

METHODS AND APPARATUSES FOR GENERATING, METHODS AND APPARATUSES FOR PROCESSING IMAGE

TECHNICAL FIELD

[0001] The present disclosure relates to the field of computer vision technology, and in particular to a method and an apparatus for generating as well as a method and an apparatus processing an image.

BACKGROUND

[0002] In a table game scene, an automatic monitoring method is desirable to perform detection, identification and the like process for game props involved in a game scene, or determine the progress of a game and whether an abnormal event occurs in the game based on detection and identification results for game props. The above process depends on the learning of a large number of game scene images with a detection and/or identification algorithm. However, since a game tabletop background contains rich game scene information, its influence on the detection and identification results for game props cannot be neglected. In the related arts, a detection or identification method is usually to learn a game scene image with a specified tabletop background. When the game scene changes, the game tabletop background changes accordingly. In this case, a large number of images involving game props in a new game scene are to be re-collected for the learning, leading to a high cost for processing game props under different game scenes.

SUMMARY

[0003] According to a first aspect of the embodiments of the present disclosure, provided is a method of generating an image. The method includes: obtaining a first game scene image of a game tabletop and a background image of the game tabletop, where a game tabletop background in the first game scene image is different from a game tabletop background in the background image; cropping a raw image involving a game prop on the game tabletop from the first game scene image; obtaining a transformed image by performing transformation on the raw image; obtaining fused position information of the game prop; obtaining a second game scene image by fusing the background image with the transformed image based on the fused position information, where a position label of the game prop in the second game scene image is determined based on the fused position information.

[0004] In some embodiments, the first game scene image involves at least one of: an image involving various game props; a plurality of images involving game props of a same class but with different attributes; a plurality of images involving stacked items, wherein the stacked items involved in each image involving stacked items are stacked in one of various stacking manners, or formed by stacking a number of game props, or formed by stacking game props along one of various stacking directions.

[0005] In some embodiments, a class of the game tabletop background corresponds to an area division manner of the game tabletop, the game table top is divided into a plurality of sub-areas based on the area division manner, and each sub-area is used to operate one class of game props.

[0006] In some embodiments, obtaining the first game scene image of the game tabletop and the background image of the game tabletop includes: detecting a first class of the game tabletop background in the first game scene image; obtaining a background image of the game tabletop from an image database in way that the game tabletop background in the obtained background image is of a second class different from the first class.

[0007] In some embodiments, the method further includes: determining a class label of the game prop in the second game scene image is a specified class label, or determining the class label of the game prop in the second game scene image based on class information of the game prop in the first game scene image, where the class information of the game prop in the first game scene image is pre-labeled, or obtained by performing game prop classification on the first game scene image.

[0008] In some embodiments, fusing the background image with the transformed image based on the fused position information includes: obtaining a pasted image by pasting the transformed image to a preset position of the background image based on the fused position information; obtaining the second game scene image by performing image enhancement on the pasted image; where the position label of the game prop in the second game scene image is determined based on the preset position.

[0009] In some embodiments, obtaining the second game scene image by performing image enhancement on the pasted image includes: performing Gaussian filtering on the pasted image; performing brightness processing on the filtered pasted image based on a brightness of a scene corresponding to the first game scene image; obtaining the second game scene image by performing noise processing on the brightness-processed pasted image based on a noise level of the scene corresponding to the first game scene image.

[0010] In some embodiments, the method further includes: obtaining an intermediate neural network by training an initial neural network based on the first game scene image; obtaining a target neural network by fine-tuning the intermediate neural network based on the second game scene image, where the target neural network is used to process game props in a to-be-processed image, and the game tabletop background in the to-be-processed image is substantial same as the game tabletop background in the second game scene image.

[0011] In some embodiments, the intermediate neural network includes a classification sub-network comprising a feature extractor and a classifier, the feature extractor is used to perform feature extraction on an image input into the intermediate neural network, and the classifier is used to perform game prop classification on the image input into the intermediate neural network based on a feature extracted by the feature extractor; fine-tuning the intermediate neural network based on the second game scene image comprises: fixing the classifier of the classification sub-network, and fine-tuning the feature extractor of the classification sub-network based on a first number of the second game scene images until a preset convergence condition is satisfied; fine-tuning the feature extractor and the classifier based on a second number of the second game scene images.

[0012] In some embodiments, the method further includes: obtaining a test image involving game props, where a game tabletop background in the test image is substantial same as the game tabletop background in the background image; testing the target neural network based on the test image.

[0013] According to a second aspect of the embodiments of the present disclosure, provided is a method of processing an image. The method includes: obtaining a to-be-processed image; obtaining an analysis result for a game prop involved in the to-be-processed image from a target neural network by inputting the to-be-processed image into the target neural network; where the target neural network is trained by: obtaining an intermediate neural network by training an initial neural network based on a first game scene image; obtaining the target neural network by fine-tuning the intermediate neural network based on a second game scene image; where a game tabletop background in the to-be-processed image is substantial same as a game tabletop background in the second game scene image, and a game tabletop background in the first game scene image is different from a game tabletop background in a background image; the second game scene image is obtained by: cropping a raw image involving a game prop on a game tabletop from the first game scene image; obtaining a transformed image by performing transformation on the raw

image; obtaining the second game scene image by fusing the background image with the transformed image based on fused position information of the game prop, where a position label of the game prop in the second game scene image is determined based on the fused position information.

[0014] According to a third aspect of the embodiments of the present disclosure, provided is an apparatus for generating an image. The apparatus includes: a first obtaining module, configured to obtain a first game scene image of a game tabletop and a background image of the game tabletop, where a game tabletop background in the first game scene image is different from a game tabletop background in the background image; a first cropping module, configured to crop a raw image involving a game prop on the game tabletop from the first game scene image; a first transforming module, configured to obtain a transformed image by performing transformation on the raw image; a second obtaining module, configured to obtain fused position information of the game prop; a first fusing module, configured to obtain a second game scene image by fusing the background image with the transformed image based on the fused position information, where a position label of the game prop in the second game scene image is determined based on the fused position information.

[0015] In some embodiments, the first game scene image comprises at least one of: an image involving various game props; a plurality of images involving game props of a same class but with different attributes; a plurality of images involving stacked items, wherein the stacked items involved in each image involving stacked items are stacked in one of various stacking manners, or formed by stacking a number of game props, or formed by stacking game props along one of various stacking directions.

[0016] In some embodiments, a class of the game tabletop background corresponds to an area division manner of the game tabletop, the game table top is divided into a plurality of sub-areas based on the area division manner, and each sub-area is used to operate one class of game props.

[0017] In some embodiments, the first obtaining module includes: a detecting unit, configured to detect a first class of the game tabletop background in the first game scene image; an obtaining unit, configured to obtain a background image of the game tabletop from an image database in way that the game tabletop background in the obtained background image is of a second class different from the first class.

