CLAIMS

1. A method of determining a route of travel for an autonomous vehicle, comprising:

receiving, at one or more computing devices, data from a storage system via a network, the data providing information regarding road segments traversed by a plurality of vehicles other than the autonomous vehicle, the data including a plurality of difficulty signals that indicate previous disengagements by one or more of the plurality of vehicles from an autonomous mode to a manual mode, wherein the storage system and the network are external to the autonomous vehicle;

determining, based on the data, a difficulty value for each road segment based on the difficulty signals;

computing, with the one or more computing devices, a route cost for each of one or more possible routes between an origin and a destination, wherein the route cost is based on at least the difficulty values for the road segments along that route; and

determining, based on the route cost for each of the one or more possible routes, which route of the one or more possible routes to travel; and

generating a routing signal based on the determined route.

2. The method of claim 1, wherein the route cost is further based on difficulty signals indicating a number of unprotected turns of the road segments along the determined route.

3. The method of claim 1, further comprising correlating the difficulty signals with temporal features.

4. The method of claim 3, wherein computing the difficulty value for a particular segment comprises comparing a day or time of expected travel along the particular segment with a day or time correlated with the difficulty signals for the particular segment.

5. The method of claim 1, wherein determining the difficulty value comprises determining a probability of encountering a difficulty corresponding to at least one of the difficulty signals.

6. The method of claim 1, further comprising entering the difficulty values into a prediction model.

7. The method of claim 1, further comprising:

computing a segment cost for each road segment, wherein the segment cost is computed based on the difficulty value, distance, and time required to traverse each road segment;

wherein the route cost is computed based on the segment cost for the road segments along the route.

8. The method of claim 7, wherein computing the segment cost comprises:

computing a difficulty score based on the difficulty value for each road segment;

computing a distance score based on the distance of each road segment;

computing a time score based on the time required to traverse each road segment;

weighting the difficulty score, the distance score, and the time score; and

computing the segment cost as a function of the weighted scores.

9. The method of claim 8, wherein weighting the difficulty score, the distance score, and the time score comprises setting coefficients for the difficulty score, the distance score, and the time score, wherein the coefficients are modifiable to adjust relative weights.

10. The method of claim 9, further comprising:

receiving input from a passenger of the autonomous vehicle; and

adjusting the coefficients based on the received input from the passenger.

11. The method of claim 1, wherein the difficulty value is further based on the difficulty signals indicating at least one of: requesting remote driving assistance, a number of unprotected turns along each road segment, a portion of a driving area where a field of view of the autonomous vehicle is occluded, or a number of obstacles along each road segment.

12. The method of claim 1, further comprising:

causing the autonomous vehicle to drive according to the determined route based on the routing signal.

13. A system for determining a route of travel for an autonomous vehicle, comprising:

a network;

a storage system; and

one or more processors configured to:

receive data from the storage system via the network, the data providing information regarding road segments traversed by a plurality of vehicles other than the autonomous vehicle at different times, the data including a plurality of difficulty signals that indicate previous disengagements by one or more of the plurality of vehicles from an autonomous mode to a manual mode, wherein the storage system and the network are external to the autonomous vehicle;

determine, based on the data, a difficulty value for each road segment based on the difficulty signals;

compute a route cost for each of one or more possible routes between an origin and a destination, wherein the route cost is based on at least the difficulty values for the road segments along that route; and

determine, based on the route cost for each of the one or more possible routes, which route of the one or more possible routes to travel; and

generate a routing signal based on the determined route.

14. The system of claim 13, wherein the route cost is further based on difficulty signals indicating a number of unprotected turns of the road segments along the determined route.

15. The system of claim 13, wherein the one or more processors are further configured to correlate the difficulty signals with temporal features.

16. The system of claim 15, wherein computing the difficulty value for a particular segment comprises comparing a day or time of expected travel along the particular segment with a day or time correlated with the difficulty signals for the particular segment.

17. The system of claim 13, wherein determining the difficulty value comprises determining a probability of encountering a difficulty corresponding to at least one of the difficulty signals.

18. The system of claim 13, wherein the one or more processors are further configured to enter the difficulty values into a prediction model.

19. The system of claim 13, wherein the one or more processors are further configured to:

compute a segment cost for each road segment, wherein the segment cost is computed based on the difficulty value, distance, and time required to traverse each road segment;

wherein the route cost is computed based on the segment cost for the road segments along the route.

20. The system of claim 19, wherein computing the segment cost comprises:

computing a difficulty score based on the difficulty value for each road segment;

computing a distance score based on the distance of each road segment;

computing a time score based on the time required to traverse each road segment;

weighting the difficulty score, the distance score, and the time score; and

computing the segment cost as a function of the weighted scores.

21. The system of claim 20, wherein weighting the difficulty score, the distance score, and the time score comprises setting coefficients for the difficulty score, the distance score, and the time score, wherein the coefficients are modifiable to adjust relative weights.

22. The system of claim 21, wherein the one or more processors are further configured to:

receive input from a passenger of the autonomous vehicle; and

adjust the coefficients based on the received input from the passenger.

23. The system of claim 13, wherein the difficulty value is further based on the difficulty signals indicating at least one of: requesting remote driving assistance, a number of unprotected turns along each road segment, a portion of a driving area where a field of view of the autonomous vehicle is occluded, or a number of obstacles along the road segment.

24. The system of claim 13, wherein the autonomous vehicle is caused to drive according to the determined route based on the routing signal.