【CLAIMS】

【Claim 1】

A hologram detection method, the hologram detection method comprising:

inputting a first image, obtained by capturing a detection object on the basis of first flash intensity, to a neural network model to obtain a first detection result value representing the detection or not of a hologram for each of predetermined at least one detection unit regions;

comparing a threshold value with the first detection result value obtained for each detection unit region to determine the detection or not of a hologram in the first image and a first detection unit region where a hologram is detected;

inputting a second image, obtained by capturing the detection object on the basis of second flash intensity, to the neural network model to obtain a second detection result value representing the detection or not of a hologram for each of the predetermined at least one detection unit regions;

comparing the threshold value with the second detection result value obtained for each detection unit region to determine the detection or not of a hologram in the second image and a second detection unit region where a hologram is detected;

comparing the first detection unit region with the second detection unit region to determine the authenticity or not of the detection object;

when the hologram is not detected in the second image or the first detection unit region is the same as the second detection unit region, inputting a third image, obtained

by capturing the detection object on the basis of third flash intensity, to the neural network model to obtain a third detection result value representing the detection or not of a hologram for each of the at least one detection unit regions;

comparing the threshold value with the third detection result value obtained for each detection unit region to determine the detection or not of the hologram in the third image and a third detection unit region where a hologram is detected; and

comparing the first detection unit region with the third detection unit region to determine the authenticity or not of the detection object.

【Claim 2】

The hologram detection method of claim 1, wherein, when there is a detection unit region where the first detection result value is greater than or equal to the threshold value, the detection of the hologram in the first image is determined and a corresponding detection unit region is determined as the first detection unit region.

【Claim 3】

The hologram detection method of claim 1, wherein, when the first detection unit region differs from the second detection unit, the detection object is determined to be normal.

【Claim 4】

The hologram detection method of claim 1, wherein, when the first detection unit region differs from the third detection unit region, the detection object is determined to be normal, and when the hologram is not detected in the third image or the first detection

unit region is the same as the third detection unit region, the detection object is determined to be abnormal.

【Claim 5】

The hologram detection method of claim 4, further comprising transmitting, to a management server, an image captured based on lowest flash intensity and an image captured based on highest flash intensity among the first to third images so as to additionally check the authenticity or not of the detection object, when it is determined that the detection object is abnormal.

【Claim 6】

A hologram detection method, the hologram detection method comprising:

obtaining a first detection result value for each of predetermined at least one detection unit regions by attempting to detect a hologram for each of the predetermined at least one detection unit regions with respect to a first image obtained by capturing a detection object on the basis of first flash intensity;

obtaining a second detection result value for each of the predetermined at least one detection unit regions by attempting to detect a hologram for each of the predetermined at least one detection unit regions with respect to a second image obtained by capturing the detection object on the basis of second flash intensity;

determining the authenticity or not of the detection object by comparing a first detection unit region, where the hologram is detected based on a comparison result of the first detection result value and a threshold value, of the detection unit regions in the first

image and a second detection unit region, where the hologram is detected based on a comparison result of the second detection result value and the threshold value, of the detection unit regions in the second image;

when the hologram is not detected in the second image or the first detection unit region is the same as the second detection unit region, obtaining a third detection result value for each of the detection unit regions by attempting to detect a hologram for each of the detection unit regions with respect to a third image obtained by capturing the detection object on the basis of third flash intensity; and

determining the authenticity or not of the detection object by comparing the first detection unit region and a third detection unit region, where it is determined that the hologram is detected based on a comparison result of the third detection result value and the threshold value, of the detection unit regions in the third image.

【Claim 7】

The hologram detection method of claim 6, wherein the determining comprises determining the detection object to be normal when the first detection unit region differs from the second detection unit region.

【Claim 8】

The hologram detection method of claim 6, wherein the detection object is determined to be normal when the first detection unit region differs from the third detection unit region; and

wherein the detection object is determined to be abnormal when the hologram is

not detected in the third image or the first detection unit region is the same as the third detection unit region.

【Claim 9】

The hologram detection method of claim 8, further comprising transmitting, to a management server, an image captured based on lowest flash intensity and an image captured based on highest flash intensity among the first to third images so as to additionally check the authenticity or not of the detection object, when it is determined that the detection object is abnormal.

【Claim 10】

The hologram detection method of claim 1 or 6, wherein the detection unit region comprises a first region including a photograph.

【Claim 11】

The hologram detection method of claim 10, wherein the detection unit region further comprises a second region where a region except the first region is divided into n number of regions in the detection object.

【Claim 12】

The hologram detection method of claim 11, wherein the second region comprises at least one of a region including a name and a region including an issued date of the detection object.

【Claim 13】

The hologram detection method of claim 6, wherein the first and second detection

result values are obtained by inputting the first and second images to a neural network model including a deep neural network (DNN) block configured with a convolution neural network (CNN).

【Claim 14】

A hologram detection service providing server, the hologram detection service providing server comprising:

a hologram detector configured to obtain a detection result value for each detection unit region by attempting to detect a hologram for each of at least one detection unit regions, with respect to each of a plurality of images obtained by capturing a detection object on the basis of different flash intensities; and

an authenticity determiner configured to determine the authenticity or not of the detection object on the basis of a first detection result value obtained for each detection unit region in a first image, captured based on first flash intensity, of the plurality of images and a second detection result value obtained for each detection unit region in a second image, captured based on second flash intensity, of the plurality of images,

wherein, when a hologram is not detected in the second image or a first detection unit region, where it is determined that the hologram is in the first image, is the same as a second detection unit region where it is determined that the hologram is detected in the second image, the authenticity determiner determines the authenticity or not of the detection object, on the basis of the first detection result value and a third detection result value obtained for each detection unit region in a third image captured based on third

flash intensity among the plurality of images.

【Claim 15】

The hologram detection service providing server of claim 14, wherein, when a first detection unit region, where it is determined that the hologram is detected based on the first detection result value in the first image, differs from a second detection unit region where it is determined that the hologram is detected based on the second detection result value in the second image, the authenticity determiner determines that the detection object is normal.

【Claim 16】

The hologram detection service providing server of claim 14, wherein,

when the first detection unit region differs from a third detection unit region where it is determined that the hologram is detected based on the third detection result value in the third image, the authenticity determiner determines that the detection object is normal, and when a hologram is not detected in the third image or the first detection unit region is the same as the second detection unit region, the authenticity determiner determines that the detection object is abnormal, and

when it is determined that the detection object is abnormal, the authenticity determiner transmits, to a management server, an image captured based on lowest flash intensity and an image captured based on highest flash intensity among the first to third images so as to additionally check the authenticity or not of the detection object.

【Claim 17】

The hologram detection service providing server of claim 14, wherein the authenticity determiner determines a detection unit region, where a first detection result value greater than or equal to a threshold value is obtained in the first image, as a first detection unit region where a hologram is detected, and determines a detection unit region, where a second detection result value greater than or equal to the threshold value is obtained in the second image, as a second detection unit region where a hologram is detected.

【Claim 18】

The hologram detection service providing server of claim 14, wherein the detection unit region comprises a first region including a photograph.

【Claim 19】

The hologram detection service providing server of claim 18, wherein the detection unit region further comprises a second region where a region except the first region is divided into n number of regions in the detection object, and the second region comprises at least one of a region including a name and a region including an issued date of the detection object.

【Claim 20】

The hologram detection service providing server of claim 14, wherein the hologram detector inputs a plurality of images, obtained by capturing the detection object, to a neural network model including a deep neural network (DNN) block configured with a convolution neural network (CNN) to obtain a detection result value

for each detection region included in the plurality of images.