CLAIMS

1. A method of estimating a road condition, comprising:

acquiring, for a first preset duration before a first moment, a sequence of user tracks for a road and a sequence of road images for the road;

extracting a track-related feature of the road from the sequence of the user tracks, and extracting an image-related feature of the road from the sequence of the road images; and

inputting the track-related feature of the road and the image-related feature of the road into a pre-trained road condition estimation model, so as to determine, for a second preset duration after the first moment, a road condition information of the road by using an estimated result of the road condition estimation model;

wherein the pre-trained road condition estimation model is obtained by training a road condition estimation model using a training data containing a road condition label, and the road condition label comprises one of seriously congested traffic, congested traffic, slow traffic or smooth traffic;

wherein the image-related feature comprises a road empty-degree feature, a traffic flow feature and a building feature; wherein the extracting an image-related feature of the road from the sequence of the road images comprises:

recognizing a building area from each road image in the sequence of the road images, by using a pre-trained image semantic segmentation model; and

calculating at least one of a similarity mean and a similarity variance for building areas of adjacent road images in the sequence of the road images, as the building feature of the road.

2. The method of claim 1, wherein the road comprises at least one of:

a preset target road,

a road in an electronic fence for the road condition, and

a road where a track point meets a preset triggering condition for estimating the road condition.

3. The method of claim 1, further comprising:

transmitting information of the road to a collection terminal, so as to acquire the sequence of the user tracks and the sequence of the road images, wherein the sequence of the user tracks and the sequence of the road images are collected by the collection terminal; or

transmitting a collection instruction to a collection terminal on the road, so as to acquire the sequence of the user tracks and the sequence of the road images, wherein the sequence of the user tracks and the sequence of the road images are collected by the collection terminal on the road.

4. The method of claim 1, wherein the track-related feature ~~includes~~ comprises a speed feature~~; and~~

~~the image-related feature includes at least one of a road empty-degree feature, a traffic flow feature and a building feature~~.

5. The method of claim 4, wherein the extracting an image-related feature of the road from the sequence of the road images further comprises:

recognizing a main driving area from each road image in the sequence of the road images, by using a pre-trained image semantic segmentation model;

extracting, from the each road image, at least one of a road empty-degree of the main driving area and a traffic flow information of the main driving area; and

obtaining the road empty-degree feature and/or the traffic flow feature, by using the road empty-degree of the main driving area in the each road image and/or the traffic flow information of the main driving area in the each road image.

6. The method of claim 5, wherein the recognizing a main driving area from each road image in the sequence of the road images, by using a pre-trained image semantic segmentation model comprises:

recognizing, for the each road image, an area category corresponding to each pixel by using the pre-trained image semantic segmentation model, so as to determine a driving area and at least one road environment area from the each road image; and

determining the main driving area from the driving area, by using the at least one road environment area.

~~7. The method of claim 4, wherein the extracting an image-related feature of the road from the sequence of the road images comprises:~~

~~recognizing a building area from each road image in the sequence of the road images, by using a pre-trained image semantic segmentation model; and~~

~~calculating a similarity mean and/or a similarity variance of building areas of adjacent road images in the sequence of the road images, as the building feature of the road.~~

~~8~~7. The method of claim 1, wherein features input into the road condition estimation model further comprises:

a time feature corresponding to the first preset duration before the first moment, and/or a property feature of the road.

~~9~~8. A method of establishing a road condition estimation model, comprising:

acquiring training data, including a sequence of user tracks for a sample road for a first preset duration before a second moment, a sequence of road images for the sample road for the first preset duration before the second moment and a road condition label for the sample road for a second preset duration after the second moment, wherein the road condition label comprises one of seriously congested traffic, congested traffic, slow traffic or smooth traffic;

extracting a track-related feature of the sample road from the sequence of the user tracks, and extracting an image-related feature of the sample road from the sequence of the road images; and

training a classification model, by using the track-related feature of the sample road and the image-related feature of the sample road as an input of the classification model, and using the road condition label for the sample road as a target output of the classification model, so as to obtain the road condition estimation model;

wherein the image-related feature comprises a road empty-degree feature, a traffic flow feature and a building feature; wherein the extracting an image-related feature of the road from the sequence of the road images comprises:

recognizing a building area from each road image in the sequence of the road images, by using a pre-trained image semantic segmentation model; and

calculating at least one of a similarity mean and a similarity variance for building areas of adjacent road images in the sequence of the road images, as the building feature of the road.

