CLAIMS

1. A method for intelligent adjustment of a driving environment, comprising:

extracting a face feature of a driver's image captured by a vehicle-mounted camera;

authenticating the extracted face feature based on at least one pre-stored registered face feature;

in response to successful face feature authentication, determining driving environment personalization information corresponding to the registered face feature corresponding to the face feature according to a correspondence between the pre-stored registered face feature and the driving environment personalization information; and

sending the driving environment personalization information to a vehicle provided with the vehicle-mounted camera, or controlling the vehicle to adjust the driving environment according to the driving environment personalization information,

wherein the driving environment personalization information comprises seat state information determined according to driver's body shape-related information and face height information, and the face height information is determined according to a position point of a place between eyebrows of the driver.

2. The method according to claim 1, further comprising: before authenticating the extracted face feature based on the at least one pre-stored registered face feature,

acquiring, through a driver registration process, a registered face feature and driving environment personalization information of a driver, and a correspondence therebetween,

wherein the driver registration process comprises:

acquiring a driver's image;

extracting a face feature of the image;

acquiring driving environment parameter setting information; and

storing the extracted face feature as the registered face feature, storing the driving environment parameter setting information as the driving environment personalization information of the registered face feature, and establishing and storing the correspondence between the registered face feature and the driving environment personalization information.

3. The method according to claim 2, wherein acquiring the driving environment parameter setting information comprises at least one of:

receiving the driving environment parameter setting information through a mobile application terminal and/or the vehicle-mounted device;

acquiring the driving environment parameter setting information of the vehicle through the vehicle-mounted device; or

acquiring the driving environment parameter setting information of the vehicle through the vehicle-mounted device, and performing an update operation on the driving environment personalization information corresponding to the registered face feature based on the acquired driving environment parameter setting information.

4. The method according to claim 2 or 3, wherein the correspondence between the registered face feature and the driving environment personalization information is stored in at least one of the following locations: the mobile application terminal, a server, or the vehicle-mounted device,

wherein sending the driving environment personalization information to the vehicle provided with the vehicle-mounted camera comprises at least one of:

sending the driving environment personalization information to the vehicle provided with the vehicle-mounted camera through the server or the mobile application terminal communicating with the vehicle; or

adjusting the driving environment of the vehicle provided with the vehicle-mounted camera through the vehicle-mounted device according to the driving environment personalization information.

5. The method according to any one of claims 1 to 3,

wherein acquiring the driving environment parameter setting information comprises:

performing detection on the driver's image to obtain a detection result comprising the position point of the place between eyebrows;

determining driver's body shape-related information and face height information according to the detection result; and

determining driver's seat state information based on the body shape-related information and

the face height information.

6. The method according to claim 5, wherein the detection result comprises coordinates of a face reference point,

wherein performing the detection on the driver's image to obtain the detection result comprises:

performing face reference point detection on the driver's image to obtain coordinates of the face reference point of the driver in a camera coordinate system; and

wherein determining the driver's face height information according to the detection result comprises:

converting the coordinates of the face reference point from the camera coordinate system to an on-board unit coordinate system; and

determining the driver's face height information based on the coordinates of the face reference point in the on-board unit coordinate system.

7. The method according to claim 6, wherein the face reference point comprises at least one face key point and/or at least one other face position point,

wherein performing the face reference point detection on the driver's image to obtain the coordinates of the face reference point of the driver in the camera coordinate system comprises:

performing the face reference point detection on the driver's image to obtain coordinates of the at least one face key point of the driver in the camera coordinate system; and/or

determining the at least one other face position point based on the coordinates of the at least one face key point.

8. The method according to any one of claims 5 to 7, wherein the body shape-related information comprises race information and/or gender information,

wherein performing the detection on the driver's image to obtain the detection result comprises:

inputting the driver's image to a neural network for attribute detection to perform attribute detection so as to obtain an attribute detection result output by the neural network; and

wherein determining the driver's body shape-related information according to the detection result comprises:

obtaining driver's race information and/or gender information corresponding to the image based on the attribute detection result.

9. The method according to any one of claims 5 to 8, wherein determining the driver's seat state information based on the body shape-related information and the face height information comprises:

obtaining a preset seat adjustment conversion relationship related to a body shape and a face height; and

determining a desired seat state corresponding to the driver based on the body shape-related information and the face height information and based on the seat adjustment conversion relationship, and taking the desired seat state as the driver's seat state information.

10. The method according to any one of claims 5 to 8, wherein determining the driver's seat state information based on the body shape-related information and the face height information comprises:

obtaining a preset first seat adjustment conversion relationship related to a face height;

determining a first desired seat state corresponding to the driver based on the face height information and the first seat adjustment conversion relationship;

obtaining a preset second seat adjustment conversion relationship related to the body shape-related information;

determining a second desired seat state based on the body shape-related information, the second seat adjustment conversion relationship and the first desired seat state; and

taking the second desired seat state as the driver's seat state information.

11. A method for driver registration, comprising:

acquiring a driver's image;

extracting a face feature of the image;

acquiring driving environment parameter setting information, wherein the driving

environment parameter setting information comprises seat state information determined according to driver's body shape-related information and face height information, and the face height information is determined according to a position point of a place between eyebrows of the driver; and

storing the extracted face feature as a registered face feature, storing the driving environment parameter setting information as driving environment personalization information of the registered face feature, and establishing and storing a correspondence between the registered face feature and the driving environment personalization information.

