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Traffic Flow Pattern in Road Network Using Clustering

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Abstract:- Wireless communication has become important in location-based services. The enormous amount of data is extracted for useful information to solve the real world problem. Global positioning system, is used to captures the position of an object at specific time period. The scheme is finding the congested route by considering the number of vehicles in a road segment. It consists of two methods, firstly it finds the group of points based on consistency of route points and second it arranges the groups in sequence of values for each route.

Keywords:- *Trajectory points; Location Based Service (LBS); Traffic Pattern; pattern-mining.*

I. INTRODUCTION

The moving object data is available with the help of GPS and mobile communication. One of the spatiotemporal data mining is to analyze data sets for detecting interesting patterns. Trajectory objects of moving objects can provide useful information for high quality location-based services (LBS). The work is divided in two methods firstly, where in it groups the points based on consistency of route and secondly, it arranges the groups in sequence of values for each route.

II. PROBLEM DEFINITION

Let DT = T1, T2, T3,…, Tn be a database of route, where in each Ti is a sequence of triples (xi, yi, ti) for i = 1, 2,., n. (xi, yi) gives a position of an object with instance of time ti . It groups the route points in same direction, in such a way that the route points inside each group must be density reachable from their respective group. Groups with the number of route points exceeding the minimum traffic threshold are removed.

III. ALGORITHMIC FRAMEWORK

➢ *Algorithm: Disc-Cluster*

In this algorithm, DT=T1, T2,..,Tn be a database of route, where each Ti is a sequence of triplets (xi,yi,ti) for i=1,2,…,n such that (xi,yi) gives a position of a moving object at any instance of time ti. Group starts with C0 = {(x0i, y0i, t0i)} where (x0i, y0i, t0i) is the randomly selected trajectory Ti in a randomly selected path.

Here, (xi,yi,ti) is compared with the other route points of the group and also with the points of same trajectories Ti except the point (x0i, y0i, t0i), such that $\text{sqrt}(x_j - x0_i)^2 + (y_j - y0_i)^2 \leq \sigma$.

➢ *Arranging Clusters:*

The *Disc-Group* algorithm provides all the possible groups in each route. These groups represent the regions where the traffic flow is very high.

➢ *Algorithm 1: Disc-Group (DT, σ, α)*

- *Group discovering algorithm.*

The route database DT = {T1, T2, T3,..., Tn} where trajectory Ti = {(xi1, yi1, ti1), (xi2, yi2, ti2),..., (xim, yim, tim)} and id and routeid are the id of the vehicle that generated route and its adjacent route.

Begin:
1: Arrange and sort Ti according to temporal values
2: k ← -1
3: s ← 0 {s is a group number}
4: for all Ti ε DT: $1 \leq i \leq n$ do
5: for points pt (xip, yip, tip) ε Ti: $1 \leq p \leq m$ do
6: if ptis not in not in any cluster formed then
7: k ← k + 1, s ← k and add Pt to Cs.
8: else
9: s ← group number which contains Pt
10: end if
11: for all Tj ε DT: $1 \leq j \leq n$ do
12: if routeid and dom of Ti, Tj are same then
13: for all points pt1(xjq, yjq, tjq) ε Tj : $1 \leq q \leq m$ do
14: if $\text{sqrt}(xjq - xip)^2 + (yjq - yip)^2 \leq \sigma$ and $|tjq - tip| \leq \varepsilon$ then
15: Add point (xjq, yjq, tjq) to cluster Cs.
16: else
17: exit for
18: end if
19: end for
20: end if
23: end for
24: end for

- *Pattern-Mining*

Pattern-mining separates the group of each route and directions and mean of time values is calculated for each group.

- *Algorithm 2: Pattern-Mining(C, routeids, dom)*
  An Algorithm for mining traffic flow patterns.

Set of groups C={C1,C2,…,Cn} obtained through algorithm *Disc-Clusters*, where Ci={(x1,y1,t1),..,(xp,yp,tp), routeidj, domj }.

Begin:
1: for all routeid, routeidj ε routeids; $1 \leq j \leq m$ do
2: for all direction of movements, dmk ε dom ; $1 \leq k \leq 2$ 3: for all clusters Ci ε C; $1 \leq i \leq n$ do
4: if routeidi = routeidj and domi =dmk then
5: tmeani $\leftarrow \sum^{p}_{l=1}$ tl
6: end if
7: end for
8: for all cluster Ci ε C: $1 \leq i \leq n$ do
9: if routeidi = routeidj and domi =dmk then
10: Arrange and sort groups according to tmeani
11: end if
14: end for
15: end for
16: end for

IV. CONCLUSION

In this paper we presented a traffic flow pattern in a road network which will remove the heavy traffic regions using the group clustering algorithm and the arrange the groups in a particular sequence for different routes.

In this paper, as the algorithm identifies the heavy traffic regions in network, it groups the route points rather than the routes which give more information about the traffic area. This work can be planned with the route to each destination based on the traffic. This algorithm can also be explored with the large traffic real dataset.

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