[0005] Furthermore, other desirable features and characteristics will become apparent from the subsequent detailed description and the appended claims, taken in conjunction with the accompanying drawings and this background of the disclosure.

Summary

[0005a] In an aspect, the present disclosure refers to a method for adaptively dividing a map into a plurality of submaps, the map comprising a plurality of roads, each of the plurality of roads being connected to at least one other road of the plurality of roads, the method comprising: for each pair of submaps from the plurality of submaps within the map, calculating an association score based on a first accuracy metric in predicting a first latent attribute of at least one first road of a first submap of the each pair of submaps using parameters for predicting a second latent attribute of at least one second road of a second submap of the each pair of submaps; and forming one of a plurality of new submaps within the map from each pair of a pair set of submaps from the plurality of submaps based on a result of determining a sum of the association scores of the pair set of submaps is higher than that of another pair set of submaps from the plurality of submaps.

[0005b] In another aspect, the present disclosure refers to a system for adaptively dividing a map into a plurality of submaps, the map comprising a plurality of roads, each of the plurality of roads being connected to at least one other road of the plurality of roads, the system comprising: at least one processor; and at least one memory including computer program code; the at least one memory and the computer program code configured to, with at least one processor, cause the server at least to: for each pair of submaps from the plurality of submaps within the map, calculate an association score based on a first accuracy metric in predicting a first latent attribute of at least one first road of a first submap of the each pair of submaps using parameters for predicting a second latent attribute of at least one second road of a second submap of the each pair of submaps; and form one of a plurality of new submaps within the map from each pair of a pair set of submaps from the plurality of submaps based on a result of determining a sum of the association scores of the pair set of submaps is higher than that of another pair set of submaps from the plurality of submaps.

[0006] In an example, the present disclosure provides a method for adaptively dividing a graph network, the graph network comprising a plurality of nodes, each of the plurality of nodes being connected to at least one other node of the plurality of nodes, the

method comprising: for each pair of subnetworks from a plurality of subnetworks within the graph network, calculating an association score based on a first accuracy metric in predicting a first latent attribute of at least one first node of a first subnetwork of the each pair of subnetworks using parameters optimized for accurately predicting a second latent attribute of at least one second node of second subnetwork of the each pair of subnetworks; and forming one of a plurality of new subnetworks within the graph network from each pair of a pair set of subnetworks from the plurality of subnetworks based on a result of determining a sum of the association scores of the pair set of subnetworks is higher than that of another pair set of subnetworks from the plurality of subnetworks.

[0007] In an example the present disclosure provides a system for adaptively dividing a graph network, the graph network comprising a plurality of nodes, each of the plurality of nodes being connected to at least one other node of the plurality of nodes, the system comprising: at least one processor; and at least one memory including computer program code; the at least one memory and the computer program code configured to, with at least one processor, cause the server at least to: for each pair of subnetworks from a plurality of subnetworks within the graph network, calculate an association score based on a first accuracy metric in predicting a first latent attribute of at least one first node of a first subnetwork of the each pair of subnetworks using parameters optimized for accurately predicting a second latent attribute of at least one second node of a second subnetwork of the each pair of subnetworks; and form one of a plurality of new subnetworks within the graph network from each pair of a pair set of subnetworks from the plurality of subnetworks based on a result of determining a sum of the association scores of the pair set of subnetworks is higher than that of another pair set of subnetworks from the plurality of subnetworks.

[0008] Additional benefits and advantages of the disclosed embodiments will become apparent from the specification and drawings. The benefits and/or advantages may be individually obtained by the various embodiments and features of the specification and

CLAIMS

1. A method for adaptively dividing a map into a plurality of submaps, the map comprising a plurality of roads, each of the plurality of roads being connected to at least one other road of the plurality of roads, the method comprising:

for each pair of submaps from the plurality of submaps within the map, calculating an association score based on a first accuracy metric in predicting a first latent attribute of at least one first road of a first submap of the each pair of submaps using parameters for predicting a second latent attribute of at least one second road of a second submap of the each pair of submaps; and

forming one of a plurality of new submaps within the map from each pair of a pair set of submaps from the plurality of submaps based on a result of determining a sum of the association scores of the pair set of submaps is higher than that of another pair set of submaps from the plurality of submaps.

