparatus further includes

a determination means for making determination on a light environment, based on a difference between the acquired color information of the face of the person and the acquired color information of the ambient environment,

the determination means in the image processing apparatus

determines that the light environment is follow light when brightness of the face is equal to or greater than a certain value and a brightness difference between the face and the ambient environment is small,

determines that the light environment is a dark place when the brightness of the face is less than a certain value and a brightness difference between the face and the ambient environment is small,

determines that the light environment is backlight when the brightness of the face is less than a certain value and a brightness difference between the face and the ambient environment is large, and

determines that the light environment is oblique light when only part of the brightness of the face is high and a brightness difference between the face and the ambient environment is small, and

the control means in the image processing apparatus controls intensity of the lighting, based on a determination result by the determination means in the image processing apparatus.

24. The face authentication system according to 23., wherein

the control means in the image processing apparatus

turns off the entire lighting when the determination result indicates that the light environment is the follow light,

turns on the lighting and sets the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value when the determination result indicates that the light environment is the dark place,

turns on the lighting and sets the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value when the determination result indicates that the light environment is the backlight, and

turns on the lighting and sets the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value and is uniform when the determination result indicates that the light environment is the oblique light.

[0083]

25. A face authentication gate apparatus including

a gate opening-closing control means for controlling opening and closing of a gate through which a person passes, by using a face authentication result of face authentication executed by the face authentication apparatus according to any one of 1. to 6. by using a first image or a second image generated by capturing an image of the person passing through the gate.

26. A face authentication gate apparatus including:

an image generation means for generating a first image by capturing an image of a person;

a control means for, when the first image does not satisfy a criterion for face collation, controlling lighting and causing the image generation means to generate a second image by capturing an image of the person again;

a face authentication means for executing face authentication by using the first image or the second image; and

a gate opening-closing control means for controlling opening and closing of a gate through which the person passes, by using a result of the face authentication by the face authentication means.

27. The face authentication gate apparatus according to 26., wherein

the face authentication means performs the face authentication by detecting a face of the person from the first image or the second image and determining a feature value of a face of the person, and

the criterion is that the feature value of a face of the person detected from the first image is determinable by the face authentication means.

28. The face authentication gate apparatus according to 26. or 27., wherein

the lighting includes a plurality of light sources being arranged in a height direction, and

the control means controls intensity of at least part of the plurality of light sources according to a position of a face of the person.

29. The face authentication gate apparatus according to any one of 26. to 28., wherein

the face authentication means acquires color information of a face of the person and color information of an ambient environment, and

the control means controls the lighting by using acquired color information of a face of

32. A face authentication gate apparatus control method including, by a face authentication gate apparatus,

controlling opening and closing of a gate through which a person passes, by using a face authentication result of face authentication executed by the face authentication apparatus according to any one of 1. to 6. by using a first image or a second image generated by capturing an image of the person passing through the gate.

33. A face authentication gate apparatus control method including, by a face authentication gate apparatus:

generating a first image by capturing an image of a person;

when the first image does not satisfy a criterion for face collation, controlling lighting and generating a second image by capturing an image of the person again;

executing face authentication by using the first image or the second image; and

controlling opening and closing of a gate through which the person passes, by using a result of the face authentication.

34. The face authentication gate apparatus control method according to 33., further including, by the face authentication gate apparatus,

performing the face authentication by detecting a face of the person from the first image or the second image and determining a feature value of a face of the person, wherein

the criterion is that the feature value of a face of the person detected from the first image is determinable when the face authentication is performed.

35. The face authentication gate apparatus control method according to 33. or 34., wherein

the lighting includes a plurality of light sources being arranged in a height direction, and

the face authentication gate apparatus control method further includes, by the face authentication gate apparatus,

controlling intensity of at least part of the plurality of light sources according to a position of a face of the person.

36. The face authentication gate apparatus control method according to any one of 33. to 35., further including, by the face authentication gate apparatus:

acquiring color information of a face of the person and color information of an ambient environment; and

controlling the lighting by using acquired color information of a face of the person and acquired color information of the ambient environment.

37. The face authentication gate apparatus control method according to 36., further including, by the face authentication gate apparatus:

apparatus according to any one of 1. to 6. by using a first image or a second image generated by capturing an image of the person passing through the gate.

