ranging technology based on a neural network of a Region-based Convolutional Neural Network (RCNN) or other types.

In the embodiments, by detecting the target object based on the neural network, the target object may be detected quickly and accurately in the image by using a powerful and accurate detection function of the neural network.

It can be understood that the foregoing method embodiments mentioned in the present disclosure are combined with each other to form a combined embodiment without departing from the principle and the logic. Details are not described in the present disclosure due to space limitation.

In addition, the present disclosure further provides an image processing apparatus, an electronic device, a computer readable storage medium, and a program. The foregoing are all used to implement any ~~image processing~~collision control method provided in the present disclosure. For corresponding technical solutions and descriptions, refer to corresponding descriptions of the method. Details are not described again.

FIG. 6 is a block diagram of a collision control apparatus according to an exemplary embodiment of the present disclosure. As shown in FIG. 6, the collision control apparatus includes:

a target object detection module 10, configured to detect a target object in an image photographed by a traveling object;

a forward collision hazard region determination module 20, configured to determine a forward collision hazard region of the traveling object; and

a collision control execution module 30, configured to execute collision control on the traveling object based on a relative relationship between the target object and the forward collision hazard region, where the collision control includes collision warning and/or driving control.

In the embodiments, collision control is executed on the traveling object based on the relationship between the detected target object and the forward collision hazard region of the traveling object, so that the collision control on the traveling object is more pertinent, efficient, and accurate.

CLAIMS

1. A collision control method, wherein the method comprises:

detecting a target object in an image photographed by a traveling object;

determining a forward collision hazard region of the traveling object based on a hazard distance and at least one of a width of the traveling object and a width of a road where the traveling object is located; and

executing collision control on the traveling object based on a relative relationship between the target object and the forward collision hazard region, wherein the collision control comprises collision warning and/or driving control

2. The method according to claim 1, wherein executing collision control on the traveling object based on the relative relationship between the target object and the forward collision hazard region comprises:

determining a hazard level of the target object based on the relative relationship between the target object and the forward collision hazard region; and

executing collision control corresponding to the hazard level on the traveling object.

3. The method according to claim 2, wherein the hazard level comprises a first hazard level and a second hazard level, and determining the hazard level of the target object based on the relative relationship between the target object and the forward collision hazard region comprises:

determining the hazard level of the target object as the first hazard level if the target object is in the forward collision hazard region; or

determining the hazard level of the target object as the second hazard level if the target object is outside the forward collision hazard region.

4. The method according to claim 3, wherein the hazard level further comprises a third hazard level, and determining the hazard level of the target object based on the relative relationship between the target object and the forward collision hazard region comprises:

determining the hazard level of the target object as the third hazard level if the target object is outside the forward collision hazard region and the target object moves into the forward collision hazard region.

~~5. The method according to any one of claims 1 to 4, wherein determining the forward collision hazard region of the traveling object comprises:~~

~~determining the forward collision hazard region of the traveling object based on a hazard distance, the width of the traveling object, and/or the width of a road where the traveling object is located.~~

~~6~~ 5. The method according to any one of claims 1 to ~~5~~ 4, wherein executing collision control on the traveling object based on the relative relationship between the target object and the forward collision hazard region comprises:

determining a distance between the target object and the traveling object; and

executing collision control on the traveling object based on the relative relationship between the target object and the forward collision hazard region and the distance.

~~7~~ 6. The method according to claim ~~6~~ 5, wherein the collision control comprises first collision control and second collision control, and executing collision control on the traveling object based on the relative relationship between the target object and the forward collision hazard region and the distance comprises:

executing the first collision control on the traveling object if the target object is in the forward collision hazard region and the distance is less than or equal to a first distance threshold; or

executing the second collision control on the traveling object if the target object is in the forward collision hazard region and the distance is greater than the first distance threshold.

