ISSN: 2320-1363

Dynamic Route Collection Index to the GPS (Geographic Information Systems) in Evaluation Path

Radhika Meegada *1, Kothuri Parashu Ramulu *2

M.Tech Student, Dept of CSE, Indur Institute Of Engineering & Technology,Medak(Dist), Ap, India.

Asst. Professor, Dept of CSE,Indur Institute Of Engineering & Technology,Medak(Dist), Ap, India.

Abstract

Technology in its aspect has given us many things. If we consider in such one of them is route relay through GPS, in this Paper we tries enhance the mechanism involved in the source to destination or to fro point in the context mechanism. Many studies have proven that GPS tracking data is feasible for capturing individual travel behavior, especially route choice. Post-processing methods of raw GPS data have also been developed. Hence, it is now possible to develop route choice models based on GPS tracking data. By using GPS tracking data, the accuracy of route choice model can be increased significantly.

Keywords: GPS, Dynamic Data, Best Shortest path, Data Collection

1. Introduction

A better understanding of the factors which influence route choice behavior can help researchers to design algorithms that generate routes based on more realistic assumptions and help greatly the transportation system management and planning process. A route choice model developed with GPS-based data offers a more accurate and reliable model for trip assignment. This increase of accuracy is really important because trip assignment results as a component of Travel Demand Analysis will be used as a basic reference for formulating an effective transport policy.

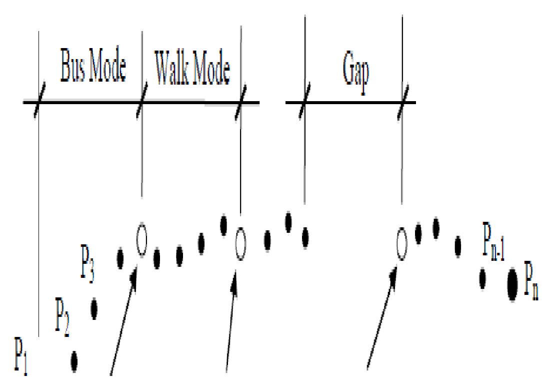

Fig. 1.1 Model Mode Positioning to the Satellite System.

The dissertation explores and illustrates the applicability of GPS technology in transportation research, specifically in

ISSN: 2320-1363

collecting data that support commute behavior and route choice. There are also several other technologies that should be examined for potential use in positional data collection. Dead reckoning devices are now being used in combination with GPS data collection efforts to supplement and /or enhance the positional data for areas in which GPS and/or differential correction signal reception is poor or nonexistent. There has also been much discussion and analysis recently of the use of cellular technologies for determining vehicle position in response to the U.S. government requirements.

2. Related work

The user's GPS receiver is the user segment of the GPS. In general, GPS receivers are composed an antenna which is tuned to the frequencies transmitted by the satellite, receiver processor, and a highly stable clock. A GPS receiver is often specified by the number of channels. These channels signify how many satellites can be monitored simultaneously. The receivers typically have between 12 and 20 channels. Many GPS receivers can relay position data to a PC or other device and interface with other devices using a serial connection, USB or Bluetooth.