[0018] In some embodiments, the apparatus further includes a first determining module configured to: determine a class label of the game prop in the second game scene image is

a specified class label, or a second determining module, configured to determine the class label of the game prop in the second game scene image based on class information of the game prop in the first game scene image, where the class information of the game prop in the first game scene image is pre-labeled, or obtained by performing game prop classification on the first game scene image.

[0019] In some embodiments, the first fusing module includes: a pasting unit, configured to obtain a pasted image by pasting the transformed image to a preset position of the background image based on the fused position information; an enhancing unit, configured to obtain the second game scene image by performing image enhancement on the pasted image; where the position label of the game prop in the second game scene image is determined based on the preset position.

[0020] In some embodiments, the enhancing unit includes a filtering sub-unit, configured to perform Gaussian filtering on the pasted image; a brightness processing sub-unit, configured to perform brightness processing on the filtered pasted image based on a brightness of a scene corresponding to the first game scene image; a noise processing sub-unit, configured to obtain the second game scene image by performing noise processing on the brightness-processed pasted image based on a noise level of the scene corresponding to the first game scene image.

[0021] In some embodiments, the apparatus further includes: a training module, configured to obtain an intermediate neural network by training an initial neural network based on the first game scene image; a fine-tuning module, configured to obtain a target neural network by fine-tuning the intermediate neural network based on the second game scene image, where the target neural network is used to process game props in a to-be-processed image, and the game tabletop background in the to-be-processed image is substantial same as the game tabletop background in the second game scene image.

[0022] In some embodiments, the intermediate neural network includes a classification sub-network including a feature extractor and a classifier, the feature extractor is used to perform feature extraction on an image input into the intermediate neural network, and the classifier is used to perform game prop classification on the image input into the intermediate neural network based on a feature extracted by the feature extractor; the fine-tuning module includes a first fine-tuning unit, configured to fix the classifier of the classification sub-network, and fine-tune the feature extractor of the classification sub-network based on a first number of second game scene images until a preset convergence

condition is satisfied; and a second fine-tuning unit, configured to fine-tune the feature extractor and the classifier based on a second number of second game scene images.

[0023] In some embodiments, the apparatus further includes: a test image obtaining module, configured to obtain a test image involving game props, where a game tabletop background in the test image is substantial same as the game tabletop background in the background image; and a testing module, configured to test the target neural network based on the test image.

[0024] According to a fourth aspect of the embodiments of the present disclosure, provided is an apparatus for processing an image. The apparatus includes a third obtaining module, configured to obtain a to-be-processed image; an inputting module, configured to obtain an analysis result for a game prop involved in the to-be-processed image from a target neural network by inputting the to-be-processed image into the target neural network; where the target neural network is trained with: a training module, configured to obtain an intermediate neural network by training an initial neural network based on a first game scene image; a fine-tuning module, configured to obtain the target neural network by fine-tuning the intermediate neural network based on a second game scene image; where a game tabletop background in the to-be-processed image is substantial same as a game tabletop background in the second game scene image, and a game tabletop background in the first game scene image is different from a game tabletop background in a background image; the second game scene image is obtained with: a second cropping module, configured to crop a raw image involving a game prop on a game tabletop from the first game scene image; a second transforming module, configured to obtain a transformed image by performing transformation on the raw image; a second fusing module, configured to obtain the second game scene image by fusing the background image with the transformed image based on fused position information of the game prop, wherein a position label of the game prop in the second game scene image is determined based on the fused position information.

[0025] According to a fifth aspect of the embodiments of the present disclosure, provided is a computer readable storage medium, storing computer programs, where the programs are executed by a processor to implement the method according to any embodiment.

[0026] According to a sixth aspect of the embodiments of the present disclosure, provided is a computer device, including a memory, a processor and computer programs stored in the memory and run on the processor, where the processor executes the programs to implement the method according to any one embodiment.

[0027] In embodiments of the present disclosure, after cropping a raw image involving one or more game props from an obtained first game scene image for a game tabletop, a transformed image is obtained by performing transformation on the raw image, and then a background image of the game tabletop is fused with the transformed image to obtain a second game scene image. In this way, a large number of second game scene images of a game tabletop background different from that of the first game scene images can be obtained by acquiring a smaller number of background images of game tabletop and a smaller number of first game scene images. Thus, a large number of images involving game props under new game scenes can be efficiently obtained without acquiring the large number of images involving game props by imaging the new game scenes, thereby reducing image acquisition costs. Furthermore, when a neural network is adopted to process game props under a new game scene, the neural network may be trained with the first game scene image and then fine-tuned with the second game scene image, without re-training the entire neural network. It can improve the efficiency of learning game prop images with the neural network, and reduce the consumptions of storage and processing resources during the training process of the neural network.

[0028] It should be understood that the above general descriptions and the subsequent detailed descriptions are merely illustrative and explanatory rather than limit the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] The accompanying drawings, which are incorporated in and constitute a part of the present description, illustrate embodiments consistent with the present disclosure and serve to explain the principles of the present disclosure together with the description.

[0030] FIG.1 is a schematic diagram of a game scene and a game area according to some embodiments of the present disclosure.

[0031] FIG. 2 is a flowchart of a method of generating an image according to one or more embodiments of the present disclosure.

[0032] FIG. 3 is a schematic diagram of sub-areas corresponding to a game tabletop according to one or more embodiments of the present disclosure.

[0033] FIG. 4A-1 and FIG. 4A-2 are schematic diagrams of cards as game props involved in game images according to one or more embodiments of the present disclosure.

[0034] FIG. 4B-1 and FIG. 4B-2 are schematic diagrams of game coins as game props involved in game images according to one or more embodiments of the present disclosure.

[0035] FIG. 4C-1 and FIG. 4C-2 are schematic diagrams of a pile of cards as game props involved in game images according to one or more embodiments of the present disclosure.

[0036] FIG. 4D-1, FIG. 4D-2, and FIG. 4D-3 are schematic diagrams of stacking manners of game props involved in game images according to one or more embodiments of the present disclosure.

[0037] FIG. 4E-1, FIG. 4E-2, and FIG. 4E-3 are schematic diagrams of stacking directions of game props involved in game images according to one or more embodiments of the present disclosure.

[0038] FIG. 5 is a general flowchart of an embodiment of the present disclosure.

[0039] FIG. 6 is a flowchart of a method of processing an image according to one or more embodiments of the present disclosure.

[0040] FIG. 7 is a block diagram of an apparatus for generating an image according to one or more embodiments of the present disclosure.

[0041] FIG. 8 is a block diagram of an apparatus for processing an image according to one or more embodiments of the present disclosure.