40. A program for causing a computer to execute:

a procedure for generating a first image by capturing an image of a person;

a procedure for, when the first image does not satisfy a criterion for face collation, controlling lighting and generating a second image by capturing an image of the person again;

a procedure for executing face authentication by using the first image or the second image; and

a procedure for controlling opening and closing of a gate through which the person passes, by using a result of the face authentication.

41. The program according to 40., further causing a computer to execute

a procedure for performing the face authentication by detecting a face of the person from the first image or the second image and determining a feature value of a face of the person, wherein

the criterion is that the feature value of a face of the person detected from the first image is determinable when the face authentication is performed.

42. The program according to 40. or 41., wherein

the lighting includes a plurality of light sources being arranged in a height direction, and

the program further causes a computer to execute

a procedure for controlling intensity of at least part of the plurality of light sources according to a position of a face of the person.

43. The program according to any one of 40. to 42., further causing a computer to execute:

a procedure for acquiring color information of a face of the person and color information of an ambient environment; and

a procedure for controlling the lighting by using acquired color information of a face of the person and acquired color information of the ambient environment.

44. The program according to 43., further causing a computer to execute

a procedure for making determination on a light environment, based on a difference between acquired color information of a face of the person and acquired color information of the ambient environment, wherein

the procedure for making the determination includes:

a procedure for determining that the light environment is follow light when brightness of the face is equal to or greater than a certain value and a brightness difference between the face and the ambient environment is small;

CLAIMS

1. A face authentication apparatus comprising:

image generation means for generating a first image by capturing an image of a person;

control means for, when the first image does not satisfy a criterion for face collation, controlling lighting and causing the image generation means to generate a second image by capturing an image of the person again; and

face authentication means for executing face authentication by using the first image or the second image.

2. The face authentication apparatus according to claim 1, wherein

the face authentication means performs the face authentication by detecting a face of the person from the first image or the second image and determining a feature value of the face of the person, and

the criterion is that the feature value of the face of the person detected from the first image is determinable by the face authentication means.

3. The face authentication apparatus according to claim 1 or 2, wherein

the lighting includes a plurality of light sources being arranged in a height direction, and

the control means controls intensity of at least part of the plurality of light sources according to a position of the face of the person.

4. The face authentication apparatus according to any one of claims 1 to 3, wherein

the face authentication means acquires color information of the face of the person and color information of an ambient environment, and

the control means controls the lighting by using acquired color information of the face of the person and acquired color information of the ambient environment.

5. The face authentication apparatus according to claim 4, further comprising

determination means for making determination on a light environment, based on a difference between the acquired color information of the face of the person and the acquired color information of the ambient environment, wherein

the determination means

determines that the light environment is follow light when brightness of the

face is equal to or greater than a certain value and a brightness difference between the face and the ambient environment is small,

determines that the light environment is a dark place when the brightness of the face is less than a certain value and a brightness difference between the face and the ambient environment is small,

determines that the light environment is backlight when the brightness of the face is less than a certain value and a brightness difference between the face and the ambient environment is large, and

determines that the light environment is oblique light when only part of the brightness of the face is high and a brightness difference between the face and the ambient environment is small, and

the control means controls intensity of the lighting, based on a determination result by the determination means.

6. The face authentication apparatus according to claim 5, wherein

the control means

turns off the entire lighting when the determination result indicates that the light environment is the follow light,

turns on the lighting and sets the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value when the determination result indicates that the light environment is the dark place,

turns on the lighting and sets the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value when the determination result indicates that the light environment is the backlight, and

turns on the lighting and sets the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value and is uniform when the determination result indicates that the light environment is the oblique light.

7. A face authentication apparatus control method comprising, by a face authentication apparatus:

generating a first image by capturing an image of a person;

when the first image does not satisfy a criterion for face collation, controlling lighting and generating a second image by capturing an image of the person again; and

executing face authentication by using the first image or the second image.

8. The face authentication apparatus control method according to claim 7, further comprising, by the face authentication apparatus

performing the face authentication by detecting a face of the person from the first image or the second image and determining a feature value of the face of the person, wherein

the criterion is that the feature value of the face of the person detected from the first image is determinable when the face authentication is performed.