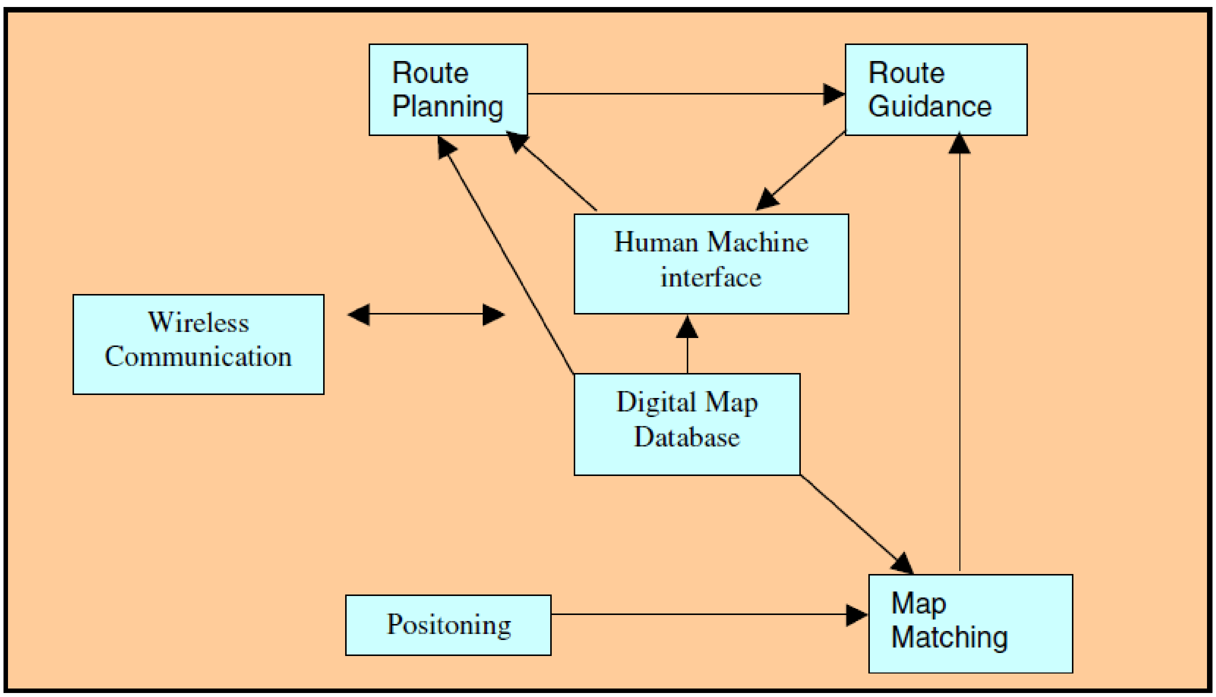

Fig. 2.1 Route planning through the Updated data.

ISSN: 2320-1363

WAAS has been working since December 1999 with nearly no interruption. It was developed for the aeronautical authority FAA to enable precise instrument approaches for landing planes (Hofmann-Wellenfof, Lichtenegger and Collins, 2001). The WAAS signal is accessible for civil use and offers a better coverage on land and on sea than the land-based DGPS systems. Unlike DGPS, the reception of WAAS requires no additional receivers. Only the software of the GPS receiver must support the reception of WAAS correction signals. However it is important that one of the geo-stationary satellites is in view of the receiver. This is more problematic, if the receiver is positioned further north, as the altitude of geo-stationary satellites above the horizon decreases. Therefore WAAS is especially useful for navigation in open land, aviation and navigation on sea. In Europe a system corresponding to WAAS is operated, called EGNOS (Euro Geo-stationary Navigation Overlay Service). In Asia, a Japanese system called MSAS (Multi-Functional Satellite Augmentation System) is planned. As all those systems operate with the same principle, a GPS receiver supporting WAAS can also benefit from EGNOS and MSAS.

3. Methods

Determination of the GPS receiver's position is influenced by the number and positioning of satellites in the sky from the view of the GPS receiver (satellite geometry). To indicate the quality of the satellite geometry, the DOP values (dilution of precision) are commonly used. DOP is computed as a function of the receiver and satellite positions. This value has a great impact on the accuracy of the position determination of GPS receiver. The reason for this lies with the triangulation method the receiver uses to calculate its position. If the satellites are evenly distributed in the sky, the position will be calculated more accurate.

In fact, there are different kinds of route choice models, such as: route choice of car drivers, motorcyclists, public transport users, multi-modal route choice, etc. However, this section only discusses the route choice modeling of car drivers. The problem of route choice modeling is complex. First, there are a large number of possible alternative routes through road networks between an origin and destination pair, and there are correlated alternatives due to overlapping path. In addition, the individual specific choice set is unknown. Second, the ultimate route choice decision is the result of many factors, such as drivers' socioeconomic characteristics, trip characteristics, road network structure, driving experience, and familiarity with the road network. Third, traffic information may influence travelers' route choice decisions, both before the trip and en-route. Furthermore, the decision-making process of route choice is a dynamic process. A learning process is central to the driver's

ISSN: 2320-1363

cognition as the information acquired through experience of earlier travel choices is processed before the next decision is made. Probabilistic/stochastic models were developed to relax the assumption of the deterministic models. The probabilistic model utilizes a discrete choice model, which is standard for modeling consumer behavior. The model is based on the idea that a decision maker is confronted with a set of alternatives (the choice set), and then he/she has to choose one of them.

It is assumed that the decision maker seeks to maximize his/her individual utility. The utility of each alternative is characterized by its measurable attributes. Multinomial Logit Model (MNL) proposed by Mac Fadden (1974) is the most commonly used discrete choice model. It assumes that decision makers have the same error distribution in the utility term, based on the Type I Extreme Value distribution (i.i.d. Gumbel distribution). These errors are theorized to be results from perception errors of the decision makers. The MNL model is not suitable to model route choice since it cannot consider the similarities among alternative routes.

