DESCRIPTION

TITLE OF INVENTION: LIVING BODY DETECTION SUPPORT APPARATUS, FACE AUTHENTICATION APPARATUS, LIVING BODY DETECTION SUPPORT METHOD, FACE AUTHENTICATION METHOD, PROGRAM, AND RECORDING MEDIUM

INCORPORATION BY REFERENCE

This application is based upon and claims the benefit of priority from Japanese patent application No. 2022-039941 filed on March 15, 2022, the disclosure of which is incorporated herein in its entirety by reference.

TECHNICAL FIELD

[0001] The present invention relates to a living body detection support apparatus, a face authentication apparatus, a living body detection support method, a face authentication method, a program, and a recording medium.

BACKGROUND ART

[0002] In recent years, face authentication technology has been used to perform personal authentication in various scenes.

[0003] Although face authentication has many advantages such as that it can be executed in a non-contact manner, it also has a risk for being broken through by deception using a face image or a video of a subject person. For this reason, a face authentication apparatus provided with a function of liveness determination (also referred to as living body determination or living body detection, for example) which is performed by detecting a color tone of a face or a facial motion of a subject person, is known as a technique for preventing spoofing with such deception (Patent Literature 1)

Citation List

Patent Literature

[0004]

Patent literature 1: JP 2020–184331A

SUMMARY

[0004a] In one aspect, the present disclosure refers to a living body detection support apparatus, comprising: a determination criteria information storage part; an instruction information output part; an image information acquisition part; a lip information acquisition part; a lip motion determination part; and a living body determination part, wherein the determination criteria information storage part stores determination criteria information, the determination criteria information is information in which types of lip motion and lip information for each of the types

of lip motion are associated with each other, the instruction information output part outputs lip motion instruction information, the lip motion instruction information includes information instructing a given type of lip motion, the image information acquisition part acquires lip image information including a mouth of a subject person, the lip information acquisition part acquires lip information of the subject person from the lip image information, the lip motion determination part determines whether the subject person performed the instructed lip motion, on the basis of the determination criteria information, the lip motion instruction information, and the lip information of the subject person, and the living body determination part determines that the subject person is a living body when it is determined that the subject person performed the instructed lip motion.

[0004b] In another aspect, the present disclosure refers to a living body detection support method, comprising: outputting instruction information; acquiring image information; acquiring lip information; determining lip motion; and determining living body, wherein the outputting instruction information outputs lip motion instruction information, the lip motion instruction information includes information instructing a given type of lip motion, the acquiring image information acquires lip image information including a mouth of a subject person, the acquiring lip information acquires the lip information of the subject person from the lip image information, the determining lip motion determines whether the subject person performed the instructed lip motion, on the basis of determination criteria information, the lip motion instruction information, and the lip information of the subject person, the determination criteria information is information in which types of lip motion and lip information for each of the types of lip motion are associated with each other, and the determining living body determines that the subject person is a living body, when it is determined that the subject person performed the instructed lip motion.

[0004c] In yet another aspect, the present disclosure refers to a program for causing a computer to execute following processes, comprising: an instruction information output process; an image information acquisition process; a lip information acquisition process; a lip motion determination process; and a living body determination process, wherein the instruction information output process outputs lip motion instruction information, the lip motion instruction information includes information instructing a given type of lip motion, the image information acquisition process acquires lip image information including a mouth of a subject person, the lip information acquisition process acquires lip information of the subject person from the lip image information, the lip motion determination process determines whether the subject person performed the instructed lip motion, on the basis of determination criteria information, the lip motion instruction information, and the lip information of the subject person, the determination criteria

information is information in which types of lip motion and lip information for each of the types of lip motion are associated with each other, and the living body determination process determines that the subject person is a living body when it is determined that the subject person performed the instructed lip motion.

Technical Problem

[0005] However, since spoofing methods are increasing year by year, a new living body detection method is required.

[0006] An example object of the invention is to provide a living body detection support apparatus which realizes living body detection.