12. An apparatus for intelligent adjustment of a driving environment, comprising:

a feature extraction unit, configured to extract a face feature of a driver's image captured by a vehicle-mounted camera;

a face feature authentication unit, configured to authenticate the extracted face feature based on at least one pre-stored registered face feature;

an environmental information acquisition unit, configured to, in response to successful face feature authentication, determine driving environment personalization information corresponding to the registered face feature corresponding to the face feature according to a correspondence between the pre-stored registered face feature and the driving environment personalization information; and

an information processing unit, configured to send the driving environment personalization information to a vehicle provided with the vehicle-mounted camera, or to control the vehicle to adjust the driving environment according to the driving environment personalization information,

wherein the driving environment personalization information comprises seat state information determined according to driver's body shape-related information and face height information, and the face height information is determined according to a position point of a place between eyebrows of the driver.

13. The apparatus according to claim 12, further comprising:

a driver registration unit, configured to acquire, through a driver registration process, a

registered face feature and driving environment personalization information of a driver, and a correspondence therebetween,

wherein the driver registration unit comprises:

an image acquisition module, configured to acquire a driver's image;

a face feature extraction module, configured to extract a face feature of the image;

a parameter information acquisition module, configured to acquire driving environment parameter setting information; and

a registration information storage module, configured to store the extracted face feature as the registered face feature, store the driving environment parameter setting information as the driving environment personalization information of the registered face feature, and establish and store the correspondence between the registered face feature and the driving environment personalization information.

14. The apparatus according to claim 13, wherein the parameter information acquisition module is configured to receive the driving environment parameter setting information through the mobile application terminal and/or the vehicle-mounted device; and/or

wherein the parameter information acquisition module is configured to acquire the driving environment parameter setting information of the vehicle through the vehicle-mounted device; and/or

wherein the parameter information acquisition module is configured to acquire the driving environment parameter setting information of the vehicle through the vehicle-mounted device, and perform an update operation on the driving environment personalization information corresponding to the registered face feature based on the acquired driving environment parameter setting information.

15. The apparatus according to claim 13 or 14, wherein the correspondence between the registered face feature and the driving environment personalization information is stored in at least one of the following locations: the mobile application terminal, a server, or the vehicle-mounted device,

wherein when sending the driving environment personalization information to the vehicle

provided with the vehicle-mounted camera, the information processing unit is configured to send the driving environment personalization information to the vehicle provided with the vehicle-mounted camera through the server or the mobile application terminal communicating with the vehicle; and/or

wherein when controlling the vehicle to adjust the driving environment according to the driving environment personalization information, the information processing unit is configured to adjust the driving environment of the vehicle provided with the vehicle-mounted camera through the vehicle-mounted device according to the driving environment personalization information.

16. An apparatus for driver registration, comprising:

an image acquisition module, configured to acquire a driver's image;

a face feature extraction module, configured to extract a face feature of the image;

a parameter information acquisition module, configured to acquire driving environment parameter setting information, wherein the driving environment parameter setting information comprises seat state information determined according to driver's body shape-related information and face height information, and the face height information is determined according to a position point of a place between eyebrows of the driver; and

a registration information storage module, configured to store the extracted face feature as a registered face feature, store the driving environment parameter setting information as driving environment personalization information of the registered face feature, and establish and store a correspondence between the registered face feature and the driving environment personalization information.

17. An electronic device, comprising: a memory, configured to store executable instructions; and

a processor, configured to communicate with the memory to execute the executable instructions so as to perform operations of:

extracting a face feature of a driver's image captured by a vehicle-mounted camera;

authenticating the extracted face feature based on at least one pre-stored registered face feature;

in response to successful face feature authentication, determining driving environment personalization information corresponding to the registered face feature corresponding to the face feature according to a correspondence between the pre-stored registered face feature and the driving environment personalization information; and

sending the driving environment personalization information to a vehicle provided with the vehicle-mounted camera, or controlling the vehicle to adjust the driving environment according to the driving environment personalization information,

wherein the driving environment personalization information comprises seat state information determined according to driver's body shape-related information and face height information, and the face height information is determined according to a position point of a place between eyebrows of the driver.

18. An electronic device, comprising: a memory, configured to store executable instructions; and

a processor, configured to communicate with the memory to execute the executable instructions so as to perform operations of:

acquiring a driver's image;

extracting a face feature of the image;

acquiring driving environment parameter setting information, wherein the driving environment personalization information comprises seat state information determined according to driver's body shape-related information and face height information, and the face height information is determined according to a position point of a place between eyebrows of the driver; and

storing the extracted face feature as a registered face feature, storing the driving environment parameter setting information as driving environment personalization information of the registered face feature, and establishing and storing a correspondence between the registered face feature and the driving environment personalization information.

19. A computer storage medium, configured to store computer-readable instructions, wherein when the instructions are executed, operations of the method for intelligent adjustment of a driving environment according to any one of claims 1 to 10 or the method for driver registration

according to claim 11 are performed.

20. A computer program, comprising a computer-readable code, wherein when the computer-readable code runs in a device, a processor in the device executes instructions for implementing the method for intelligent adjustment of a driving environment according to any one of claims 1 to 10 or the method for driver registration according to claim 11.