room for consideration as to how to surely determine whether the person has passed through a passageway in the gate.

[0005] One non-limiting example of the present disclosure facilitates providing an information processing apparatus, an information processing method, and a program each capable of improving the determination accuracy of determining whether a person has passed through a specific passageway such as a passageway in a gate.

[0006] An information processing apparatus according to one exemplary example of the present disclosure includes: a detector that performs detection of a foreign object, in an image obtained by capturing a passageway from above, for each of a plurality of zones set to the passageway, where the foreign object is an object not included in the image in a stationary state; and a determiner that determines whether a person corresponding to the foreign object has passed through the passageway based on a change over time in a zone in which the foreign object is detected, among the plurality of zones.

[0006a] In one aspect, the present disclosure refers to an information processing apparatus, comprising, a detector that performs detection of a foreign object, in an image obtained by capturing a passageway from above, for each of a plurality of zones set to the passageway, the foreign object being an object not included in the image in a stationary state, and a determiner that determines whether a person corresponding to the foreign object has passed through the passageway based on a change over time in a zone in which the foreign object is detected, among the plurality of zones, wherein the detector starts the detection in response to a start of authentication processing using a face image of the person, and wherein a result of the determination is in association with an authentication processing result for the person.

[0006b] In another aspect, the present disclosure refers to an information processing method, comprising, performing, by one or more information processing apparatuses, detection of a foreign object, in an image obtained by capturing a passageway from above,

for each of a plurality of zones set to the passageway, the foreign object being an object not included in the image in a stationary state, and determining, by the one or more information processing apparatuses, whether a person corresponding to the foreign object has passed through the passageway based on a change over time in a zone in which the foreign object is detected, among the plurality of zones, wherein the detection starts in response to a start of authentication processing using a face image of the person, and wherein a result of the determination is in association with an authentication processing result for the person.

[0006c] In yet another aspect, the present disclosure refers to a program that causes one or more information processing apparatuses to perform, processing of performing detection of a foreign object, in an image obtained by capturing a passageway from above, for each of a plurality of zones set to the passageway, the foreign object being an object not included in the image in a stationary state, and processing of determining whether a person corresponding to the foreign object has passed through the passageway based on a change over time in a zone in which the foreign object is detected, among the plurality of zones, wherein the detection starts in response to a start of authentication processing using a face image of the person, and wherein a result of the determination is in association with an authentication processing result for the person.

[0007] It should be noted that a general or specific example may be implemented as a system, an apparatus, a method, an integrated circuit, a computer program, a storage medium, or any selective combination thereof.

[0008] One exemplary example of the present disclosure makes it possible to improve the determination accuracy of determining whether a person has passed through a specific passageway such as a passageway in a gate.

[0009] Additional benefits and advantages of the disclosed examples will become apparent from the specification and drawings. The benefits and/or advantages may be individually obtained by the various examples and features of the specification and drawings, which need

not all be provided in order to obtain one or more of such benefits and/or advantages.

Brief Description of Drawings

CLAIMS

[Claim 1] An information processing apparatus, comprising:

a detector that performs detection of a foreign object, in an image obtained by capturing a passageway from above, for each of a plurality of zones set to the passageway, the foreign object being an object not included in the image in a stationary state; and

a determiner that determines whether a person corresponding to the foreign object has passed through the passageway based on a change over time in a zone in which the foreign object is detected, among the plurality of zones,

wherein the detector starts the detection in response to a start of authentication processing using a face image of the person, and

wherein a result of the determination is in association with an authentication processing result for the person.

[Claim 2] The information processing apparatus according to claim 1, wherein

in a case where the change over time indicates that, among the plurality of zones, the zone in which the foreign object is detected changes in sequence between a zone corresponding to an entrance of the passageway and a zone corresponding to an exit of the passageway, the determiner determines that the person has passed from the entrance of the passageway to the exit of the passageway.

[Claim 3] The information processing apparatus according to claim 1, wherein

in a case where the change over time indicates that an order of a plurality of the zones in which the foreign object is detected is reversed, the determiner determines that the person has gone back in the passageway.

[Claim 4] The information processing apparatus according to claim 1, wherein

the determiner determines whether the foreign object is the person based on a size of the foreign object, and

the determiner does not use the foreign object which has been determined as not the person, in determination as to whether the person has passed through the passageway.

[Claim 5] The information processing apparatus according to claim 1, wherein

a floor surface of the passageway is subjected to color coding for each of the plurality of zones.

[Claim 6] The information processing apparatus according to claim 5, wherein

the color coding is a pattern that changes stepwise for each of the plurality of zones.

[Claim 7] The information processing apparatus according to claim 5, wherein

the color coding is a pattern in which a specific color appears periodically for each of the plurality of zones.

[Claim 8] The information processing apparatus according to claim 1, wherein:

in the detection of the foreign object, the detector varies at least one of hue, brightness, colorfulness, and/or contrast for each of the plurality of zones.

[Claim 9] The information processing apparatus according to claim 1, wherein:

a width of one of the plurality of zones in a direction along a traveling direction of the passageway is a width that allows only one person to pass through the passageway, and

in a case where a plurality of the foreign objects corresponding to a plurality of the persons is detected in the passageway, the determiner determines whether the plurality of persons has passed through the passageway, by assuming that replacement of an order of the

plurality of persons along the traveling direction of the passageway does not occur until the plurality of persons passes through the passageway.

[Claim 10] The information processing apparatus according to claim 1, wherein

the determiner sets a width of one, some or all of the plurality of zones in a direction along a traveling direction of the passageway to a width that varies depending on a position of the person in the image.

[Claim 11] The information processing apparatus according to claim 10, wherein

the determiner sets the width of a zone of the plurality of zones to be narrower as the position of the person is closer to a center of the image, the zone being close to a center of the passageway.

[Claim 12] The information processing apparatus according to claim 1, wherein

the passageway is a passageway in a gate at which face authentication of the person is performed.

[Claim 13] An information processing method, comprising:

performing, by one or more information processing apparatuses, detection of a foreign object, in an image obtained by capturing a passageway from above, for each of a plurality of zones set to the passageway, the foreign object being an object not included in the image in a stationary state; and

determining, by the one or more information processing apparatuses, whether a person corresponding to the foreign object has passed through the passageway based on a change over time in a zone in which the foreign object is detected, among the plurality of zones,

wherein the detection starts in response to a start of authentication processing using a

face image of the person, and

wherein a result of the determination is in association with an authentication processing result for the person.

[Claim 14] A program that causes one or more information processing apparatuses to perform:

processing of performing detection of a foreign object, in an image obtained by capturing a passageway from above, for each of a plurality of zones set to the passageway, the foreign object being an object not included in the image in a stationary state; and

processing of determining whether a person corresponding to the foreign object has passed through the passageway based on a change over time in a zone in which the foreign object is detected, among the plurality of zones,

wherein the detection starts in response to a start of authentication processing using a face image of the person, and

wherein a result of the determination is in association with an authentication processing result for the person.