[0042] FIG. 9 is a structural schematic diagram of a computer device according to one or more embodiments of the present disclosure.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0043] Embodiments will be described in detail herein, with the illustrations thereof represented in the drawings. When the following descriptions involve the drawings, like numerals in different drawings refer to like or similar elements unless otherwise indicated. The embodiments described in the following examples do not represent all embodiments consistent with the present disclosure. Rather, they are merely examples of apparatuses and methods consistent with some aspects of the present disclosure as detailed in the appended claims.

[0044] The terms used in the present disclosure are for the purpose of describing particular embodiments only, and are not intended to limit the present disclosure. Terms such as “a”, “the” and “said” in their singular forms in the present disclosure and the appended claims are also intended to include plurality, unless clearly indicated otherwise in the context. It should also be understood that the term “and/or” as used herein refers to and includes any

and all possible combinations of one or more of the associated listed items. Further, the term “at least one” herein represents any one of multiple or any combination of at least two of multiple.

[0045] It is to be understood that although different information may be described using the terms such as first, second, third, etc. in the present disclosure, the information should not be limited to these terms. These terms are used only to distinguish the same type of information from each other. For example, the first information may also be referred to as the second information without departing from the scope of the present disclosure, and similarly, the second information may also be referred to as the first information. Depending on the context, the word “if” as used herein may be interpreted as “when” or “as” or “determining in response to”.

[0046] In order to help those skilled in the art to better understand the technical solutions of the embodiments of the present disclosure and make the above objects, features and advantages of the embodiments of the present disclosure clearer and more understandable, the technical solutions of the embodiments of the present disclosure will be further detailed below in combination with the accompanying drawings.

[0047] In a table game scene, it is usually required to perform detection and identification and the like and relevant analyses for game props in the game scene by an automatic monitoring method. FIG. 1 is a schematic diagram of a game scene. The game scene includes a game area R, for example, a grey elliptical area shown in the figure, and one or more game participants (e.g. player A and player B in the figure) may operate game props in the game area R. The game props may include but not limited to one or more of card, game coin, game marker, dice and the like. One or more image acquisition apparatuses 101 may be disposed around the game area R to collect an image of the game area and send the collected image to a server 102, such that the server 102 can detect and identify game props in the game area based on the image of the game area and do the like.

[0048] The processing result of game props may be further sent to a service layer such that the service layer makes determination for an event of operating game props in the game area. For example, a placement position of a particular game prop may be detected from one image and then sent to the service layer, and the service layer may determine whether the placement position of the game prop is within a preset placement area. For another example, a placement sequence of a particular game prop may be detected from a plurality of images

and then sent to the service layer and the service layer may determine whether the placement sequence of the game prop complies with a preset sequence.

[0049] Those skilled in the art may understand that the above application scene is only illustrative rather than limiting of the present disclosure.

[0050] The above processing process depends on learning of a large number of game scene images with a detection and/or identification algorithm. However, since a game tabletop background contains rich game scene information, its influence on the detection and identification results of game props cannot be neglected. In the related arts, a detection or identification method is usually to learn a game scene image with a specified tabletop background. When the game scene changes, the game tabletop background changes accordingly. Visual features of game tabletop backgrounds under different game scenes may differ to some extent. The visual features may include but not limited to color, pattern, size, material, texture, transparency and the like. Therefore, it is required to re-collect a large number of images involving game props in a new game scene for learning, leading to high costs for processing game props under different game scenes.

[0051] In view of this, an embodiment of the present disclosure provides a method of generating an image. As shown in FIG. 2, the method includes the following steps.

[0052] At step 201, a first game scene image of a game tabletop and a background image of the game tabletop are obtained, wherein a game tabletop background in the first game scene image is different from a game tabletop background in the background image.

[0053] At step 202, a raw image involving a game prop on the game tabletop is cropped from the first game scene image.

[0054] At step 203, a transformed image is obtained by performing transformation on the raw image.

[0055] At step 204, fused position information of the game prop is obtained.

[0056] At step 205, a second game scene image is obtained by fusing the background image with the transformed image based on the fused position information, where a position label of the game prop in the second game scene image is determined based on the fused position information.

[0057] In step 201, the first game scene image of the game tabletop and the background image of the game tabletop may be obtained using an image acquisition apparatus (e.g. a camera). When the first game scene image is obtained, at least one camera may be disposed around the game tabletop, so as to obtain the first game scene image by capturing an image

of the game tabletop. The first game scene image may include a game prop such as game coin and a card, and may also include a game tabletop background. During a game, images of the game tabletop may be acquired in real time and an image involving the game prop is taken as the first game scene image. Alternatively, in a case of no game going on the game tabletop, a game prop is placed on the game tabletop by hand and an image of the game tabletop is collected as the first game scene image.

[0058] In some embodiments, the first game scene image may include an image involving various game props. As shown in FIG. 4A-1, FIG. 4A-2, FIG. 4B-1, and FIG. 4B-2, the first game scene image includes a card image and a game coin image. In some other embodiments, the first game scene image may include a plurality of images involving game props of a same class but with different attributes. For example, the first game scene image may include an image of a card 1 as shown in FIG. 4A-1 and an image of a card 2 as shown in FIG. 4A-2, where the cards in the two images have different patterns. For another example, the first game scene image may include an image of a game coin 1 as shown in FIG. 4B-1 and an image of a game coin 2 as shown in FIG. 4B-2, where the game coins in the two images have different colors and patterns. In addition to pattern and color, the attribute of game prop may further include size, shape, material and the like, which are not enumerated one by one herein.

[0059] In some other embodiments, the first game scene image may include a plurality of images involving stacked items. The stacked items involved in each image involving stacked items are stacked in one of various stacking manners. The stacking manner may include standing stacking, lying stacking, and spread stacking and the like. For example, in the standing stacking manner as shown in FIG. 4D-1, some item of the stacked items is capable of contacting with a plane for placing the stacked items and any one item of the stacked items is at least partially overlapped with another item of the stacked items. In the lying stacking manner as shown in FIG. 4D-2, sides of a plurality of items all are capable of contacting with a plane for placing the stacked items and all items of the stacked items are stacked along a direction parallel to the plane. In the spread stacking manner as shown in FIG. 4D-3, the stacked items are formed by at least two items, where each of the at least two items is capable of contacting with a plane for placing the stacked items, and any one item of the stacked items is partially overlapped with another item of the stacked items. For example, the first game scene image includes two images, one includes stacked items in the standing stacking manner and the other includes stacked items in the spread stacking manner.

[0060] Optionally, the stacked items involved in each image involving stacked items may be formed by stacking a number of game props. For example, the first game scene image includes an image of a card pile 1 as shown in FIG. 4C-1 and an image of a card pile 2 as shown in FIG. 4C-2, where the image of the card pile 1 involves a card pile stacked by two cards, and the image of the card pile 2 involves a card pile stacked by four cards.