9. The face authentication apparatus control method according to claim 7 or 8, wherein

the lighting includes a plurality of light sources being arranged in a height direction, and

the face authentication apparatus control method further comprises, by the face authentication apparatus,

controlling intensity of at least part of the plurality of light sources according to a position of the face of the person.

10. The face authentication apparatus control method according to any one of claims 7 to 9, further comprising, by the face authentication apparatus:

acquiring color information of the face of the person and color information of an ambient environment; and

controlling the lighting by using acquired color information of the face of the person and acquired color information of the ambient environment.

11. The face authentication apparatus control method according to claim 10, further comprising, by the face authentication apparatus:

making determination on a light environment, based on a difference between the acquired color information of the face of the person and the acquired color information of the ambient environment;

in the determination,

determining that the light environment is follow light when brightness of the face is equal to or greater than a certain value and a brightness difference between the face and the ambient environment is small,

determining that the light environment is a dark place when the brightness of the face is less than a certain value and a brightness difference between the face and the ambient environment is small,

determining that the light environment is backlight when the brightness of the face is less than a certain value and a brightness difference between the face and the ambient environment is large, and

determining that the light environment is oblique light when only part of the brightness of the face is high and a brightness difference between the face and the ambient environment is small; and

controlling intensity of the lighting, based on a result of the determination.

12. The face authentication apparatus control method according to claim 11, further comprising, by the face authentication apparatus:

turning off the entire lighting when a result of the determination indicates that the light environment is the follow light;

turning on the lighting and setting the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value when a result of the determination indicates that the light environment is the dark place;

turning on the lighting and setting the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value when a result of the determination indicates that the light environment is the backlight; and

turning on the lighting and setting the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value and is uniform when a result of the determination indicates that the light environment is the oblique light.

13. A computer-readable storage medium storing a program for causing a computer to execute:

a procedure for generating a first image by capturing an image of a person;

a procedure for, when the first image does not satisfy a criterion for face collation, controlling lighting and generating a second image by capturing an image of the person again; and

a procedure for executing face authentication by using the first image or the second image.

14. The computer-readable storage medium according to claim 13, wherein the program further causes a computer to execute

a procedure for performing the face authentication by detecting a face of the person from the first image or the second image and determining a feature value of the face of the person, wherein

the criterion is that the feature value of the face of the person detected from the first image is determinable when the face authentication is performed.

15. The computer-readable storage medium according to claim 13 or 14, wherein

the lighting includes a plurality of light sources being arranged in a height direction, and

the program further causes a computer to execute

a procedure for controlling intensity of at least part of the plurality of light sources according to a position of the face of the person.

16. The computer-readable storage medium according to any one of claims 13 to 15, wherein the program further causes a computer to execute:

a procedure for acquiring color information of the face of the person and color information of an ambient environment; and

a procedure for controlling the lighting by using acquired color information of the face of the person and acquired color information of the ambient environment.

17. The computer-readable storage medium according to claim 16, wherein the program further causes a computer to execute

a procedure for making determination on a light environment, based on a difference between the acquired color information of the face of the person and the acquired color information of the ambient environment, wherein

the procedure for making the determination includes:

a procedure for determining that the light environment is follow light when brightness of the face is equal to or greater than a certain value and a brightness difference between the face and the ambient environment is small;

a procedure for determining that the light environment is a dark place when the brightness of the face is less than a certain value and a brightness difference between the face and the ambient environment is small;

a procedure for determining that the light environment is backlight when the brightness of the face is less than a certain value and a brightness difference between the face and the ambient environment is large; and

a procedure for determining that the light environment is oblique light when

only part of the brightness of the face is high and a brightness difference between the face and the ambient environment is small, and

the program further causes a computer to execute

a procedure for controlling intensity of the lighting, based on a result of the determination.

18. The computer-readable storage medium according to claim 17, wherein the program further causes a computer to execute:

a procedure for turning off the entire lighting when a result of the determination indicates that the light environment is the follow light;

a procedure for turning on the lighting and setting the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value when a result of the determination indicates that the light environment is the dark place;

a procedure for turning on the lighting and setting the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value when a result of the determination indicates that the light environment is the backlight; and

a procedure for turning on the lighting and setting the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value and is uniform when a result of the determination indicates that the light environment is the oblique light.