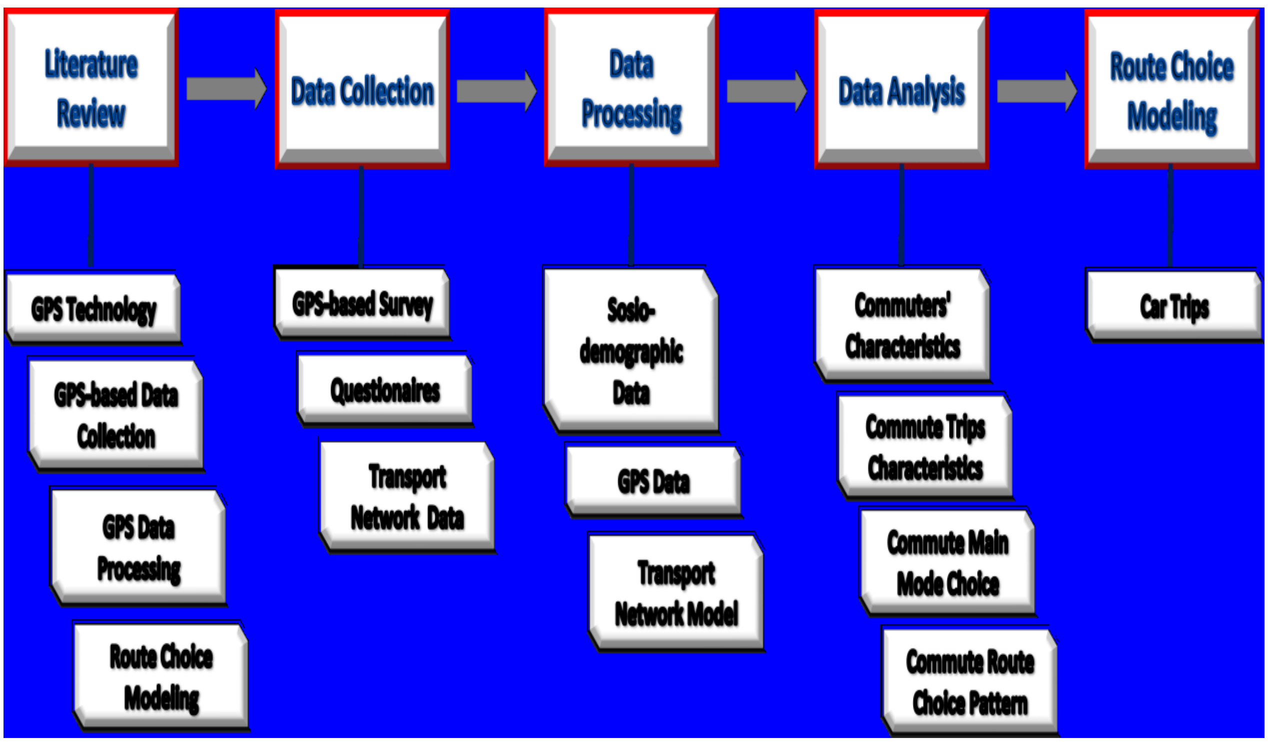

Fig. 3.1 Collection and Dynamic Change of Data Architectural Flow

ISSN: 2320-1363

The availability of information about the number of satellites in view and the PDOP value depends on the type of GPS device used. We have two types of GPS devices, i.e. MobiTest and Holux. MobiTest provides information on the number of satellites in view, but Holux does not. Both MobiTest and Holux do not provide the PDOP value. Based on this situation, one criterion for our filtering algorithm was the number of satellites in view. GPS points recorded with less than four satellites in view were removed from the data set.

The second criterion is sudden position jump, which is used to reduce multipath errors. Position jumps are detected by comparing the distance between two consecutive GPS points. The distance must be not more than 42 m, which represents the distance a person could have traveled with a maximum speed of 150 km/h (i.e. traveling by train). The distance between every two consecutive GPS points is calculated based on the longitude and latitude of each GPS point, which are recorded in decimal degree format, however, the distance should be in meters. Therefore, a sub-algorithm was added to the filtering algorithm for calculating distance in meters from decimal degrees of longitude and latitude using the following spherical law of cosines formula:

D = arcos (sin (Lat1il) . sin (Lat1il2) + cos (Lat1il) . cos (Lat1il1) . cos (Longtd2-Longtd1)) . R

Where:

D = Distance between two consecutive GPS points

Long1 = Longitude of GPS point 1

Lat1il = Latitude of GPS point 1

Longtd2 = Longitude of GPS point 2

Latli2 = Latitude of GPS point 2

R = Earth's radius (mean radius = 6,371 km)

A GPS point with a distance of more than 42 meters from its preceding point is deleted. The procedure is repeated until the distance between two consecutive GPS points is not more than the defined threshold.