[0061] Optionally, the stacked items involved in each image involving stacked items may be formed by stacking game props along one of various stacking directions. For example, the first game scene image includes three images involving stacked items which are stacked along a first stacking direction as shown in FIG. 4E-1, stacked along a second stacking direction as shown in FIG. 4E-2, and stacked along a third stacking direction as shown in FIG. 4E-3 respectively, where the first stacking direction, the second stacking direction and the third stacking direction are indicated by arrows in figure.

[0062] When a background image of a game tabletop is obtained, game props on the game tabletop may be cleared in advance. Thus, in a case of no game props on the game tabletop, an image of the game tabletop may be acquired by a camera disposed around the game tabletop and then taken as the background image. It should be noted that “game tabletop” in the first game scene image of the game tabletop herein and the “game tabletop” in the background image of the game tabletop are used in a general sense and may not refer to a same game tabletop. A game tabletop background in the first game scene image is different from a game tabletop background in the background image, and the difference may be reflected in difference in at least one of size, color, pattern, shape, sub-area number, and light irradiation condition and the like.

[0063] In some embodiments, the game tabletop background can be classified according to one or more above elements such that two game tabletop backgrounds of a same class are considered as substantial same with each other, while two game tabletop backgrounds of two different classes are considered as different from each other. For example, a class of the game tabletop background may be determined based on an area division manner of the game tabletop. The game tabletop is divided into a plurality of sub-areas based on the area division manner and each sub-area is used to operate one class of game props. As shown in FIG. 3, the game tabletop is divided into sub-areas 301-311, where the sub-areas 301 and 302 are used to operate game props of card class, the sub-areas 303-305 are used to operate game props of game coin class, and the sub-areas 306-311 are used to operate game props of game marker class. Furthermore, different sub-areas may correspond to different game characters.

For example, the sub-area 301 corresponds to game character A to operate cards for game character A; the sub-area 302 corresponds to game character B to operate cards for game character B. The sub-areas 306-308 correspond to game character A to operate game markers for game character A; the sub-areas 309-311 correspond to game character B to operate game markers for game character B. Further, different sub-areas may correspond to different game players. For example, the sub-areas 303, 304 and 305 may correspond to player a, player b and player c respectively, and may be used to operate game coins of players a, b and c respectively. The player refers to a real object participating in a game, and a game character refers to a virtual character involved in a game.

[0064] In some embodiments, the first class of the game tabletop background of the first game scene image may be detected; the background image of the game tabletop is obtained from an image database in way that the game tabletop background in the obtained background image is of a second class different from the first class. An association relationship between identifier information corresponding to the class of the game tabletop background and identifier information of the background image of the game tabletop may be pre-stored. After the first class of the game tabletop background in the first game scene image is detected, identifier information of the corresponding background image of the game tabletop is queried in the association relationship based on the identifier information corresponding to the first class, and then the corresponding background image of the game tabletop may be obtained from the image database based on the obtained identifier information of the background image of the game tabletop. In this way, the background image of the game tabletop with a game tabletop background having a class different from the first game scene image can be obtained quickly from the image database.

[0065] In step 202, the raw image involving one or more game props may be cropped from the first game scene image. The position of the game prop in the first game scene image may be pre-labeled, or obtained by performing target detection for the first game scene image.

[0066] In step 203, a transformation may be performed on the raw image involving one or more game props in at least one of the following manners: translation, flip, rotation, stacking, color transformation, brightness transformation, transparency transformation, adding random noise, dimensional transformation, changing the number of the target objects, changing the completeness of the target object, and changing a distortion degree of the target object. The richness of game props in a generated image can be improved by performing

transformation on the raw image. Thus, a plurality of second game scene images including game props of different features may be generated by acquiring a small number of first game scene images.

[0067] In steps 204 and 205, the second game scene image may be obtained by fusing the background image with the transformed image based on the obtained fused position information. One second game scene image may be obtained by fusing one background image with one or more transformed images. The plurality of transformed images fused with the same background image may be transformed images involving game props of a same class. For example, the plurality of transformed images may be transformed images involving game props of card class. Alternatively, the plurality of transformed images fused with the same background image may also be transformed images involving game props of different classes, for example, one is a transformed image involving game props of card class and the other is a transformed image involving game props of game coin class. Different transformed images may be fused on different positions of the background image and may be mutually overlapped with each other or not in the second game scene image.

[0068] In some embodiments, the pasted image may be obtained by pasting the transformed image to the preset position of the background image based on the fused position information; the second game scene image is obtained by performing image enhancement on the pasted image.

[0069] The fused position information may be specified by a user in advance. For example, coordinate information input by a user may be obtained as the fused position information. In this case, the pasted image may be obtained by pasting the transformed image to the preset position corresponding to the coordinate information in the background image. For another example, number information input by a user may be obtained and then a corresponding number of pieces of fused position information are generated randomly based on the number information, where each piece of fused position information corresponds to one preset position in the background image. Next, a plurality of transformed images are obtained and each of the transformed images is pasted to one preset position. It is noted that one pasted image can be obtained by pasting one or more transformed images to one background image. For example, one pasted image is obtained by pasting one transformed image to the background image. If the input number information is N, N pieces of fused position information may be generated randomly, which correspond to the preset positions Q1, Q2, ... and QN respectively. If the obtained transformed images are T1, T2, ... and TN,

T1 is pasted to the preset position Q1 in the background image to generate one pasted image; T2 is pasted to the preset position Q2 in the background image to generate one pasted image and so on.

[0070] Of course, the fused position information may be generated in another way, for example, the background image may be divided into a plurality of sub-areas and different sub-areas may generate different numbers of pieces of fused position information. Alternatively, the distribution of the generated fused position information on the corresponding positions of the background image is designated as a preset distribution function.

[0071] In this embodiment, any number and classes of game props may be pasted to the preset positions of the background image, for example, game coins may be pasted to a first position of the background image to obtain a first sample image A, and game coins may be pasted to a second position of the background image and cards may be pasted to a third position of the background image, so as to obtain a first sample image B. Because the pasting position is preset, it is not required to label the position of the game prop in the first sample image, thus further reducing image labeling costs.

[0072] The second game scene image includes two parts, one of which is an image of game props (i.e. transformed image) and the other is a background image of the game tabletop. When there are a plurality of classes of game props and a plurality of classes of game tabletop backgrounds, the images of different classes of game props and the background images of different classes of game tabletops may be combined arbitrarily to obtain a second game scene image of each game prop under a different game tabletop background. In the related arts, the images of each game prop under different game backgrounds are usually collected when a sample image is collected. For example, if the number of game props is M and the number of game backgrounds is N, it is required to collect $M \times N$ sample images. This image acquisition manner leads to a high cost. In the embodiments of the present disclosure, the images of game props and the background images of game tabletops are collected separately and then fused. This manner only requires collection of $M+N$ images. That is, $M \times N$ sample images can be generated by permutation and combination, thus reducing the number of images to be collected and lowering the image acquisition cost. Furthermore, along with decrease of the number of sample images, the number of images to be labeled decreases, thus reducing the image labeling cost.

