CLAIMS

What is claimed is:

1. A computer-implemented method, comprising:

receiving image data of a cropped photograph region of an identity document (ID), wherein the ID comprises a photograph and the cropped photograph region comprises at least the photograph;

predicting, by a multiclass classification model, an ID category based on the image data of the cropped photograph region of the ID, wherein the predicted ID category corresponds to one of a set of predefined classes in the multiclass classification model;

comparing the predicted ID category with an indicated category of the ID;

in response to the predicted ID category mismatching the indicated category of the ID, determining that the cropped photograph region includes a replaced photograph; and

updating training data of the multiclass classification model by including the image data of the cropped photograph region of the ID.

2. The method as claimed in claim 1, wherein the cropped photograph region further comprises a background surrounding the photograph.

3. The method as claimed in claim 2, wherein the photograph has a height of H and a width of W, and the cropped photograph region has a height between H and R_H*H and a width between W *and* R_W*W, wherein R_H and R_W are predetermined ratios that are greater than 1.

4. The method as claimed in any one of the preceding claims, wherein receiving the image data of the cropped photograph region of the ID comprises:

receiving an image of the ID;

pre-processing the image of the ID to generate an aligned image of the ID; and

cropping a photograph region from the aligned image of the ID based on the indicated category of the ID and photograph location information corresponding to the indicated category of the ID.

5. The method as claimed in any one of the preceding claims, wherein predicting the ID category based on the image data of the cropped photograph region comprises:

inputting the image data to the multiclass classification model;

outputting a score for each class in the set of the predefined classes; and

determining the ID category, wherein the ID category corresponds to a class in the set of the predefined classes with a highest score.

6. The method as claimed in claim 5, the method further comprising:

setting a threshold for the highest score; and

in response to the predicted ID category matching the indicated category of the ID and the highest score being below the threshold, determining that the cropped photograph region comprises a replaced photograph.

7. The method as claimed in any one of the preceding claims, wherein the indicated category of the ID is entered or selected by a user.

8. The method as claimed in any one of the preceding claims, wherein the set of predefined classes comprises national ID cards, passports, driver licenses from one or more countries.

9. The method as claimed in any one of the preceding claims, wherein the multiclass classification model is trained by:

providing sample images of *N* categories of photo IDs;

obtaining cropped photograph regions from the sample images as the training data; and

training a classification model of *N* classes based on the cropped photograph regions, wherein the *N* classes correspond to the *N* categories of photo IDs.

10. The method as claimed in claim 9, wherein obtaining the cropped photograph regions from the sample images as the training data comprises:

pre-processing at least one of the sample images to generate an aligned image of the photo ID; and

cropping a photograph region from the aligned image of the photo ID, based on a category of the photo ID and photograph location information corresponding to the category of the photo ID.

11. The method as claimed in claim 9 or 10, wherein training the classification model of *N* classes based on the cropped photograph regions is based on a convolutional neural network (CNN) algorithm.

12. A computer-implemented system, comprising:

one or more processors; and

one or more computer-readable memories coupled to the one or more processors and having instructions stored thereon that are executable by the one or more processors to perform the method of any one of claims 1 to 11.

13. An apparatus comprising a plurality of modules for performing the method of any one of claims 1 to 11.