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IMPROVISING TRAJECTORY MINING FOR MAP PATTERN USING GPS/GIS

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Abstract :- A latest method is introduced to determine and examine the unknown information of huge taxi route data within a city. This approach imaginatively transforms the geographic coordinates (i.e. latitude and longitude) to street names reflecting related semantic information. Therefore, the movement of each taxi is considered as a document consisting of the taxi traversed street names, which enables semantic study of huge taxi data sets as document amounts. Unseen themes like taxi topics, are recognized through textual area modeling techniques. Urban mobility patterns and developments, reflect the taxi topics which are displayed and analyzed through a visual analytics system. In system there is an interactive visualization tools, like taxi area maps, area routes, street clouds and parallel coordinates, to visualize the probability-based current information. Urban planners, administration, travelers, and drivers can carry out their various knowledge discovery tasks with direct semantic and visual assists. The use of Global Positioning System technology is that collecting the GPS trajectory data and visualize the map of any object moving in that trajectory. The system has been also used to show changes in position, speed and direction of object moving in particular path. Using the geographic components in the collected GPS data, and visualizing by mapping, provides a clear view of any region in which the object is moving.
Keywords : GPS, pattern mining, object mapping, speed analysis, direction, latitude.

I. INTRODUCTION

By the rapid progress of mobile devices and sensors, trajectory data from GPS and mobile sensors have been popular. Since trajectories are sequences of real-valued locations with errors and missing values, mining of these trajectory is not a straightforward task. Hence, research of trajectory mining has renowned impact towards next generation. A new visual analytics system can be proposed that finds and manifests implicit patterns derived from the taxi movement data throughout a city. The study can be done for each trajectory as a document consisting of the taxi-traversed street names. This is made possible by mapping GPS coordinates (i.e. latitude and longitude) from geometric positions to a meaningful text representation.

A modern vehicle GPS device on a taxi can record its real time moving path (i.e. trajectory). At each location, GPS information and Meta information are stored such as time, geographical coordinates (latitude, longitude), speed, and direction. The trajectory as a document consisting of taxi-traversed street names for knowing the taxi location, such as the street names, point of interest (e.g. any restaurants & shops). For all these the VATT (Visual Analysis of Taxi Topics) system aimed at supporting visual analytics tasks.
In trajectory mining the track of location can be determined by using smart phone. The study on human mobility from sequences of place visits can represent various traits including visiting patterns on different place categories.

This work is related to use of large-scale data collected from many users in a limited time period. Another concept is analysis of place inferred continuously from phone sensor data. By using large number of built-in sensors, smart phones can record quality data without any need of any additional devices. Actually mobile phones location data can be sensed using several techniques. For that Wi-Fi access points are fixed, Wi-Fi traces can be used to extract places. The predictability of human mobility from GSM tower data, whose location accuracy varies depending on the region. For that we consider location data with state of the art accuracy extracted from GPS, Wi-Fi sensors that allow us to extract meaningful places that people visit in their daily life. The longitudinal continuously recorded location traces that allowed us to characterize many individual mobility aspects.

II. RELATED WORK

2.1. Trajectory Mining:

By using Euclidean or shortest-path over networks clustering and classifying long trajectories are performed over distance actions. For example, partition of trajectories are used to collect them in rectangular regions, creating fine-grain groups. Trajectories are used to take out geographical borders. This method assumes non-overlapping regions which is predictable for administrative/spatial borders.

2.2 . Trajectory and Object Visualization:

Many approaches have existing visual tools for exploring geographical information. The techniques occupy map-based displays and use information visualization techniques to visualize the spatial attributes of the data over temporal changes. Object trajectories are a key type of movement data where many techniques have been developed, such as Geo Time.In visualizing hidden themes of taxi movement with semantic transformation, Ding Chu [1] developed a new visual analytics system that finds and manifests hidden patterns derived from the taxi movement data throughout a city. Here there is an each trajectory as a article consisting of the taxi-traversed street names. This is made possible by mapping GPS coordinates (i.e. latitude and longitude) from geometric positions to a important text representation.

According to Obuhuma, J. I. Moturi[2] many vehicle systems which are currently in use are some form of Automatic Vehicle Location (AVL), which is a concept for determining the geographic location of a vehicle and this information is transmitted to a remotely located server. To achieve vehicle tracking in real time, an in-vehicle unit and a tracking server is used.

Fosca Giannotti [4] from towards mining approaches for trajectory data projected first algorithm to find out pattern from trajectory data. The new pattern, that is called trajectory pattern, stand for a set of individual trajectories that split the property of visiting the same sequence of places with similar travel times.GSM and GPS based vehicle location and tracking system V. K. Raju [5], will provide useful, real time vehicle location, mapping and reporting this information value and add by improving the level of service provided.

III. MODULES DESCRIPTION

3.1 Visual Analytic System:

A modern vehicle GPS device on a taxi can record its real time moving path (i.e. trajectory) as a series of positions sampled with a small periodic interval. At each location, GPS information and meta information a restored such as time, geographical coordinates (latitude, longitude), speed, direction, and occupied/vacant status regarding whether the taxi has a customer. It remains a far-reaching goal to extensively decipher the information hidden in the complex, dynamic behavior of large populations. Moreover, domain experts and practitioners require effective visualization so that they can intuitively manipulate the iterative, exploratory process and derive pertinent insights.

