

CLAIMS

1. A method for detecting a state of a signal indicator light, comprising:
detecting a target region in a target image and determining first feature values of pixels within
5 the target region, wherein at least one signal indicator light having different display states is
included in the target region;
clustering the pixels within the target region based on the first feature values to obtain a
plurality of class groups for the pixels; and
determining a display state of the signal indicator light based on the obtained plurality of class
10 groups.
2. The method according to claim 1, wherein determining a display state of the signal indicator
light based on the obtained plurality of class groups comprises:
determining whether a class center matching a reference feature value preset in an image
15 capturing device for the target image is present according to the reference feature value and the
first feature values corresponding to class centers of the class groups; and
determining that the signal indicator light is in a first state in response to presence of a class
center matching the reference feature value.
- 20 3. The method according to claim 2, further comprising:
determining that the signal indicator light is in a second state in response to absence of a class
center matching the reference feature value, after determining whether a class center matching
the reference feature value is present according to the reference feature value and the first
feature values corresponding to class centers of the class groups.
- 25 4. The method according to claim 2 or 3, wherein the reference feature value is set by:
capturing an image of a color calibration target with the image capturing device, to obtain a
reference image; and
determining the reference feature value according to a color value of a pixel within a preset
30 color region in the reference image.
5. The method according to claim 4, wherein determining the reference feature value according
to a color value of a pixel within a preset color region in the reference image comprises:
determining a color value of a pixel within the preset color region as the reference feature value;
35 or

normalizing a color value of a pixel within the preset color region to obtain the reference feature value.

6. The method according to any one of claims 2 to 5, wherein the reference feature value includes a reference feature value of a red state, a reference feature value of an amber state and a reference feature value of a green state.

7. The method according to any one of claims 2 to 6, further comprising:

in case of determining that the signal indicator light is in the first state, based on pixels in a class group corresponding to a class center matching the reference feature value, determining a first area defined by the class group in the target region;

determining the pixels included in the class group having the maximum first area as the pixels contained by the signal indicator light; and

determining the display color of the signal indicator light within the target region based on the reference feature value matching the class center of the class group having the maximum first area.

8. The method according to any one of claims 2 to 6, further comprising:

in case of determining that the signal indicator light is in the first state, clustering the pixels in the class group corresponding to the class center matching the reference feature value to obtain a plurality of new class groups;

determining reference feature values matching the class centers of the new class groups and determining a second area defined by pixels in each new class group within the target region;

determining pixels included in a class group having a maximum second area as the pixels contained by the signal indicator light; and

determining a display color of the signal indicator light within the target region based on the reference feature value matching the class center of the class group having the maximum second area.

9. The method according to any one of claims 1-8, wherein determining the first feature values of the pixels within the target region comprises:

determining a color value of a pixel within the target region as the first feature value;

or

normalizing the color value of the pixel within the target region to obtain the first feature value.

10. The method according to any one of claims 1-9, wherein clustering the pixels within the target region based on the first feature values to obtain a plurality of class groups for the pixels comprises:

clustering the pixels within the target region by a K-means clustering algorithm to obtain a
5 preset number of class groups.

11. A method for driving control, comprising:

capturing a road image by an image capturing device on intelligent driving equipment;

subjecting the road image as the target image to the method for detecting a state of a signal
10 indicator light according to any one of claims 1-10, to obtain the display state of the signal indicator light in the road image; and

generating and outputting a control instruction for controlling the intelligent driving equipment based on the display state of the signal indicator light in the road image to control the intelligent driving equipment.

12. The method according to claim 11, wherein the control instruction includes at least one of: a speed keeping control instruction, a speed adjusting control instruction, a direction keeping control instruction, a direction adjusting control instruction, a warn prompting control instruction, and a driving mode switching control instruction.

13. An apparatus for detecting a state of a signal indicator light, comprising:

a detection module, configured to detect a target region in a target image and determine first feature values of pixels within the target region, wherein at least one signal indicator light having different display states is present in the target region;

a clustering module, configured to cluster the pixels within the target region based on the first feature values to obtain a plurality of class groups for the pixels; and

a determination module, configured to determine a display state of the signal indicator light based on the obtained plurality of class groups.

14. The apparatus according to claim 13, wherein the determination module is configured to: determine whether a class center matching a reference feature value preset in an image capturing device for the target image is present according to the reference feature value and the first feature values corresponding to class centers of the class groups; and

determine that the signal indicator light is in a first state in response to presence of the class center matching the reference feature value.

15. The apparatus according to claim 14, wherein the determination module is further configured to determine that the signal indicator light is in a second state in response to absence of the class center matching the reference feature value after determining whether the class center matching the reference feature value is present according to the reference feature value and the first feature values corresponding to the class centers of the class groups.

16. The apparatus according to claim 14 or 15, further comprising: a setting module, configured to capture an image of a color calibration target with the image capturing device, to obtain a reference image; and determine the reference feature value according to a color value of a pixel within a preset color region in the reference image.

17. The apparatus according to claim 16, wherein the setting module is configured to: capture an image of the color calibration target with the image capturing device, to obtain the reference image; determine a color value of a pixel within the preset color region as the reference feature value, or normalize a color value of a pixel within the preset color region to obtain the reference feature value.

18. An apparatus for driving control, comprising: an image capturing device, mounted on intelligent driving equipment and configured to capture a road image; a signal indicator light state detecting module, configured to subject the road image as the target image to the method for detecting a state of a signal indicator light according to any one of claims 1-10, to obtain the display state of the signal indicator light in the road image; and a control module, configured to generate and output a control instruction for controlling the intelligent driving equipment based on the display state of the signal indicator light in the road image to control the intelligent driving equipment.

19. An electronic device, comprising: a processor; and a memory configured to store processor-executable instructions; wherein the processor is configured to perform the method according to any one of claims 1 to 10, or the method according to claim 11 or 12.

20. A computer readable storage medium having computer program instructions stored thereon, wherein the computer program instructions, when executed by a processor, implement the method according to any one of claims 1 to 10, or the method according to claim 11 or 12.

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