

What is Claimed is:

1. A computer-implemented method for identifying damages of a vehicle, the method comprising:

obtaining, by a computing device, a set of tagged digital images as training data, wherein each tagged digital image includes at least one damage object;

training, based on the training data, a damage identification model independent of a part associated with the damage object~~based on the training data~~, wherein training the damage identification model comprises:

identifying at least a damage object in the training data based on a target detection technique;

generating a set of feature vectors for the training data; and

using the set of feature vectors to optimize a set of parameters associated with the damage identification model to obtain a trained damage identification model; and

applying the trained damage identification model to obtain a damage category prediction

result.

2. The method of claim 1, wherein an area comprising the damage object is tagged with a damage bounding box and a damage category tag corresponding to the damage bounding box, and wherein the damage category tag indicates a damage material and a damage mode.

3. The method of claim 2, wherein the damage material includes one of:

a painted piece;

a plastic piece;

a metal piece;

a sanded piece; and

a glass.

4. The method of claim 2, wherein the damage mode includes one of:

a scratch;

a deformation;

a crack; and

a fragmentation.

5. The method of claim 2, wherein the damage category tag further indicates a damage degree, and wherein the damage degree corresponds to at least one of:

minor damage;
medium damage; and
5 severe damage.

6. The method of claim 1, wherein training the damage identification model further comprises reducing noise associated with the identified damage object in the training data prior to generating the feature vectors, and wherein reducing the noise comprises:

10 determining whether a sub-area associated with the identified damage object corresponds to a maximum damaged area;
in response to determining that the sub-area does not include the maximum damaged area, filtering out negative matches; and
retaining positive matches.

7. The method of claim 6, wherein the negative matches indicate that the one or
15 more portions in the sub-area do not include the damage object, and wherein the positive matches indicate that the one or more portions in the sub-area includes the damage object.

8. The method of claim 1, wherein applying the trained damage identification model to obtain a damage category prediction result comprises:

20 obtaining an untagged digital image of a target object;
providing the digital image to the trained damage identification model;
using the trained damage identification model to:
identify a damage object from the digital image; and
determine a damage category prediction result associated with the identified
damage object; and
25 determining a damage material and a damage mode of the damage object based on the damage category prediction result and a mapping table.

9. The method of claim 8, further comprising:
determining a repair solution based on the damage category prediction result.

10. An apparatus for identifying damages of a vehicle, the apparatus comprising:
30 one or more processors; and

a storage medium storing instructions that, when executed by the one or more processors, cause the apparatus to perform a method comprising:

obtaining, by a computing device, a set of tagged digital images as training data, wherein each tagged digital image includes at least one damage object;

5 training, based on the training data, a damage identification model independent of a part associated with the damage object~~based on the training data~~, wherein training the damage identification model comprises:

identifying at least a damage object in the training data based on a target detection technique;

10 generating a set of feature vectors for the training data; and

using the set of feature vectors to optimize a set of parameters associated with the damage identification model to obtain a trained damage identification model; and

15 applying the trained damage identification model to obtain a damage category prediction result.

11. The apparatus of claim 10, wherein an area comprising the damage object is tagged with a damage bounding box and a damage category tag corresponding to the damage bounding box, and wherein the damage category tag indicates a damage material and a damage mode.

20 12. The apparatus of claim 10, wherein training the damage identification model further comprises reducing noise associated with the identified damage object in the training data prior to generating the feature vectors, and wherein reducing the noise comprises:

determining whether a sub-area associated with the identified damage object corresponds to a maximum damaged area;

25 in response to determining that the sub-area does not include the maximum damaged area, filtering out negative matches; and retaining positive matches.

13. The apparatus of claim 12, wherein the negative matches indicate that the one or more portions in the sub-area do not include the damage object, and wherein the positive matches 30 indicate that the one or more portions in the sub-area includes the damage object.

14. The apparatus of claim 10, wherein applying the trained damage identification model to obtain a damage category prediction result comprises:

obtaining an untagged digital image of a target object;

providing the digital image to the trained damage identification model;

5 using the trained damage identification model to:

identify a damage object from the digital image; and

determine a damage category prediction result associated with the identified damage object; and

10 ~~determine~~ determining a damage material and a damage mode of the damage object based on the damage category prediction result and a mapping table.

15 15. The apparatus of claim 14, wherein the method further comprising:

determining a repair solution based on the damage category prediction result.

16. A non-transitory computer-readable storage medium storing instructions that when executed by a computer cause the computer to perform a method for identifying damages of a vehicle, the method comprising:

obtaining, by a computing device, a set of tagged digital images as training data, wherein each tagged digital image includes at least one damage object;

20 training, based on the training data, a damage identification model independent of a part associated with the damage object ~~based on the training data~~, wherein training the damage identification model comprises:

identifying at least a damage object in the training data based on a target detection technique;

generating a set of feature vectors for the training data; and

25 using the set of feature vectors to optimize a set of parameters associated with the damage identification model to obtain a trained damage identification model; and applying the trained damage identification model to obtain a damage category prediction result.

30 17. The non-transitory computer-readable storage medium claim 16, wherein an area comprising the damage object is tagged with a damage bounding box and a damage category tag corresponding to the damage bounding box, and wherein the damage category tag indicates a damage material and a damage mode.

18. The non-transitory computer-readable storage medium claim 16, wherein training the damage identification model further comprises reducing noise associated with the identified damage object in the training data prior to generating the feature vectors, and wherein reducing the noise comprises:

- 5 determining whether a sub-area associated with the identified damage object corresponds to a maximum damaged area;
- in response to determining that the sub-area does not include the maximum damaged area, filtering out negative matches; and
- retaining positive matches.

10 19. The non-transitory computer-readable storage medium claim 18, wherein the negative matches indicate that the one or more portions in the sub-area do not include the damage object, and wherein the positive matches indicate that the one or more portions in the sub-area includes the damage object.

15 20. The non-transitory computer-readable storage medium claim 16, wherein applying the trained damage identification model to obtain the damage category prediction result comprises:

- obtaining an untagged digital image of a target object;
- providing the digital image to the trained damage identification model;
- using the trained damage identification model to:
- 20 identify a damage object from the digital image; and
- determine a damage category prediction result associated with the identified damage object; and
- ~~determine~~ determining a damage material and a damage mode of the damage object based on the damage category prediction result and a mapping table.