3.2 GPS Device:

To achieve vehicle tracking in real time, an in-vehicle unit and a tracking server is used. The information is transmitted to a tracking server using GSM/GPRS modem on GSM network by using direct TCP/IP connection with tracking server through GPRS. The tracking server also has GSM/GPRS modem that receives vehicle location information via GSM network and stores this information in a database. A system that allows a user to view the present and the past positions recorded of a target object on Google Map through the internet. The system reads the current position of the object using GPS and the data sent via GPRS service from the GSM network towards a web server using the POST method of the HTTP protocol. The object's position data is then stored in the database for live and past tracking. figure shows the block diagram of visual analysis system.

IV. BLOCK DIAGRAM

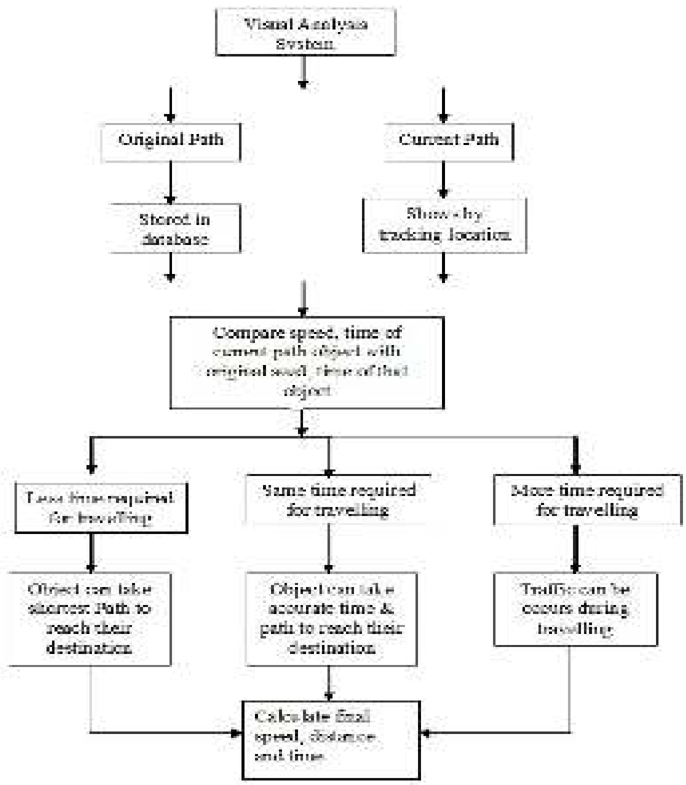

Fig1. Block diagram of Visual Analysis System

V. CLASSIFICATION ALGORITHM STRATEGY

5.1 Data Mining Algorithm:

The K-Nearest Neighbor Algorithm, a supervised learning algorithm was employed towards the determination of congestions and road usage patterns. The purpose of this algorithm was to classify new vehicles based on the position of the initial point. Its operation was based on minimum distance from the query instance to the GPS position data samples to determine the K-nearest neighbors. After we gather K nearest neighbors, we take simple majority of these K-nearest neighbors to be the prediction of the query instance. Depending on the GPS data points that are detected to be close together, the K-Means Clustering algorithm was applied at certain points to establish clusters of vehicles with a given k centroid. This was useful in determination of the road usage patterns.

5.2 Computing the Nearest Location:

The Spherical Law of Cosines was used towards the determination of the nearest location i.e. the distance through SQL statements.

Distance=acos(sin(latitude1).sin(latitude2)+cos(latitude1).cos(latitude2).cos(longitude2−longitude1)).radius

Where: the radius is the earth's radius (mean radius = 6,371km). The angles to be passed to the trigonometric functions need to be in radians. The Spherical Law of Cosines was used because it incorporates six trigonometric functions in its computation hence results in a more accurate distance value that can be as small as 1 metre as opposed to the Haversine and Equirectangular Approximation formulas.

5.3. The Speed Analysis Algorithm:

The speed analysis algorithm works well by utilizing the captured data parameters where it detects the number of vehicles in any given road segment, their direction of movement, the total speed. It then computes the average speed of vehicle. The algorithm is potential for use if subjected to a set of GPS data containing coordinates, speed, direction and timestamp parameter. In this project, the algorithm was subjected to both historical data and the test data collected after the development of the GPS server.

5.4. The Road Usage Algorithm:

The Road Usage pattern algorithm works well by utilizing the captured data parameters whereby it detects the vehicles within a given radius and plots the routes the vehicles used in form of polylines. It will shows in different colors in each case portray different vehicles. This is termed as a route player that depicts the road usage pattern on Google maps. The algorithm is potential for use if subjected to a set of GPS data containing coordinates and timestamp parameter.

5.5. GPS Algorithm:

These algorithm is used for determining geo-coordinates i.e. latitude and longitude. After calculating the geo-coordinates some additional semantic information can also be determined by algorithm like street names, point of interest and street ID.

V. CONCLUSION

A new visual analytics system can be proposed for tracking location of any object by using GPS technology. Along with this analysis speed and direction can also be determined that compared the current speed & time with original speed & time of that objet. This system can helpful for any private agency like travels agency to determined the current position of any vehicle. They can also take up to date information of their vehicles travelling from source to destination. It will also helpful for government buses and vehicles that they will also see hidden information about their vehicles at any time.

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