2. The method of claim 1, wherein the association score is calculated further based on a second accuracy metric in predicting the second latent attribute of the at least one second road of the second submap using parameters for predicting the first latent attribute of the at least one first road of the first submap.

3. The method of claim 2, further comprising:

determining if the first accuracy metric is higher than a third accuracy metric in predicting the first latent attribute of the at least one first road of the first submap of the each pair of submaps using the parameters for predicting the first latent attribute of the at least one first road of the first submap and/or the second accuracy metric is higher than a fourth accuracy metric in predicting the second latent attribute of the at least one second road of the second submap of the each pair of submaps using the parameters for predicting the second latent attribute of the at least one second road of the second submaps; wherein forming the one of the plurality of new submaps within the map from the each pair of submaps is carried out in response to the determination of the first accuracy metric being higher than the third accuracy metric and/or the second accuracy metric being higher than the fourth accuracy metric.

4. The method of any one of claims 1-3, wherein the association score is calculated further based on a degree of connectedness between roads in the first subnetwork and the second submap of the each pair of submaps of the plurality of submaps.

5. The method of any one of claims 1 to 4, further comprising:

determining if the number of submaps within the map is higher than a pre-configured threshold number of submaps, wherein the calculation of the association scores is carried out in response to the determination of the number of submaps being higher than the pre-configured threshold number of submaps.

6. The method of any one of claims 1 to 5, further comprising:

identifying a third road in a target submap of the plurality of submaps based on a highest fifth accuracy metric in predicting a third latent attribute of the third road using parameters for predicting the third latent attribute of the third road;

for each of the remaining submaps of the plurality of the submaps, calculating a reassignment score to assign the third road to the each of the remaining submaps based on a sixth accuracy metric in predicting the third latent attribute of the third road using parameters for predicting a fourth latent attribute of at least one fourth road of the each of the remaining submaps; and

reforming the target submap to remove the third road from the target submap and one of the remaining submaps with a highest reassignment score from the calculated reassignment scores to further comprise the third road.

7. The method of claim 6, further comprising:

determining if the sixth accuracy metric associated with the highest reassignment score from the calculated reassignment scores is higher than the fifth accuracy metric, wherein reforming the target submap to remove the third road from the target submap and the one of the remaining submaps to further comprise the third road is carried out in response to the determination of the sixth accuracy metric being higher than the fifth accuracy metric.

8. The method of any one of claims 1 to 7, further comprising:

dividing the map into a plurality of submaps, wherein the calculation of the association scores is carried out based on the plurality of divided submaps.

9. The method of any one of claims 1 to 8, further comprising:

calculating a sum of the association scores of each of a plurality of pair sets of submaps; and

selecting a pair set of submaps from the plurality of pair sets of submaps with a highest sum among the sums of the association scores, wherein the one of the plurality of new submaps within the map is formed from each pair of the pair set of submaps with the highest sum.

10. The method of any one of claims 1 to 9, wherein each of the plurality of submaps exclusively comprises one or more roads of the plurality of roads, and wherein the step of predicting a latent attribute of a road corresponds to a step of predicting at least one of a number of points of interest (POIs) on the map that are accessible from the road, a type of the road, an average traffic speed on the road at a given time and an average number of vehicles traversing the road at a given time .

11. A system for adaptively dividing a map into a plurality of submaps, the map comprising a plurality of roads, each of the plurality of roads being connected to at least one other road of the plurality of roads, the system comprising:

at least one processor; and

at least one memory including computer program code;

the at least one memory and the computer program code configured to, with at least one processor, cause the server at least to:

for each pair of submaps from the plurality of submaps within the map, calculate an association score based on a first accuracy metric in predicting a first latent attribute of at least one first road of a first submap of the each pair of submaps

using parameters for predicting a second latent attribute of at least one second road of a second submap of the each pair of submaps; and

form one of a plurality of new submaps within the map from each pair of a pair set of submaps from the plurality of submaps based on a result of determining a sum of the association scores of the pair set of submaps is higher than that of another pair set of submaps from the plurality of submaps.