Solution to Problem

[0007] A living body detection support apparatus according to an example of the disclosure includes: a determination criteria information storage part; an instruction information output part; an image information acquisition part; a lip information acquisition part; a lip motion determination part; and a living body determination part, wherein the determination criteria information storage part stores determination criteria information, the determination criteria information is information in which types of lip motion and lip information for each of the types of lip motion are associated with each other, the instruction information output part outputs lip motion instruction information, the lip motion instruction information includes information instructing a given type of lip motion, the image information acquisition part acquires lip image information including a mouth of a subject person, the lip information acquisition part acquires lip information of the subject person from the lip image information, the lip motion determination part determines whether the subject person performed the instructed lip motion, on the basis of the determination criteria information, the lip motion instruction information, and the lip information of the subject person, and the living body determination part determines that the subject person is a living body when it is determined that the subject person performed the instructed lip motion.

[0008] A face authentication apparatus according to an example of the disclosure includes: a living body detection part; a face image acquisition part; and an authentication part, wherein the living body detection part is the living body detection support apparatus according to an example of the disclosure, and executes living body detection of an authentication subject person, the face image acquisition part acquires a face image of the authentication subject person, and the authentication part executes face authentication of the authentication subject person on the basis of the face image of the authentication subject person and authentication criteria information.

[0009] A living body detection support method according to an example of the disclosure includes: outputting instruction information; acquiring image information; acquiring lip information; determining lip motion; and determining living body, wherein the outputting instruction information outputs lip motion instruction information, the lip motion instruction information includes information instructing a given type of lip motion, the acquiring image information acquires lip image information including a mouth of a subject person, the acquiring lip information acquires the lip information of the subject person from the lip image information, the determining lip motion determines whether the subject person performed the instructed lip motion, on the basis of determination criteria information, the lip motion instruction information, and the lip information of the subject person, the determination criteria information is information in which types of lip motion and lip information for each of the types of lip motion

are associated with each other, and the determining living body determines that the subject person is a living body, when it is determined that the subject person performed the instructed lip motion.

[0010] A face authentication method according to an example of the disclosure includes: detecting a living body; acquiring a face image; and authenticating, wherein the detecting a living body is the living detection support method according to an example of the disclosure, and executes living body detection of an authentication subject person, the acquiring a face image acquires the face image of the authentication subject person, and the authenticating executes face authentication of the authentication subject person on the basis of the face image of the authentication subject person and authentication criteria information.

[0011] A first program for causing a computer to execute following processes, according to an example of the disclosure includes: an instruction information output process; an image information acquisition process; a lip information acquisition process; a lip motion determination process; and a living body determination process, wherein the instruction information output process outputs lip motion instruction information, the lip motion instruction information includes information instructing a given type of lip motion, the image information acquisition process acquires lip image information including a mouth of a subject person, the lip information acquisition process acquires lip information of the subject person from the lip image information, the lip motion determination process determines whether the subject person performed the instructed lip motion, on the basis of determination criteria information, the lip motion instruction information, and the lip information of the subject person, the determination criteria information is information in which types of lip motion and lip information for each of the types of lip motion are associated with each other, and the living body determination process determines that the subject person is a living body when it is determined that the subject person performed the instructed lip motion.

[0012] A second program for causing a computer to execute following processes, according to an example of the disclosure includes: a living body detection process; a face image acquisition process; and an authentication process, wherein the living body detection process is executed by the first program, and executes living body detection of an authentication subject person, the face image acquisition process acquires a face image of the authentication subject person, and the authentication process executes face authentication of the authentication subject person, on the basis of the face image of the authentication subject person and authentication criteria information.

Advantageous Effects of Invention

[0013] An example advantage according to the invention is that a living body detection can be

CLAIMS

[Claim 1] A living body detection support apparatus, comprising:

a determination criteria information storage part;

an instruction information output part;

an image information acquisition part;

a lip information acquisition part;

a lip motion determination part; and

a living body determination part, wherein

the determination criteria information storage part stores determination criteria information,

the determination criteria information is information in which types of lip motion and lip information for each of the types of lip motion are associated with each other,

the instruction information output part outputs lip motion instruction information,

the lip motion instruction information includes information instructing a given type of lip motion,

the image information acquisition part acquires lip image information including a mouth of a subject person,

the lip information acquisition part acquires lip information of the subject person from the lip image information,

the lip motion determination part determines whether the subject person performed the instructed lip motion, on the basis of the determination criteria information, the lip motion instruction information, and the lip information of the subject person, and

the living body determination part determines that the subject person is a living body when it is determined that the subject person performed the instructed lip motion.

