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DETERMINATION OF THE VEHICLE LOCATION IN CASE OF INCOMPLETE GPS DATA AND COMPLEX SHAPED ROUTE

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Abstract

The present paper gives the solution for determining of the precise location of the vehicle in case of incomplete GPS data and complex shaped route. Information about real time location is necessary for predicting the arrival time of vehicle on final or intermediate destinations. Predicted arrival times can be shown on information boards and sites in order to reduce wait time of passengers. The paper suggests to use several neural networks, placed in complex shaped segments of the route in order to determine precise location of the vehicle within that segments in case of incomplete GPS data.

Thesis

GPS tracking technology is used in many countries in order to ease the solving of the issues connected with public transport system. GPS tracking technology helps to predict the arrival times precisely and display on the information boards and information sites. It is especially useful for passengers as they will need less time for waiting their transport in rainy and cold days. Many other issues can be solved successfully with good tracking system.

Knowing exact real time location of vehicle is key for all the tasks that arises in transport systems. The location information is transmitted from vehicle to the information centres. The frequency of transmission of the GPS coordinates is important parameter for tracking system. With more frequent transmission of coordinates we can determine the real time location with more precision. The GPS tracking technology is good, but not cheap solution for transport system. Sometimes the frequency of transmission of GPS data is reduced, in order to reduce costs of tracking system. If the accuracy of GPS equipment is not very good, period between two neighbour coordinates of GPS is quite big and the shape of route is complex, the determination of precise location of the vehicle on the route is not trivial task.

The present paper gives the solution for determining vehicle location in case of above mentioned incomplete GPS data and complex shaped routes.

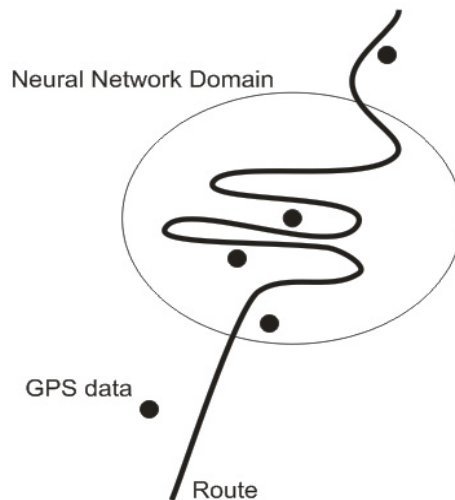As a tool for solving above mentioned task, we choose the neural network.

Figure 1 - Complex route

At route segments with complex shapes (e.g. serpentine route in mountains) we use neural networks. The network is trained to determine the location of the vehicle by incomplete GPS data.

We choose radial based neural network [1] for our tasks. Several coordinates are taken as network input. We get the route segment part as output of the network. Once we know the segment part, we can find the route point of the vehicle.

References:

1. Simon Haykin: Neural Networks, A comprehensive Foundation // Prentice Hall, Second Edition. 1999. P 256-312.