

CLAIMS

1. A method for predicting the destination location of a vehicle, comprising:
processing a local preference graph of a user of the vehicle having nodes corresponding to locations visited before by the user by a first graph neural network;
processing one or more of
 - a spatial graph representing information about geographical proximity of locations;
 - a temporal graph representing information about locations which have been visited one after another by users and the time between the visits of the locations; and
 - a preference graph representing information about locations which have been visited one after another and the frequency of visits of the locations;by a second graph neural network;
combining the result of the processing by the first graph neural network and the result of the processing by the second graph neural network by at least one neural network layer; and
using the output of the at least one neural network layer as prediction of the destination location.
2. The method of claim 1, further comprising processing a user-user graph representing information about similarity of users in terms of the locations they have visited by a third graph neural network and combining the results of the processing by the third graph neural network with the result of the processing of the first graph neural network and the result of the processing of the third graph neural network by the at least one neural network layer.
3. The method of claim 1 or 2, wherein the spatial graph has nodes corresponding to locations, edges between nodes if the locations corresponding to the nodes are geographically near each other and edge weights depending on the geographical proximity of the locations corresponding to the nodes connected by the edges.

4. The method of any one of claims 1 to 3, wherein the temporal graph has nodes corresponding to locations, edges between nodes if the locations corresponding to the nodes have been visited one after another based on the visits' timestamps and edge weights depending on the time between the visits of the locations corresponding to the nodes connected by the edges.
5. The method of any one of claims 1 to 4, wherein the preference graph has nodes corresponding to locations edges between nodes if the locations corresponding to the nodes have been visited one after another in all users' historical sequential visits and edge weights depending on the frequency with which the locations corresponding to the nodes connected by the edges have been visited one after another.
6. The method of any one of claims 1 to 5, wherein the user-user graph has nodes corresponding to users and edges between nodes if the similarity of the users corresponding to the nodes in terms of the locations they have visited is above a predetermined threshold.
7. The method of any one of claims 1 to 6, wherein processing at least one of the spatial graph, the temporal graph and the preference graph comprises selecting a sub-graph of the respective graph and feeding the sub-graph to the second graph neural network.
8. The method of claim 7, wherein selecting the sub-graph of a graph comprises selecting nodes of the graph by one or more random walks through the graph.
9. The method of claim 8, wherein the one or more random walks depend on the edge weights of the graph.
10. The method of claim 8 or 9, wherein a multiplicity of random walks are performed on the graph and nodes which have been visited most in the random walks are selected for the sub-graph.

11. The method of any one of claims 1 to 10, wherein processing at least one of the spatial graph, the temporal graph and the preference graph comprises selecting a plurality of sub-graphs of the respective graph and feeding the sub-graphs to different sub-graph neural networks of the second graph neural network.
12. The method of claim 11, wherein selecting a plurality of sub-graphs for a graph comprises selecting at least one sub-graph having nodes adjacent to one or more nodes of the vehicle's user's historical destination visit sequence and selecting at least one graph selected by at least one random walk through the graph.
13. The method of any one of claims 1 to 12, comprising processing at least two of the spatial graph, the temporal graph and the preference graph by feeding, for each of the at least two graphs, a first sub-graph having nodes adjacent to one or more nodes of the vehicle's user's historical destination visit sequence to a first set of sub-graph neural networks, and a second sub-graph having nodes selected by one or more random walks to a second set of sub-graph neural networks, mean pooling the result of the first set of sub-graph neural networks, mean pooling the results of the second set of sub-graph neural networks and combining the results of the mean poolings by the one or more neural network layers.
14. The method of any one of claims 1 to 13, wherein the at least one neural network layer comprises at least one of a dropout layer and a linear layer.
15. The method of any one of claims 1 to 14, comprising processing all of the spatial graph, the temporal graph and the preference graph by the second graph neural network.
16. The method of any one of claims 1 to 15, wherein one or more of
nodes corresponding to locations have trainable features,
nodes corresponding to users have trainable features,
the graph neural networks have trainable weights and
the at least one neural network layer has trainable weights.

17. The method of any one of claims 1 to 16, comprising setting one or more of the trainable features and the trainable weights by a training procedure using historical trips of the users.
18. The method of any one of claims 1 to 17, further comprising selecting a vehicle for making a trip with the user depending on the predicted destination location from a plurality of candidate vehicles.
19. The method of claim 18, comprising predicting a travel distance from the prediction of the destination location and selecting the vehicle from the plurality of candidate vehicles depending on the predicted travel distance.
20. The method of claim 19, comprising selecting the vehicle from the plurality of candidate vehicles such that the selected vehicle has sufficient fuel or battery to travel the predicted travel distance.
21. A server computer comprising a radio interface, a memory interface and a processing unit configured to perform the method of any one of claims 1 to 20.
22. A computer program element comprising program instructions, which, when executed by one or more processors, cause the one or more processors to perform the method of any one of claims 1 to 20.
23. A computer-readable medium comprising program instructions, which, when executed by one or more processors, cause the one or more processors to perform the method of any one of claims 1 to 20.