~~10~~9. The method of claim ~~9~~8, wherein the track-related feature ~~includes~~ comprises a speed feature~~; and~~

~~the image-related feature includes at least one of a road empty-degree feature, a traffic flow feature and a building feature~~.

~~11~~10. The method of claim ~~10~~9, wherein the extracting an image-related feature of the sample road from the sequence of the road images comprises:

recognizing a main driving area from each road image in the sequence of the road images, by using a pre-trained image semantic segmentation model;

extracting, from the each road image, at least one of a road empty-degree of the main driving area and a traffic flow information of the main driving area; and

obtaining the road empty-degree feature and/or the traffic flow feature, by using the road empty-degree of the main driving area in the each road image and/or the traffic flow information of the main driving area in the each road image.

~~12~~11. The method of claim ~~11~~10, wherein the recognizing a main driving area from each road image in the sequence of the road images, by using a pre-trained image semantic segmentation model comprises:

recognizing, for the each road image, an area category corresponding to each pixel by using the pre-trained image semantic segmentation model, so as to determine a driving area and at least one road environment area from the each road image; and

determining the main driving area from the driving area, by using the at least one road environment area.

~~13. The method of claim 10, wherein the extracting an image-related feature of the sample road from the sequence of the road images comprises:~~

~~recognizing a building area from each road image in the sequence of the road images, by using a pre-trained image semantic segmentation model; and~~

~~calculating a similarity mean and/or a similarity variance of building areas of adjacent road images in the sequence of the road images, as the building feature of the sample road.~~

~~14~~12. The method of claim ~~9~~8, wherein the input of the classification model further comprises:

a time feature corresponding to the first preset duration before the second moment, and/or a property feature of the sample road.

~~15~~13. An electronic device, comprising:

at least one processor; and

a memory communicatively connected to the at least one processor,

wherein the memory stores instructions executable by the at least one processor, and the instructions, when executed by the at least one processor, cause the at least one processor to implement operations of estimating a road condition, comprising:

acquiring, for a first preset duration before a first moment, a sequence of user tracks for a road and a sequence of road images for the road;

extracting a track-related feature of the road from the sequence of the user tracks, and extracting an image-related feature of the road from the sequence of the road images; and

inputting the track-related feature of the road and the image-related feature of the road into a pre-trained road condition estimation model, so as to determine, for a second preset duration after the first moment, a road condition information of the road by using an estimated result of the road condition estimation model;

wherein the pre-trained road condition estimation model is obtained by training a road condition estimation model using a training data containing a road condition label, and the road condition label comprises one of seriously congested traffic, congested traffic, slow traffic or smooth traffic;

wherein the image-related feature comprises a road empty-degree feature, a traffic flow feature and a building feature; wherein the extracting an image-related feature of the road from the sequence of the road images comprises:

recognizing a building area from each road image in the sequence of the road images, by using a pre-trained image semantic segmentation model; and

calculating at least one of a similarity mean and a similarity variance for building areas of adjacent road images in the sequence of the road images, as the building feature of the road.

~~16~~14. An electronic device, comprising:

at least one processor; and

a memory communicatively connected to the at least one processor,

wherein the memory stores instructions executable by the at least one processor, and the instructions, when executed by the at least one processor, cause the at least one processor to implement the method of claim ~~9~~8.

~~17~~15. A non-transitory computer-readable storage medium having computer instructions stored thereon, wherein the computer instructions allows a computer to implement the method of claim 1.

~~18~~16. A non-transitory computer-readable storage medium having computer instructions stored thereon, wherein the computer instructions allows a computer to implement the method of claim ~~9~~8.