[0073] Furthermore, the position label of the game prop in the second game scene image can be determined based on the preset position and the preset position can be quickly obtained from user input and the like. Therefore, the position label of the game prop in the second game scene image may be determined without performing a target detection on the second game scene image, thereby increasing the image labeling efficiency and reducing the image labeling cost.

[0074] Furthermore, the class label of the game prop in the second game scene image may also be obtained. For example, the class label of the game prop in the second game scene image may be determined as a specified class label. For another example, the class label of the game prop in the second game scene image may be determined based on class information of the game prop in the first game scene image.

[0075] In some embodiments, class information of a game prop in the first game scene image may be pre-labeled. Because the transformation does not change the class information of game props, the class information of a game prop in various transformed images obtained by performing transformation on a raw image involving the game prop, and the class information of the game prop in various second game scene images corresponding to these transformed images, both are identical to the class information of the game prop in the raw image. Therefore, class labels of game props in a larger number of second game scene images can be obtained by labeling a smaller number of first game scene images with class information of game props rather than labeling each of the second game scene images with class labels of game props, thus reducing the image labeling cost.

[0076] The labeled class information of game props in the first game scene image may be obtained by performing game prop classification on the first game scene image. Alternatively, in some scenes, game props of a specified class may be placed on the game tabletop and an image of the game tabletop is taken to obtain the first game scene image. In this case, the class information of game props in the first game scene image can be directly determined without performing game prop classification on the first game scene image. The class label of the game prop in the second game scene image may be determined directly as the class label of the specified class, or determined based on the labeled class information of game props in the first game scene image.

[0077] In some embodiments, image enhancement processing such as Gaussian filtering processing, brightness processing and noise processing may be performed on the pasted image. By the Gaussian filtering, an overlapping portion between the background image and

a game prop is made smoother in the pasted image. By the brightness processing and the noise processing, visual effects of different game scenes can be simulated.

[0078] Optionally, Gaussian filtering processing may be performed on the pasted image; brightness processing is performed on the filtered pasted image based on a brightness of a scene corresponding to the first game scene image; noise processing is performed on the brightness-processed pasted image based on a noise level of the scene corresponding to the first game scene image to obtain the second game scene image. Thus, the second game scene image is made closer to a real game scene.

[0079] A target neural network may be obtained by using the second game scene image generated by the method according to the embodiments of the present disclosure as a sample image. In this embodiment, the function of the target neural network may be selected according to actual requirements, for example, the target neural network may be a neural network used to identify game props so as to determine class information of game props, or a neural network used to detect game props so as to determine position information of game props. The target neural network may also be used to realize other functions which will not be enumerated herein.

[0080] The target neural network is used to, for example, identify game props. In this case, the target neural network may include a target classification sub-network including a target feature extractor and a target classifier, the target feature extractor is used to perform feature extraction on an image input into the target neural network, and the target classifier is used to perform game prop classification on the image input into the target neural network based on a feature extracted by the feature extractor to determine class information of game props in the image input into the target neural network. Optionally, the target feature extractor is a convolutional neural network and a network structure of the target feature extractor is a resnet network subject. The target classifier may include a fully-connected (FC) layer and a softmax layer for outputting a class of a single game object, or may include a FC layer and a Connectionist Temporal Classification (CTC) network for identifying stacked game props such as game coins to output a sequence identification result. Alternatively, the target classifier is a FC classifier.

[0081] The target neural network may be obtained in the following two stages. The first stage is a training stage in which an intermediate neural network is obtained by training an initial neural network based on the first game scene image. The intermediate neural network has a good processing effect for game props in a game scene corresponding to the first game

scene image but a poor processing effect for game props in a game scene corresponding to the second game scene image.

[0082] The second stage is a fine-tuning stage in which the target neural network may be obtained by fine-tuning the intermediate neural network based on the second game scene image. The target neural network is used to process game props in a to-be-processed image, a game tabletop background in the to-be-processed image is substantial same as a game tabletop background in the second game scene image, and the fine-tuned target neural network has a better processing performance for game props in the game scene corresponding to the second game scene image than the intermediate neural network.

[0083] The intermediate neural network includes a classification sub-network including a feature extractor and a classifier, the feature extractor is used to perform feature extraction on an image input into the intermediate neural network and the classifier is used to perform game prop classification on the image input into the intermediate neural network based on a feature extracted by the feature extractor. The intermediate neural network may be fine-tuned in the following two stages. In the first fine-tuning stage, the classifier of the classification sub-network is fixed, and the feature extractor of the classification sub-network is fine-tuned based on a first number of the second game scene images until a preset convergence condition is satisfied. The convergence condition may be preset, for example, based on a classification loss of the intermediate neural network. In the second fine-tuning stage, the feature extractor and the classifier may be fine-tuned based on a second number of the second game scene images. Where, the first number of the second game scene images and the second number of the second game scene images may be different from each other.

[0084] After the target neural network is obtained, the performance of the target neural network may be tested. A test image involving game props may be obtained, where the game tabletop background in the test image is substantial same as the game tabletop background in the background image; the target neural network is tested based on the test image. The test image may be an image collected by an image acquisition apparatus in a real game scene. The processing performance of the target neural network in a real scene may be determined by performing performance test for the target neural network using the image collected in the real scene.

[0085] The entire flow of the embodiments of the present disclosure will be described below in combination with FIG .5.

[0086] At step 501, an intermediate neural network is obtained. In this step, the intermediate neural network which performs well in a first game scene is obtained by performing training and test for an initial neural network using a first game scene image of a game tabletop of the first game scene and labeling information of the first game scene image. The intermediate neural network may refer to different neural networks in a general sense and may be a neural network having the function of identifying and/or detecting game props and the like.

[0087] At step 502, a second game scene image under a second game scene is prepared.

[0088] At step 5021, a small number of high-quality first game scene images T are prepared. The first game scene image T may be collected under a common collection environment. The first game scene image T may be obtained by performing imaging for a game tabletop in the first game scene. The first game scene image T includes game props, for example, game coins, cards and the like in the first game scene. During collection, it is only required to ensure the diversity of game props without considering the diversity of the backgrounds and the number of the first game scene images T. For the game coins, stacked items formed by different numbers of game coins may be collected as many as possible in the same game tabletop. In this case, light irradiation changes should guarantee that game props in the first game scene image T are clearly visible. In this way, the complexity of image acquisition is reduced.

[0089] At step 5022, position information and class information of the game prop in the first game scene image T are obtained by labeling the first game scene image T collected at step 5021 so as to generate a sample data set DTrain 1. Next, a raw image involving one or more game props is cropped from the first game scene image T using the position information box and stored to obtain a target sample library D.

[0090] At step 5023, a test image is collected in the real second game scene and labeled so to obtain a test dataset DTest.