12. The system of claim 11, wherein the at least one memory and the computer program code configured to, with the at least one processor, cause the server at least to further:

calculate the association score based on a second accuracy metric in predicting the second latent attribute of the at least one second road of the second subnetwork using parameters for predicting the first latent attribute of the at least one first road of the first subnetwork.

13. The system of claim 12, wherein the at least one memory and the computer program code configured to, with the at least one processor, cause the server at least to further:

determine if the first accuracy metric is higher than a third accuracy metric in predicting the first latent attribute of the at least one first road of the first subnetwork of the each pair of submaps using the parameters for predicting the first latent attribute of the at least one first road of the first submap and/or the second accuracy metric is higher than a fourth accuracy metric in predicting the second latent attribute of the at least one second road of the second subnetwork of the each pair of submaps using the parameters for predicting the second latent attribute of the at least one second road of the second submap; and

form the one of the plurality of new submaps within the map from the each pair of submaps is carried out in response to the determination of the first accuracy metric being higher than the third accuracy metric and/or the second accuracy metric being higher than the fourth accuracy metric.

14. The system of any one of claims 11 to 13, wherein the at least one memory and the computer program code configured to, with the at least one processor, cause the server at least to further:

calculate the association score based on a degree of connectedness between roads in the first submap and the second submap of the each pair of submaps of the plurality of submaps.

15. The system of any one of claims 11 to 14, wherein the at least one memory and the computer program code configured to, with at least one processor, cause the server at least to further:

determine if the number of submaps within the map is higher than a pre-configured threshold number of submaps, wherein the calculation of the association scores is carried out in response to the determination of the number of submaps being higher than the pre-configured threshold number of submaps.

16. The system of any one of claims 11 to 15, wherein the at least one memory and the computer program code configured to, with the at least one processor, cause the server at least to further:

identifying a third road in a target submap of the plurality of submaps based on a highest fifth accuracy metric in predicting a third latent attribute of the third road using parameters for predicting the third latent attribute of the third road;

for each of the remaining submaps of the plurality of the submaps, calculating a reassignment score to assign the third road to the each of the remaining submaps based on a sixth accuracy metric in predicting the third latent attribute of the third road using parameters for predicting a fourth latent attribute of at least one fourth road of the each of the remaining submaps; and

reforming the target submap to remove the third road from the target submap and one of the remaining submaps with a highest reassignment score from the calculated reassignment scores to further comprise the third road.

17. The system of claim 16, further comprising:

determine if the sixth accuracy metric is higher than the fifth accuracy metric in predicting the third latent attribute of the at least one third road of the target submap; and

reform the target subnetwork to remove the third road from the target submap and the one of the remaining submaps with the highest reassignment score from the calculated

reassignment score to further comprise the third road is carried out in response to the determination of the sixth accuracy metric being higher than the fifth accuracy metric.

18. The system of any one of claims 11 to 17, wherein the at least one memory and the computer program code configured to, with the at least one processor, cause the server at least to further:

divide the map into a plurality of submaps, wherein the at least one memory and the computer program code configured to, with at least one processor, cause the server at least to calculate the association scores based on the plurality of divided submaps.

19. The system of any one of claims 11 to 18, the at least one memory and the computer program code configured to, with the at least one processor, cause the server at least to further:

calculate a sum of the association scores of each of a plurality of pair sets of submaps; and

select a pair set of submaps from the plurality of pair sets of submaps with a highest sum among the sums of the association scores, wherein the one of the plurality of new submaps within the map is formed from each pair of the pair set of submaps with the highest sum.

20. The system of any one of claims 11 to 19, wherein each of the plurality of submaps exclusively comprises one or more roads of the plurality of roads, and wherein the step predicting a latent attribute of a road corresponds to a step of predicting at least one of a number of points of interest (POIs) on the map that are accessible from the road, a type of the road, an average traffic speed on the road at a given time and an average number of vehicles traversing the road at a given time.