[Claim 2] The living body detection support apparatus according to Claim 1, wherein

the lip information includes lip coordinate information,

the determination criteria information includes information in which types of lip motion and lip coordinate information for each of the types of lip motion are associated with each other,

the lip information acquisition part acquires the lip coordinate information of the subject person from the lip image information as the lip information, and

the lip motion determination part specifies reference lip coordinate information

on the basis of the determination criteria information and the lip motion instruction information, and execute matching of the reference lip coordinate information and the lip coordinate information of the subject person to determine whether the subject person performed the instructed lip motion.

[Claim 3] The living body detection support apparatus according to Claim 1 or 2, wherein

the type of lip motion includes phonation of a given character,

the determination criteria information includes information in which types of given characters and lip information for each of the types of characters are associated with each other, and

the instruction information output part outputs information instructing the phonation of the given character, as the lip motion instruction information.

[Claim 4] A face authentication apparatus, comprising:

a living body detection part;

a face image acquisition part; and

an authentication part, wherein

the living body detection part is the living body detection support apparatus according to claim 1 or 2, and executes living body detection of an authentication subject person,

the face image acquisition part acquires a face image of the authentication subject person, and

the authentication part executes face authentication of the authentication subject person on the basis of the face image of the authentication subject person and authentication criteria information.

[Claim 5] A living body detection support method, comprising:

outputting instruction information;

acquiring image information;

acquiring lip information;

determining lip motion; and

determining living body, wherein

the outputting instruction information outputs lip motion instruction information,

the lip motion instruction information includes information instructing a given type of lip motion,

the acquiring image information acquires lip image information including a mouth of a subject person,

the acquiring lip information acquires the lip information of the subject person from the lip image information,

the determining lip motion determines whether the subject person performed the instructed lip motion, on the basis of determination criteria information, the lip motion instruction information, and the lip information of the subject person,

the determination criteria information is information in which types of lip motion and lip information for each of the types of lip motion are associated with each other, and

the determining living body determines that the subject person is a living body, when it is determined that the subject person performed the instructed lip motion.

[Claim 6] The method according to Claim 5, wherein

the lip information includes lip coordinate information,

the determination criteria information includes information in which a given type of lip motion and lip coordinate information for each of the types of lip motion are associated with each other,

the acquiring lip information acquires the lip coordinate information of the subject person from the lip image information, as the lip information, and

the determining lip motion specifies reference lip coordinate information on the basis of the determination criteria information and the lip motion instruction information, and executes matching of the reference lip coordinate information and the lip coordinate information of the subject person to determine whether the subject person performed the instructed lip motion.

[Claim 7] The method according to Claim 5 or 6, wherein

the type of lip motion includes phonation of a given character,

the determination criteria information includes information in which types of given characters and lip information for each of the types of characters are associated with each other,

the outputting instruction information outputs information instructing the phonation of a given character, as the lip motion instruction information.

[Claim 8] A face authentication method, comprising:

detecting a living body;

acquiring a face image; and

authenticating, wherein

the detecting a living body is the living detection support method according to claim 1 or 2, and executes living body detection of an authentication subject person,

the acquiring a face image acquires the face image of the authentication subject person, and

the authenticating executes face authentication of the authentication subject person on the basis of the face image of the authentication subject person and authentication criteria information.

[Claim 9] A program for causing a computer to execute following processes, comprising:

an instruction information output process;

an image information acquisition process;

a lip information acquisition process;

a lip motion determination process; and

a living body determination process, wherein

the instruction information output process outputs lip motion instruction information,

the lip motion instruction information includes information instructing a given type of lip motion,

the image information acquisition process acquires lip image information including a mouth of a subject person,

the lip information acquisition process acquires lip information of the subject person from the lip image information,

the lip motion determination process determines whether the subject person performed the instructed lip motion, on the basis of determination criteria information, the lip motion instruction information, and the lip information of the subject person,

the determination criteria information is information in which types of lip motion and lip information for each of the types of lip motion are associated with each other, and

the living body determination process determines that the subject person is a living body when it is determined that the subject person performed the instructed lip motion.

[Claim 10] A program for causing a computer to execute following processes, comprising:

a living body detection process;

a face image acquisition process; and

an authentication process, wherein

the living body detection process is executed by the program according to claim 9, and executes living body detection of an authentication subject person,

the face image acquisition process acquires a face image of the authentication subject person, and

the authentication process executes face authentication of the authentication subject person, on the basis of the face image of the authentication subject person and authentication criteria information.