[0091] At step 5024, a background image of the game tabletop is prepared. When the background image is collected, no game props may be placed on the game tabletop to ensure clearness, and the background image is added to a background library B.

[0092] At step 5025, a second game scene image is generated. Specifically, a sample d may be selected randomly from the target sample library D, and then subjected to processing such as horizontal flip and dimensional transformation to obtain a sample d' which is then pasted to any background image b in the background library B.

[0093] At step 5026, an overlapping portion is made smoother by using an image enhancement method such as Gaussian filtering, and then brightness and noise processing are performed on the entire image to simulate visual effects under different game scenes so as to finally obtain a sample dataset DTrain 2 of the second game scene. Because pasting positions and class information of game props are already known, no labeling is required.

[0094] At step 503, a target neural network is obtained by fine-tuning an intermediate neural network using the DTrain 1 and the DTrain 2.

[0095] At step 5031, in the first fine-tuning stage, all structures and parameter weights of the intermediate neural network are inherited, all network layers other than a final layer of FC classifier in the intermediate neural network are fixed, and the intermediate neural network is fine-tuned on the datasets DTrain 1 and DTrain 2.

[0096] At step 5032, in the second fine-tuning stage, after convergence of the last step, all network layers are released, and then the intermediate neural network is fine-tuned using the datasets DTrain 1 and DTrain 2, so as to obtain the target neural network by convergence.

[0097] At step 504, the effect of the target neural network is tested on the dataset DTest.

[0098] In the embodiments of the present disclosure, a large number of second game scene images are generated using combinations of a small number of images, but not directly labeling position and class of game props in each second game scene image, thus reducing costs of data collection and labeling. Furthermore, in the embodiments of the present disclosure, a neural network applicable to the first game scene is taken as an initial neural network, and a target neural network applicable to the second game scene is obtained by fine-tuning the initial neural network. Thus, re-training of the neural network is not required, thus shortening the training process of the neural network, improving the image processing efficiency and saving image processing costs.

[0099] As shown in FIG. 6, an embodiment of the present disclosure further provides a method of processing an image. The method includes the following steps.

[0100] At step 601, a to-be-processed image is obtained.

[0101] At step 602, an analysis result for a game prop involved in the to-be-processed image from a target neural network is obtained by inputting the to-be-processed image into the target neural network.

[0102] The target neural network is trained by:

[0103] At step 603, an intermediate neural network is obtained by training an initial neural network using a first game scene image.

[0104] At step 604, the target neural network is obtained by fine-tuning the intermediate neural network based on a second game scene image.

[0105] A game tabletop background in the to-be-processed image is substantially same as a game tabletop background in the second scene image; a game tabletop background in the first game scene image is different from a game tabletop background in the background image.

[0106] The second game scene image may be obtained by:

[0107] At step 605, a raw image involving a game prop on the game tabletop is cropped from the first game scene image.

[0108] At step 606, a transformed image is obtained by performing transformation on the raw image.

[0109] At step 607, the second game scene image is obtained by fusing the background image with the transformed image based on fused position information of the game prop, where a position label of the game prop in the second game scene image is determined based on the fused position information.

[0110] The details of the embodiment may be known from the above embodiments of the method of generating an image and will not be repeated herein.

[0111] Those skilled in the art should understand that in the above method of the specific embodiments, the drafting sequence of various steps does not mean a stringent execution sequence to constitute any limitation to the implementation process and the execution sequence of various steps should be determined based on their functions and internal logics.

[0112] As shown in FIG. 7, an embodiment of the present disclosure further provides an apparatus for generating an image. The apparatus includes: a first obtaining module 701, configured to obtain a first game scene image of a game tabletop and a background image of the game tabletop, wherein a game tabletop background in the first game scene image is different from a game tabletop background in the background image; a first cropping module 702, configured to crop a raw image involving one or more game props on the game tabletop from the first game scene image; a first transforming module 703, configured to obtain a transformed image by performing transformation on the raw image; a second obtaining module 704, configured to obtain fused position information of the game prop; a first fusing module 705, configured to obtain a second game scene image by fusing the background image with the transformed image based on the fused position information, wherein a

position label of the game prop in the second game scene image is determined based on the fused position information.

[0113] In some embodiments, the first game scene image includes at least one of: an image involving various game props; a plurality of images involving game props of a same class but with different attributes; a plurality of images involving stacked items, wherein the stacked items involved in each image involving stacked items are stacked in one of various stacking manners, or formed by stacking a number of game props, or formed by stacking game props along one of various stacking directions.

[0114] In some embodiments, a class of the game tabletop background corresponds to an area division manner of the game tabletop, the game table top is divided into a plurality of sub-areas based on the area division manner, and each sub-area is used to operate one class of game props.

[0115] In some embodiments, the first obtaining module includes: a detecting unit, configured to detect a first class of the game tabletop background in the first game scene image; an obtaining unit, configured to obtain a background image of the game tabletop from an image database in way that the game tabletop background in the obtained background image is of a second class different from the first class.

[0116] In some embodiments, the apparatus further includes: a first determining module, configured to determine a class label of the game prop in the second game scene image is a specified class label; or a second determining module, configured to determine the class label of the game prop in the second game scene image based on class information of the game prop in the first game scene image, where the class information of the game prop in the first game scene image is pre-labeled, or obtained by performing game prop classification on the first game scene image.

[0117] In some embodiments, the first fusing module includes: a pasting unit, configured to obtain a pasted image by pasting the transformed image to a preset position of the background image based on the fused position information; an enhancing unit, configured to obtain the second game scene image by performing image enhancement on the pasted image; where the position label of the game prop in the second game scene image is determined based on the preset position.

[0118] In some embodiments, the enhancing unit includes a filtering sub-unit, configured to perform Gaussian filtering on the pasted image; a brightness processing sub-unit, configured to perform brightness processing on the filtered pasted image based on a

brightness of a scene corresponding to the first game scene image; a noise processing sub-unit, configured to obtain the second game scene image by performing noise processing on the brightness-processed pasted image based on a noise level of the scene corresponding to the first game scene image.

[0119] In some embodiments, the apparatus further includes: a training module, configured to obtain an intermediate neural network by training an initial neural network based on the first game scene image; a fine-tuning module, configured to obtain a target neural network by fine-tuning the intermediate neural network based on the second game scene image, where the target neural network is used to process game props in a to-be-processed image, and the game tabletop background in the to-be-processed image is substantially same as the game tabletop background in the second game scene image.

[0120] In some embodiments, the intermediate neural network includes a classification sub-network including a feature extractor and a classifier, the feature extractor is used to perform feature extraction on an image input into the intermediate neural network, and the classifier is used to perform game prop classification on the image input into the intermediate neural network based on a feature extracted by the feature extractor; the fine-tuning module includes a first fine-tuning unit, configured to fix the classifier of the classification sub-network, and fine-tune the feature extractor of the classification sub-network based on a first number of the second game scene images until a preset convergence condition is satisfied; and a second fine-tuning unit, configured to fine-tune the feature extractor and the classifier based on a second number of the second game scene images.