~~8~~7. The method according to claim ~~6~~ 5, wherein the collision control comprises third collision control and fourth collision control, and executing collision control on the traveling object based on the relative relationship between the target object and the forward collision hazard region and the distance comprises:

executing the third collision control on the traveling object if the target object is outside the forward collision hazard region and the distance is less than or equal to a second distance threshold; or

executing the fourth collision control on the traveling object if the target object is outside the forward collision hazard region and the distance is greater than the second distance threshold.

~~9~~8. The method according to any one of claims 1 to ~~5~~4, wherein executing collision control on the traveling object based on the relative relationship between the target object and the forward collision hazard region comprises:

determining a collision time between the target object and the traveling object; and

executing collision control on the traveling object based on the relative relationship between the target object and the forward collision hazard region and the collision time.

~~10~~9. The method according to claim ~~9~~8, wherein the collision control comprises fifth collision control and sixth collision control, and executing collision control on the traveling object based on the relative relationship between the target object and the forward collision hazard region and the collision time comprises:

executing the fifth collision control on the traveling object if the target object is in the forward collision hazard region and the collision time is less than or equal to a first time threshold; or

executing the sixth collision control on the traveling object if the target object is in the forward collision hazard region and the collision time is greater than the first time threshold.

~~11~~10. The method according to claim ~~9~~8, wherein the collision control comprises seventh collision control and eighth collision control, and executing collision control on the traveling object based on the relative relationship between the target object and the forward collision hazard region and the collision time comprises:

executing the seventh collision control on the traveling object if the target object is outside the forward collision hazard region and the collision time is less than or equal to a second time threshold; or

executing the eighth collision control on the traveling object if the target object is outside the forward collision hazard region and the collision time is greater than the second time threshold.

~~12~~11. The method according to any one of claims 1 to ~~11~~10, wherein the target object comprises at least one of the following: a pedestrian, a vehicle, a non-motor vehicle, a plant, an animal, an obstacle, a robot, or a building.

~~13~~12. The method according to any one of claims 1 to ~~12~~11, wherein detecting the target object in the image photographed by the traveling object comprises:

detecting the target object in the image photographed by the traveling object via a neural network.

~~14~~13. A collision control apparatus, wherein the apparatus comprises:

a target object detection module, configured to detect a target object in an image photographed by a traveling object;

a forward collision hazard region determination module, configured to determine a forward collision hazard region of the traveling object based on a hazard distance and at least one of a width of the traveling object and a width of a road where the traveling object is located; and

a collision control execution module, configured to execute collision control on the traveling object based on a relative relationship between the target object and the forward collision hazard region, wherein the collision control comprises collision warning and/or driving control.

~~15~~14. The apparatus according to claim ~~14~~13, wherein the collision control execution module comprises:

a hazard level determination submodule, configured to determine a hazard level of the target object based on the relative relationship between the target object and the forward collision hazard region; and

a first collision control execution submodule, configured to execute collision control corresponding to the hazard level on the traveling object.

~~16~~15. The apparatus according to claim ~~15~~14, wherein the hazard level comprises a first hazard level and a second hazard level, and the hazard level determination submodule is configured to:

determine the hazard level of the target object as the first hazard level if the target object is in the forward collision hazard region; or

determine the hazard level of the target object as the second hazard level if the target object is outside the forward collision hazard region.

~~17~~16. The apparatus according to claim ~~16~~15, wherein the hazard level further comprises a third hazard level, and the hazard level determination submodule is configured to:

determine the hazard level of the target object as the third hazard level if the target object is outside the forward collision hazard region and the target object moves into the forward collision hazard region.

~~18~~17. An electronic device, comprising:

a processor; and

a memory configured to store processor executable instructions,

wherein the processor directly or indirectly invokes the executable instructions to execute the method according to any one of claims 1 to ~~13~~12.

~~19~~18. A computer readable storage medium having computer program instructions stored thereon, wherein the method according to any one of claims 1 to ~~13~~12 is implemented when the computer program instructions are executed by a processor.

~~20~~19. A computer program, wherein the method according to any one of claims 1 to ~~13~~12 is implemented when the computer program is executed by a processor.