

WHAT IS CLAIMED IS:

1. A car damage picture angle correction method, comprising the following steps:

A. after a car damage picture angle correction system receives a car damage picture to be classified and identified, identifying a rotation category corresponding to the received car damage picture by using a pre-trained picture rotation category identification model;

analyzing whether the identified rotation category corresponding to the car damage picture is a second preset rotation category or a third preset rotation category, wherein the second preset rotation category is clockwise rotation of 90 degrees, and the third preset rotation category is clockwise rotation of 270 degrees; or, the second preset rotation category is clockwise rotation of 270 degrees, and the third preset rotation category is clockwise rotation of 90 degrees;

B. determining a rotation control parameter corresponding to the identified rotation category according to a pre-determined mapping relation between rotation categories and rotation control parameters, the rotation control parameter comprising a rotation angle and a rotation direction;

step B comprising: determining, if the identified rotation category is a second preset rotation category, a rotation control parameter corresponding to the identified rotation category according to a pre-determined mapping relation between rotation categories and rotation control parameters; and

C. rotating the received car damage picture according to the determined rotation control parameter, so as to generate an angle-normal car damage picture;

step C comprising: rotating the received car damage picture according to the determined rotation control parameter to generate a rotation picture to be secondarily identified;

identifying, by using the pre-trained picture rotation category identification model, a secondary identification rotation category corresponding to the rotation picture to be secondarily identified;

determining, if the secondary identification rotation category is a first preset rotation category, the rotation picture to be secondarily identified as an angle-normal car damage picture, wherein the first preset rotation category is clockwise rotation of 0 degree or clockwise rotation of 360 degrees; and

determining, if the secondary identification rotation category is a fourth preset rotation category, the identified rotation category corresponding to the car damage picture as a third preset rotation category, determining a rotation control parameter corresponding to the third preset rotation category according to the pre-determined mapping relation between rotation categories and rotation control parameters, and rotating the received car damage picture according to the determined rotation control parameter to generate an angle-normal car damage picture, wherein the fourth preset rotation category is clockwise rotation of 180 degrees or counterclockwise rotation of 180 degrees.

2. The car damage picture angle correction method of claim 1, wherein the picture rotation category identification model is a deep convolutional neural network model, and the training process of the picture rotation category identification model is as follows:

A1. acquiring a preset number of angle-normal car damage picture samples;

A2. performing a preset number of angle rotations on each car damage picture sample respectively in accordance with a preset rotation direction to generate a rotation picture corresponding to each car damage picture sample, and labeling each car damage picture sample and the corresponding rotation picture thereof with a corresponding rotation category, wherein each car damage picture sample is correspondingly labeled with a first preset rotation category;

A3. taking each car damage picture sample labeled with a rotation category and a corresponding rotation picture thereof as a picture training subset, and dividing all picture training subsets into a training set with a first proportion and a verification set with a second proportion;

A4. training the picture rotation category identification model by using the training set; and

A5. verifying the accuracy of the trained picture rotation category identification model by using the verification set, if the accuracy is greater than or equal to a preset accuracy, ending training, or, if the accuracy is smaller than a preset accuracy, increasing the number of car damage picture samples, and re-executing S2, S3, S4, and S5.

3. The car damage picture angle correction method of claim 2, wherein a rotation angle for one-time angle rotation of the car damage picture sample is a ; if $360/a$ is a positive integer, a preset number of the angle rotations for each car damage picture sample is equal to $(360/a)$; or, if $360/a$ is a decimal number, the preset number is equal to an integer part of $(360/a)$.

4. The car damage picture angle correction method of any one of claims 1 to 3, wherein step B further comprises:

determining, if the identified rotation category corresponding to the car damage picture is neither a second preset rotation category nor a third preset rotation category, a rotation control parameter corresponding to the identified rotation category according to the pre-determined mapping relation between rotation categories and rotation control parameters, and executing step C.

5. An electronic device, comprising a memory, a processor, and a car damage picture angle correction system stored on the memory and operable on the processor, and when being executed by the processor, the car damage picture angle correction system implementing the following steps:

after receiving a car damage picture to be classified and identified, identifying a rotation category corresponding to the received car damage picture by using a pre-trained picture rotation category identification model;

determining a rotation control parameter corresponding to the identified rotation category according to a pre-determined mapping relation between rotation categories and rotation control parameters, the rotation control parameter comprising a rotation angle and a rotation direction; and

rotating the received car damage picture according to the determined rotation control parameter, so as to generate an angle-normal car damage picture;

analyzing whether the identified rotation category corresponding to the car damage picture is a second preset rotation category or a third preset rotation category, wherein the second preset rotation category is clockwise rotation of 90 degrees, and the third preset rotation category is clockwise rotation of 270 degrees; or, the second

preset rotation category is clockwise rotation of 270 degrees, and the third preset rotation category is clockwise rotation of 90 degrees;

determining, if the identified rotation category is a second preset rotation category, a rotation control parameter corresponding to the identified rotation category according to a pre-determined mapping relation between rotation categories and rotation control parameters; determining, if the secondary identification rotation category is a first preset rotation category, the rotation picture to be secondarily identified as an angle-normal car damage picture, wherein the first preset rotation category is clockwise rotation of 0 degree or clockwise rotation of 360 degrees; determining, if the secondary identification rotation category is a fourth preset rotation category, the identified rotation category corresponding to the car damage picture as a third preset rotation category, and determining a rotation control parameter corresponding to the third preset rotation category according to the pre-determined mapping relation between rotation categories and rotation control parameters, wherein the fourth preset rotation category is clockwise rotation of 180 degrees or counterclockwise rotation of 180 degrees;

rotating the received car damage picture according to the determined rotation control parameter to generate a rotation picture to be secondarily identified; and

identifying, by using the pre-trained picture rotation category identification model, a secondary identification rotation category corresponding to the rotation picture to be secondarily identified.