[0121] In some embodiments, the apparatus further includes: a test image obtaining module, configured to obtain a test image involving game props, where a game tabletop background in the test image is substantially same as the game tabletop background in the background image; and a testing module, configured to test the target neural network based on the test image.

[0122] As shown in FIG. 8, an embodiment of the present disclosure further provides an apparatus for processing a sample image. The apparatus includes the following modules: a third obtaining module 801, configured to obtain a to-be-processed image; an inputting module 802, configured to obtain an analysis result for a game prop involved in the to-be-processed image from a target neural network by inputting the to-be-processed image into the target neural network.

[0123] Where the target neural network is trained based on the following modules: a training module 803, configured to obtain an intermediate neural network by training an initial neural network based on a first game scene image; a fine-tuning module 804, configured to obtain the target neural network by fine-tuning the intermediate neural network based on a second game scene image; where a game tabletop background in the to-be-processed image is substantially same as a game tabletop background in the second game scene image, and a game tabletop background in the first game scene image is different from a game tabletop background in a background image.

[0124] The second game scene image may be obtained based on the following modules: a second cropping module 805, configured to crop a raw image involving one or more game props on a game tabletop from the first game scene image; a second transforming module 806, configured to obtain a transformed image by performing transformation on the raw image; a second fusing module 807, configured to obtain the second game scene image by fusing the background image with the transformed image based on fused position information of the game prop, wherein a position label of the game prop in the second game scene image is determined based on the fused position information.

[0125] In some embodiments, the functions or modules included in the apparatus according to the embodiments of the present disclosure may be used to perform the method of the above method embodiments with its detailed descriptions referred to in the above method embodiments. For simplicity, no redundant descriptions are made herein.

[0126] An embodiment of the present disclosure further provides a computer device, at least including a memory, a processor and computer programs stored in the memory and run on the processor, where the processor executes the programs to implement the method according to any one of the above embodiments.

[0127] FIG. 9 shows a hardware structure diagram of a more specific computer device according to one or more embodiments of the present disclosure. The device may include a processor 901, a memory 902, an input/output interface 903, a communication interface 904, and a bus 905. The processor 901, the memory 902, the input/output interface 903 and the communication interface 904 realize communication via the bus 905 in the device.

[0128] The processor 901 may be implemented by a general central processing unit (CPU), a microprocessor, an Application Specific Integrated Circuit (ASIC) or one or more integrated circuits or the like to execute relevant programs so as to realize the technical solutions of the embodiments of the present disclosure. The processor 901 may also include

a graphics card which may be Nvidiatitan X graphics card or 1080Ti graphics card or the like.

[0129] The memory 902 may be implemented by read only memory (ROM), random access memory (RAM), static storage device, and dynamic storage device and the like. The memory 902 stores operating system and other application programs. When the technical solutions of the embodiments of the present disclosure are realized by software or firmware, relevant programs codes are stored in the memory 902 and may be invoked and executed by the processor 901.

[0130] The input/output interface 903 is used to connect with an inputting/outputting module to realize information input and output. The inputting/outputting module may be configured as a component in a device (not shown), or externally connected with a device to provide corresponding functions. The input device may include keyboard, mouse, touch screen, microphone, and various sensors and the like, and the output device may include display, loudspeaker, vibrator and indicator lamp and the like.

[0131] The communication interface 904 is used to connect with a communication module (not shown) to realize communication interaction between the present device and other devices. The communication module may realize communication in a wired manner (for example, USB and network cable and the like) or in a wireless manner (for example, mobile network, WIF, Bluetooth and the like).

[0132] The bus 905 includes a passage which transmits information among various components of the device (e.g. the processor 901, the memory 902, the input/output interface 903 and the communication interface 904).

[0133] It should be noted that although the above device only shows the processor 901, the memory 902, the input/output interface 903, the communication interface 904 and the bus 905, the device may further include other components to realize normal operation during a specific implementation. Furthermore, those skilled in the art may understand that the above device may only include the components required for realizing the technical solution of the embodiments of the present disclosure rather than all components shown in figures.

[0134] An embodiment of the present disclosure further provides a computer readable storage medium, storing computer programs, where the programs are executed by a processor to implement the method according to any one of the above embodiments.

[0135] The computer readable storage medium includes permanent, non-permanent, mobile and non-mobile media, which can realize information storage by any method or

technology. The information may be computer readable instructions, data structures, program modules and other data. The examples of the computer storage medium include but not limited to: phase change random access memory (PRAM), a Static Random Access Memory (SRAM), a Dynamic Random Access Memory (DRAM), and other types of RAMs, Read-Only Memory (ROM), an Electrically-Erasable Programmable Read-Only Memory (EEPROM), a Flash Memory, or other memory technology, CD-ROM, digital versatile disc (DVD) or other optical storage, cassette type magnetic tape, magnetic disk storage or other magnetic storage device or other non-transmission medium for storing information accessible by computing devices. As defined in the present disclosure, the computer readable medium does not include transitory computer readable media such as modulated data signals or carriers.

[0136] It may be known from descriptions of the above embodiments that persons skilled in the art may clearly understand that the embodiments of the present disclosure may be implemented by means of software and a necessary general hardware platform. Based on such understanding, the technical solutions of embodiments of the present disclosure essentially or a part contributing to the prior art may be embodied in the form of a software product, and the computer software product may be stored in a storage medium, such as a ROM/RAM, a diskette or a compact disk, and includes several instructions for enabling a computer device (such as a personal computer, a server or a network device) to perform the methods of different embodiments or some parts of the embodiments of the present disclosure.

[0137] The systems, apparatuses, modules or units described in the above embodiments may be specifically implemented by a computer chip or an entity or may be implemented by a product with a particular function. A typical implementing device may be a computer and the computer may be specifically a personal computer, a laptop computer, a cellular phone, a camera phone, a smart phone, a personal digital assistant, a media player, a navigation device, an email transceiver, a game console, a tablet computer, a wearable device, or a combination of any several devices of the above devices.

[0138] Different embodiments in the present disclosure are described in a progressive manner. Each embodiment focuses on the differences from other embodiments with those same or similar parts among the embodiments referred to each other. Particularly, since the apparatus embodiments are basically similar to the method embodiments, the apparatus embodiments are briefly described with relevant parts referred to the descriptions of the

method embodiments. The apparatus embodiments described above are merely illustrative, where the modules described as separate members may be or not be physically separated, and the functions of various modules may be implemented in one or more software and/hardware during implementation of the embodiments of the present disclosure. Alternatively, part or all of the modules may be selected according to actual requirements to implement the objectives of the solutions in the embodiments. Those of ordinary skill in the art may understand and carry out them without creative work.