19. A face authentication system comprising:

a face authentication apparatus; and

an image processing apparatus, wherein

the image processing apparatus includes:

image generation means for generating a first image by capturing an image of a person;

control means for, when the first image does not satisfy a criterion for face collation, controlling lighting and causing the image generation means to generate a second image by capturing an image of the person again; and

face authentication processing means for causing the face authentication apparatus to execute face authentication by using the first image or the second image.

20. The face authentication system according to claim 19, wherein

the face authentication processing means in the image processing apparatus causes the face authentication apparatus to perform the face authentication by detecting a face of the person

from the first image or the second image and determining a feature value of the face of the person, and

the criterion is that the feature value of the face of the person detected from the first image is determinable by the face authentication apparatus.

21. The face authentication system according to claim 19 or 20, wherein

the lighting includes a plurality of light sources being arranged in a height direction, and

the control means in the image processing apparatus controls intensity of at least part of the plurality of light sources according to a position of the face of the person.

22. The face authentication system according to any one of claims 19 to 21, wherein

the face authentication processing means in the image processing apparatus acquires color information of the face of the person and color information of an ambient environment from the face authentication apparatus, and

the control means in the image processing apparatus controls the lighting by using acquired color information of the face of the person and acquired color information of the ambient environment.

23. The face authentication system according to claim 22, wherein

the image processing apparatus further includes

determination means for making determination on a light environment, based on a difference between the acquired color information of the face of the person and the acquired color information of the ambient environment,

the determination means in the image processing apparatus

determines that the light environment is follow light when brightness of the face is equal to or greater than a certain value and a brightness difference between the face and the ambient environment is small,

determines that the light environment is a dark place when the brightness of the face is less than a certain value and a brightness difference between the face and the ambient environment is small,

determines that the light environment is backlight when the brightness of the face is less than a certain value and a brightness difference between the face and the ambient environment is large, and

determines that the light environment is oblique light when only part of the brightness of the face is high and a brightness difference between the face and the ambient

environment is small, and

the control means in the image processing apparatus controls intensity of the lighting, based on a determination result by the determination means in the image processing apparatus.

24. The face authentication system according to claim 23, wherein

the control means in the image processing apparatus

turns off the entire lighting when the determination result indicates that the light environment is the follow light,

turns on the lighting and sets the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value when the determination result indicates that the light environment is the dark place,

turns on the lighting and sets the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value when the determination result indicates that the light environment is the backlight, and

turns on the lighting and sets the intensity of the lighting in such a way that the brightness of the face is equal to or greater than the certain value and is uniform when the determination result indicates that the light environment is the oblique light.

25. A face authentication gate apparatus comprising

gate opening-closing control means for controlling opening and closing of a gate through which a person passes, by using a face authentication result of face authentication executed by the face authentication apparatus according to any one of claims 1 to 6 by using a first image or a second image generated by capturing an image of the person passing through the gate.

26. A face authentication gate apparatus control method comprising, by a face authentication gate apparatus,

controlling opening and closing of a gate through which a person passes, by using a face authentication result of face authentication executed by the face authentication apparatus according to any one of claims 1 to 6 by using a first image or a second image generated by capturing an image of the person passing through the gate.

27. A computer-readable storage medium storing a program for causing a computer to execute

a procedure for controlling opening and closing of a gate through which a person passes,

by using a face authentication result of face authentication executed by the face authentication apparatus according to any one of claims 1 to 6 by using a first image or a second image generated by capturing an image of the person passing through the gate.

28. A face authentication gate system comprising:

a face authentication apparatus; and

a face authentication gate apparatus, wherein

the face authentication gate apparatus includes:

image generation means for generating a first image by capturing an image of a person;

control means for, when the first image does not satisfy a criterion for face collation, controlling lighting and causing the image generation means to generate a second image by capturing an image of the person again;

face authentication processing means for causing the face authentication apparatus to execute face authentication by using the first image or the second image; and

gate opening-closing control means for controlling opening and closing of a gate through which a person passes, by using a face authentication result of the face authentication executed by the face authentication apparatus by using the first image or the second image generated by capturing an image of the person passing through the gate.