CLAIMS

1. A picture-based method for assessing vehicle damage, wherein the method comprises:

acquiring, at a cloud server and from a mobile device, a to-be-processed picture for vehicle loss assessment, wherein the to-be-processed picture comprises a photograph of a damaged vehicle taken using the mobile device and uploaded to the cloud server using a mobile application;

examining, by the cloud server, the to-be-processed picture using a component identification model constructed by a first machine learning algorithm, comprising:

identifying a vehicle component in the to-be-processed picture, the vehicle component comprising multiple parts, and

determining a component region in the to-be-processed picture corresponding to the identified vehicle component;

examining, by the cloud server, the to-be-processed picture using a damage identification model comprising a deep neural network constructed by a second machine learning algorithm, comprising:

identifying a damaged part, a damage type, and a damage degree in the to-be-processed picture; and

determining a damage region in the to-be-processed picture corresponding to the damaged part;

determining, by the cloud server, whether the damage region matches the component region;

in response to determining that the damage region matches the component region, determining, by the cloud server, the vehicle component as a damaged component, and determining a damaged part of the determined damaged component, a damage type of the determined damaged component, and a damage degree of the determined damaged component;

generating, by the cloud server, a maintenance plan based on information comprising the determined damaged component, the damaged part of the determined damaged component, the damage type of the determined damage component and the damage degree of the determined damaged component; and

initiating the generated maintenance plan by transmitting work assignment data to a selected vehicle maintenance shop to conduct maintenance operations.

2. The method according to claim 1, wherein the method further comprises:

acquiring information about a maintenance strategy of the damaged component, wherein correspondingly, the maintenance plan further comprises estimated maintenance costs corresponding to the maintenance strategy, wherein the estimated maintenance costs are estimated maintenance costs of the damaged component that are calculated based on the information comprising the damaged component, the damaged part, the damage type, and the maintenance strategy, and data comprising a product price corresponding to the damaged component in the maintenance strategy and/or a price for a maintenance service corresponding to the damaged component in the maintenance strategy.

3. The method according to claim 1, wherein at least one of the component identification model or the damage identification model comprises:

a deep neural network that is based on a network model comprising a convolutional layer and a region proposal layer and constructed after training based on sample data.

4. The method according to claim 1, wherein examining the to-be-processed picture using the component identification model and examining the to-be-processed picture using the damage identification model is performed in parallel.

5. The method according to claim 3, wherein

the component identification model is trained using a component sample picture comprising marked data, wherein the component sample picture comprises at least one vehicle component; and

the damage identification model is set to:

output at least one damaged part and a damage type corresponding to the damaged part when a damage sample picture is input for model training, and

output data information indicating a confidence level for a degree of authenticity of the damage type when the damage identification model is used to examine the to-be-processed picture.

6. The method according to claim 5, wherein determining whether the damage region matches the component region comprises:

querying, in the component region, whether there is a damage region of the damaged part; and if there is the damage region of the damaged part, determining that the damage region matches the component region.

7. The method according to claim 5, wherein the damaged component, the damaged part of the damaged component, and the damage type are determined in the following manner:

acquiring a set of to-be-processed pictures that comprise the damaged part;

extracting feature vectors of the to-be-processed pictures in the set using a convolutional neural network, performing picture clustering processing for a same vehicle component based on the feature vectors, and determining the damaged component;

combining the damaged parts belonging to a same damaged component, and acquiring damage clustering feature data of the damaged parts; and

determining, according to the damage clustering feature data, the damaged part comprised in the damaged component and the damage type corresponding to the damaged part.

8. The method according to claim 7, wherein combining the damaged parts belonging to a same damaged component comprises:

selecting and combining damaged parts in K to-be-processed pictures in descending order of confidence levels from to-be-processed pictures that belong to a same damage sample component in the picture cluster, wherein $K \geq 2$.

9. The method according to claim 7, wherein acquiring damage clustering feature data of the damaged parts comprises:

selecting, from a combined picture cluster, damage clustering feature data of C to-be-processed pictures in descending order of weighted values of damaged parts, wherein $C \geq 2$, and a weight factor of the weighted value is a confidence level of the damaged part.

10. The method according to claim 8 or 9, wherein the damaged part and the damage type in the damage sample picture are identified according to the damage clustering feature data,

comprising:

using the damage clustering feature data as input data for a specified multiclass gradient boosting decision tree model, and identifying the damaged part and the damage type.

11. The method according to claim 7, wherein a training sample picture used by the at least one of the component identification model or the damage identification model comprises:

picture information drew when a computer is used to simulate the damaged vehicle component.

12. The method according to claim 1, wherein determining the damaged part and the damage type of the determined damaged component comprises selecting a damaged part corresponding to a damage type with the highest damage degree as the damaged part of the determined damaged component, wherein the damage type with the highest damage degree is determined as the damage type of the determined damage component.

13. The method according to claim 1, wherein damage types comprise mild scratches, severe scratches, mild deformations, moderate deformations, severe deformations, damages, requirement of disassembling for an examination.

14. The method according to claim 1, further comprising:

determining multiple damaged parts of the damaged component; and

selecting a maintenance plan for the damage part that is most severely damaged as the generated maintenance plan.

15. An apparatus for assessing vehicle damage, comprising a processor and a memory configured to store a processor executable instruction, wherein when executing the instruction, the processor implements operations according to any one of claims 1 to 14.

16. A computer-readable storage medium, wherein the computer-readable storage medium stores a computer instruction, and when the instruction is executed, steps according to any one of claims 1 to 14 are implemented.

17. An apparatus for assessing vehicle damage, the apparatus comprising a cloud server in communication with a mobile device, wherein

the cloud server comprises a processor and a memory configured to store an instruction that can be executed by the processor, wherein when executing the instruction, the processor implements operations comprising:

acquiring a to-be-processed picture for vehicle loss assessment;

examining the to-be-processed picture using a component identification model comprising a deep neural network constructed by a first machine learning algorithm, comprising:

identifying a vehicle component in the to-be-processed picture, the vehicle component comprising multiple parts, and

determining a component region in the to-be-processed picture corresponding to the identified vehicle component;

examining the to-be-processed picture using a damage identification model comprising a deep neural network constructed by a second machine learning algorithm, comprising:

identifying a damaged part, a damage type, and a damage degree in the to-be-processed picture; and

determining a damage region in the to-be-processed picture corresponding to the damaged part;

determining whether the damage region matches the component region;

in response to determining that the damage region matches the component region, determining the vehicle component as a damaged component, and determining a damaged part, a damage type and a damage degree of the damaged component;

generating a maintenance plan based on information comprising the damaged component and the damaged part, the damage type and the damage degree of the damaged component; and

returning the generated maintenance plan to the mobile device; or

initiating the generated maintenance plan by transmitting work assignment data to a selected vehicle maintenance shop to conduct maintenance operations; and

the mobile device comprises a processor and a memory configured to store an instruction

that can be executed by the processor, wherein when executing the instruction, the processor implements operations comprising:

requesting, by a mobile device application installed on the mobile device, a vehicle damage assessment service, comprising:

taking a photograph of a damaged vehicle part and an entire vehicle using the mobile device; and

uploading the taken photograph through the mobile device application to the cloud server as the to-be-processed picture; and

receiving, from the cloud server, a maintenance plan for the vehicle.