CLAIMS

1. An impersonation detection system, which detects whether an authentication target person is a real person or a person captured in a plane surface object, comprising:

capturing means for capturing a plurality of frames of a face of the authentication target person at different angles;

feature detection means for detecting an aspect ratio which is a ratio of a longitudinal length to a lateral length of the face of the authentication target person from each of a plurality of frame images captured by the capturing means; and

impersonation detection means for detecting impersonation of a person using the plane surface object based on the aspect ratio of the face of the authentication target person captured at the different angles, wherein

the impersonation detection means extracts at least three feature points positioned apart in a width direction of the face among a plurality of feature points in each of the frame images, calculates a ratio of distances between the feature points on a right side and a left side of the face at the extracted feature points as a three-dimensional similarity degree, and detects the impersonation based on a plurality of the three-dimensional similarity degrees calculated for each of the frame images.

2. The impersonation detection system according to claim 1, wherein

the impersonation detection means calculates, in addition to the three-dimensional similarity, a change rate or a change amount of the aspect ratio of the face of the authentication target person with respect to a reference aspect ratio for each of the frame images as a plane similarity degree, and detects the impersonation based on a plurality of the calculated plane similarity degrees.

3. An impersonation detection system, which detects whether an authentication target

person is a real person or a person captured in a plane surface object, comprising:

capturing means for capturing a plurality of frames of a face of the authentication target person at different angles;

feature detection means for detecting an aspect ratio which is a ratio of a longitudinal length to a lateral length of the face of the authentication target person from each of a plurality of frame images captured by the capturing means; and

impersonation detection means for detecting impersonation of a person using the plane surface object based on the aspect ratio of the face of the authentication target person captured at the different angles, wherein

the impersonation detection means calculates, as a plane similarity degree, a change rate or a change amount of the aspect ratio of the face of the authentication target person with respect to a reference aspect ratio for each of the frame images, and detects the impersonation based on a plurality of the calculated plane similarity degrees, and

the impersonation detection means acquires, as the reference aspect ratio, an aspect ratio of the face of the person himself/herself registered in advance, or an aspect ratio of the face of the authentication target person in a frame image captured first among the plurality of frame images.

4. The impersonation detection system according to claim 2, wherein

the impersonation detection means performs a process of counting up a plane score in a case where the plane similarity degree is equal to or greater than a predetermined value and counting up a three-dimensional score in a case where the three-dimensional similarity degree is equal to or greater than a predetermined value for each of the frame images, detects that impersonation is present in a case where the plane score is equal to or greater than a predetermined difference D with respect to the three-dimensional score, and detects that

impersonation is not present in a case where the three-dimensional score is equal to or greater than the difference D with respect to the plane score.

5. An impersonation detection system, which detects whether an authentication target person is a real person or a person captured in a plane surface object, comprising:

capturing means for capturing a plurality of frames of a face of the authentication target person at different angles;

feature detection means for detecting an aspect ratio which is a ratio of a longitudinal length to a lateral length of the face of the authentication target person from each of a plurality of frame images captured by the capturing means; and

impersonation detection means for detecting impersonation of a person using the plane surface object based on the aspect ratio of the face of the authentication target person captured at the different angles, wherein

the feature detection means detects positions of feature points of the face of the target person for each of the frame images captured at the different angles, and

the impersonation detection means further performs a process of calculating a difference in the positions of the feature points from other frame images continuously captured, for each of the frame images, and determining that impersonation is present using both the plane surface object and a three-dimensional object in a case where the difference is equal to or greater than a threshold value TL.

6. A storage medium storing an impersonation detection program, the program detecting whether an authentication target person is a real person or a person captured in a plane surface object, causing a computer to execute:

an acquisition function of acquiring a plurality of frame images obtained by capturing the authentication target person at different angles;

a feature detection function of detecting an aspect ratio which is a ratio of a longitudinal length to a lateral length of a face of the authentication target person from each of the plurality of frame images; and

an impersonation detection function of detecting impersonation of a person using the plane surface object based on the aspect ratio of the face of the authentication target person captured at the different angles, wherein

the impersonation detection function extracts at least three feature points positioned apart in a width direction of the face among a plurality of feature points in each of the frame images, calculates a ratio of distances between the feature points on a right side and a left side of the face at the extracted feature points as a three-dimensional similarity degree, and detects the impersonation based on a plurality of the three-dimensional similarity degrees calculated for each of the frame images.

7. A storage medium storing an impersonation detection program, the program detecting whether an authentication target person is a real person or a person captured in a plane surface object, causing a computer to execute:

an acquisition function of acquiring a plurality of frame images obtained by capturing the authentication target person at different angles;

a feature detection function of detecting an aspect ratio which is a ratio of a longitudinal length to a lateral length of a face of the authentication target person from each of the plurality of frame images; and

an impersonation detection function of detecting impersonation of a person using the plane surface object based on the aspect ratio of the face of the authentication target person captured at the different angles, wherein

the impersonation detection means calculates, as a plane similarity degree, a change rate or a change amount of the aspect ratio of the face of the authentication target person with

respect to a reference aspect ratio for each of the frame images, and detects the impersonation based on a plurality of the calculated plane similarity degrees, and

the impersonation detection means acquires, as the reference aspect ratio, an aspect ratio of the face of the person himself/herself registered in advance, or an aspect ratio of the face of the authentication target person in a frame image captured first among the plurality of frame images.

8. A storage medium storing an impersonation detection program, the program detecting whether an authentication target person is a real person or a person captured in a plane surface object, causing a computer to execute:

an acquisition function of acquiring a plurality of frame images obtained by capturing the authentication target person at different angles;

a feature detection function of detecting an aspect ratio which is a ratio of a longitudinal length to a lateral length of a face of the authentication target person from each of the plurality of frame images; and

an impersonation detection function of detecting impersonation of a person using the plane surface object based on the aspect ratio of the face of the authentication target person captured at the different angles, wherein

the feature detection function detects positions of feature points of the face of the target person for each of the frame images captured at the different angles, and

the impersonation detection function further performs a process of calculating a difference in the positions of the feature points from other frame images continuously captured, for each of the frame images, and determining that impersonation is present using both the plane surface object and a three-dimensional object in a case where the difference is

equal to or greater than a threshold value TL.