[0139] The above descriptions are made to merely some embodiments of the present disclosure. It should be pointed out that those skilled in the art may also make several improvements and modifications without departing from the principle of the present disclosure, and these improvements and modifications shall all fall within the scope of protection of the present disclosure.

CLAIMS

1. A method of generating an image, comprising:

obtaining a first game scene image of a game tabletop and a background image of the game tabletop, wherein a game tabletop background in the first game scene image is different from a game tabletop background in the background image;

cropping a raw image involving a game prop on the game tabletop from the first game scene image;

obtaining a transformed image by performing transformation on the raw image;

obtaining fused position information of the game prop;

obtaining a second game scene image by fusing the background image with the transformed image based on the fused position information and

determining a position label of the game prop in the second game scene image based on the fused position information.

2. The method according to claim 1, wherein the first game scene image comprises at least one of:

an image involving various game props;

a plurality of images involving game props of a same class but with different attributes;

a plurality of images involving stacked items, wherein the stacked items involved in each image involving stacked items are stacked in one of various stacking manners, or formed by stacking a number of game props, or formed by stacking game props along one of various stacking directions.

3. The method according to claim 1 or 2, wherein obtaining the first game scene image of the game tabletop and the background image of the game tabletop comprises:

detecting a first class of the game tabletop background in the first game scene image;

obtaining a background image of the game tabletop from an image database in way that the game tabletop background in the obtained background image is of a second class different from the first class.

4. The method according to claim 3, wherein a class of the game tabletop background corresponds to an area division manner of the game tabletop, the game tabletop is divided

into a plurality of sub-areas based on the area division manner, and each of the sub-areas is used to operate one class of game props.

5. The method according to any one of claims 1-4, further comprising:

determining a class label of the game prop in the second game scene image is a specified class label; or

determining the class label of the game prop in the second game scene image based on class information of the game prop in the first game scene image, wherein the class information of the game prop in the first game scene image is pre-labeled or obtained by performing game prop classification on the first game scene image.

6. The method according to any one of claims 1-5, wherein fusing the background image with the transformed image based on the fused position information comprises:

obtaining a pasted image by pasting the transformed image to a preset position of the background image based on the fused position information;

obtaining the second game scene image by performing image enhancement on the pasted image;

wherein the position label of the game prop in the second game scene image is determined based on the preset position.

7. The method according to claim 6, wherein obtaining the second game scene image by performing image enhancement on the pasted image comprises:

performing Gaussian filtering on the pasted image;

performing brightness processing on the filtered pasted image based on a brightness of a scene corresponding to the first game scene image;

obtaining the second game scene image by performing noise processing on the brightness-processed pasted image based on a noise level of the scene corresponding to the first game scene image.

8. The method according to any one of claims 1-7, further comprising:

obtaining an intermediate neural network by training an initial neural network based on the first game scene image;

obtaining a target neural network by fine-tuning the intermediate neural network based on the second game scene image, wherein the target neural network is used to process a game prop involved in a to-be-processed image, and a game tabletop background in the to-be-processed image is substantial same as the game tabletop background in the second game scene image.

9. The method according to claim 8, wherein the intermediate neural network comprises a classification sub-network comprising a feature extractor and a classifier, the feature extractor is used to perform feature extraction on an image input into the intermediate neural network, and the classifier is used to perform game prop classification on the image input into the intermediate neural network based on a feature extracted by the feature extractor; fine-tuning the intermediate neural network based on the second game scene image comprises:

fixing the classifier of the classification sub-network, and fine-tuning the feature extractor of the classification sub-network based on a first number of the second game scene images until a preset convergence condition is satisfied;

fine-tuning the feature extractor and the classifier based on a second number of the second game scene images.

10. The method according to claim 8 or 9, further comprising:

obtaining a test image involving a game prop, wherein a game tabletop background in the test image is substantial same as the game tabletop background in the background image; testing the target neural network based on the test image.

11. A method of processing an image, comprising:

obtaining a to-be-processed image;

obtaining an analysis result for a game prop involved in the to-be-processed image from a target neural network by inputting the to-be-processed image into the target neural network;

wherein the target neural network is trained by:

obtaining an intermediate neural network by training an initial neural network based on a first game scene image;

obtaining the target neural network by fine-tuning the intermediate neural network based on a second game scene image;

wherein a game tabletop background in the to-be-processed image is substantially same as a game tabletop background in the second game scene image, and a game tabletop background in the first game scene image is different from a game tabletop background in a background image of a game tabletop;

the second game scene image is obtained by:

cropping a raw image involving a game prop on the game tabletop from the first game scene image;

obtaining a transformed image by performing transformation on the raw image;

obtaining the second game scene image by fusing the background image with the transformed image based on fused position information of the game prop, wherein a position label of the game prop in the second game scene image is determined based on the fused position information.

12. An apparatus for generating an image, comprising:

a first obtaining module, configured to obtain a first game scene image of a game tabletop and a background image of the game tabletop, wherein a game tabletop background in the first game scene image is different from a game tabletop background in the background image;

a first cropping module, configured to crop a raw image involving a game prop on the game tabletop from the first game scene image;

a first transforming module, configured to obtain a transformed image by performing transformation on the raw image;

a second obtaining module, configured to obtain fused position information of the game prop;

a first fusing module, configured to obtain a second game scene image by fusing the background image with the transformed image based on the fused position information, and determine a position label of the game prop in the second game scene image based on the fused position information.

13. An apparatus for processing an image, comprising:

a third obtaining module, configured to obtain a to-be-processed image;

an inputting module, configured to obtain an analysis result for a game prop involved in the to-be-processed image from a target neural network by inputting the to-be-processed image into the target neural network;

wherein the target neural network is trained with:

a training module, configured to obtain an intermediate neural network by training an initial neural network based on a first game scene image;

a fine-tuning module, configured to obtain the target neural network by fine-tuning the intermediate neural network based on a second game scene image;

wherein a game tabletop background in the to-be-processed image is substantially same as a game tabletop background in the second game scene image, and a game tabletop background in the first game scene image is different from a game tabletop background in a background image of a game tabletop;

the second game scene image is obtained with:

a second cropping module, configured to crop a raw image involving a game prop on the game tabletop from the first game scene image;

a second transforming module, configured to obtain a transformed image by performing transformation on the raw image;

a second fusing module, configured to obtain the second game scene image by fusing the background image with the transformed image based on fused position information of the game prop, wherein a position label of the game prop in the second game scene image is determined based on the fused position information.

14. A computer readable storage medium, storing computer program, wherein the program is executed by a processor to implement the method according to any one of claims 1-11.

15. A computer device, comprising a memory, a processor and computer program stored in the memory and run on the processor, wherein the processor executes the program to implement the method according to any one of claims 1-11.