6. The electronic device of claim 5, wherein the picture rotation category identification model is a deep convolutional neural network model, and the training process of the picture rotation category identification model is as follows:

A1. acquiring a preset number of angle-normal car damage picture samples;

A2. performing a preset number of angle rotations on each car damage picture sample respectively in accordance with a preset rotation direction to generate a rotation picture corresponding to each car damage picture sample, and labeling each car damage picture sample and the corresponding rotation picture thereof with a corresponding rotation category, wherein each car damage picture sample is correspondingly labeled with a first preset rotation category;

A3. taking each car damage picture sample labeled with a rotation category and a corresponding rotation picture thereof as a picture training subset, and dividing all picture training subsets into a training set with a first proportion and a verification set with a second proportion;

A4. training the picture rotation category identification model by using the training set; and

A5. verifying the accuracy of the trained picture rotation category identification model by using the verification set, if the accuracy is greater than or equal to a preset accuracy, ending training, or, if the accuracy is smaller than a preset accuracy, increasing the number of car damage picture samples, and re-executing S2, S3, S4, and S5.

7. The electronic device of claim 6, wherein a rotation angle for one-time angle rotation of the car damage picture sample is a ; if $360/a$ is a positive integer, a preset number of the angle rotations for each car damage picture sample is equal to $(360/a)$; or, if $360/a$ is a decimal number, the preset number is equal to an integer part of $(360/a)$.

8. A computer-readable storage medium, storing a car damage picture angle correction system, wherein the car damage picture angle correction system is executable by at least one processor, such that the at least one processor executes the following steps:

A. after the car damage picture angle correction system receives a car damage picture to be classified and identified, identifying a rotation category corresponding to the received car damage picture by using a pre-trained picture rotation category identification model;

B. determining a rotation control parameter corresponding to the identified rotation category according to a pre-determined mapping relation between rotation categories and rotation control parameters, the rotation control parameter comprising a rotation angle and a rotation direction; and

C. rotating the received car damage picture according to the determined rotation control parameter, so as to generate an angle-normal car damage picture;

analyzing whether the identified rotation category corresponding to the car damage picture is a second preset rotation category or a third preset rotation category, wherein the second preset rotation category is clockwise rotation of 90 degrees, and the third preset rotation category is clockwise rotation of 270 degrees; or, the second preset rotation category is clockwise rotation of 270 degrees, and the third preset rotation category is clockwise rotation of 90 degrees;

determining, if the identified rotation category is a second preset rotation category, a rotation control parameter corresponding to the identified rotation category according to a pre-determined mapping relation between rotation categories and rotation control parameters; determining, if the secondary identification rotation

category is a first preset rotation category, the rotation picture to be secondarily identified as an angle-normal car damage picture, wherein the first preset rotation category is clockwise rotation of 0 degree or clockwise rotation of 360 degrees; determining, if the secondary identification rotation category is a fourth preset rotation category, the identified rotation category corresponding to the car damage picture as a third preset rotation category, and determining a rotation control parameter corresponding to the third preset rotation category according to the pre-determined mapping relation between rotation categories and rotation control parameters, wherein the fourth preset rotation category is clockwise rotation of 180 degrees or counterclockwise rotation of 180 degrees;

rotating the received car damage picture according to the determined rotation control parameter to generate a rotation picture to be secondarily identified; and

identifying, by using the pre-trained picture rotation category identification model, a secondary identification rotation category corresponding to the rotation picture to be secondarily identified.

9. The computer-readable storage medium of claim 8, wherein the picture rotation category identification model is a deep convolutional neural network model, and the training process of the picture rotation category identification model is as follows:

A1. acquiring a preset number of angle-normal car damage picture samples;

A2. performing a preset number of angle rotations on each car damage picture sample respectively in accordance with a preset rotation direction to generate a rotation picture corresponding to each car damage picture sample, and labeling each car damage picture sample and the corresponding rotation picture thereof with a

corresponding rotation category, wherein each car damage picture sample is correspondingly labeled with a first preset rotation category;

A3. taking each car damage picture sample labeled with a rotation category and a corresponding rotation picture thereof as a picture training subset, and dividing all picture training subsets into a training set with a first proportion and a verification set with a second proportion;

A4. training the picture rotation category identification model by using the training set; and

A5. verifying the accuracy of the trained picture rotation category identification model by using the verification set, if the accuracy is greater than or equal to a preset accuracy, ending training, or, if the accuracy is smaller than a preset accuracy, increasing the number of car damage picture samples, and re-executing S2, S3, S4, and S5.

10. The computer-readable storage medium of claim 9, wherein a rotation angle for one-time angle rotation of the car damage picture sample is a ; if $360/a$ is a positive integer, a preset number of the angle rotations for each car damage picture sample is equal to $(360/a)$; or, if $360/a$ is a decimal number, the preset number is equal to an integer part of $(360/a)$.

11. The computer-readable storage medium of any one of claims 8 to 10, wherein step B further comprises:

determining, if the identified rotation category corresponding to the car damage picture is neither a second preset rotation category nor a third preset rotation category, a rotation control parameter corresponding to the identified rotation category

according to the pre-determined mapping relation between rotation categories and rotation control parameters, and executing step C.