3. 1 Characteristic Deviations in Dynamic Shortest Path

GPS data logging enables extended travel studies; it is highly probable that the development of a "Nielson" family of vehicles will occur soon. In this type of study, a sample of households could be recruited to participate for a multi-year period. Each vehicle of the household would be instrumented with a GPS data logger and a communications link to transfer the GPS data back to a central location on a regular basis. In a method similar to that used for television's Nielson ratings, the travel and

ISSN: 2320-1363

activity patterns of this sample could be analyzed and monitored over time to assess the impact of congestion or transportation control measures on travel behavior.

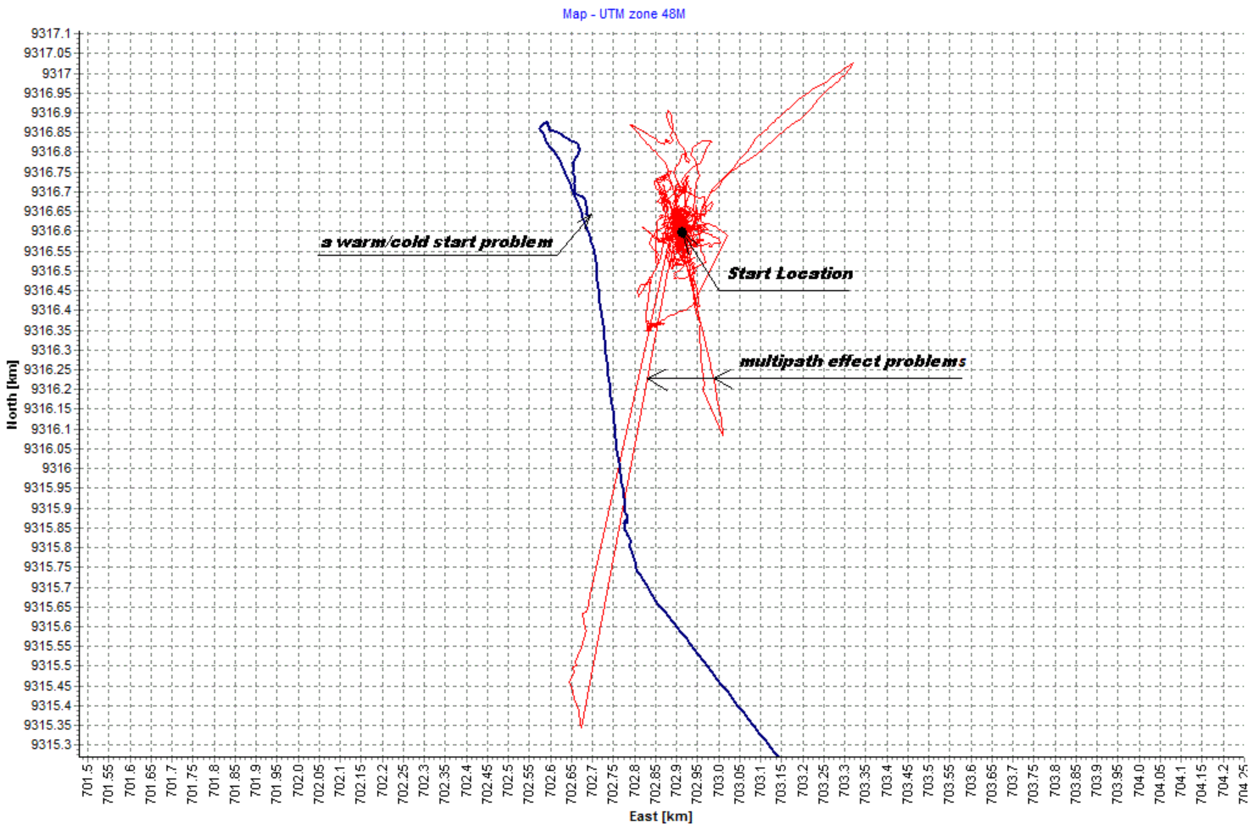

Fig.3.1.1 Graphical Trajectory View Best Dynamic Shortest Path

GPS data in this study were collected using person-based GPS devices. Hence, the respondents did not turn off the GPS device when they stopped or made an activity, except at home or in the office. Thus, intermediate stops/activities during commuting were identified based on 120-second dwell time. It was assumed that the vehicle was stopping when the speed goes under 3 km/h. Thus, if the movement of GPS points approached zero speed (lower than 3 km/h) and the duration of such records is more than 120 seconds, this stream of GPS points are grouped as an activity. Note that waiting time during mode transfer maybe identified as such activity in some cases. However, mode transfer was not considered as a trip chaining stop in this study, as well as stops on the usual commute trajectories

ISSN: 2320-1363

4. Conclusion

Main mode used for commuting can be identified from GPS data which is supplemented by questionnaires and prompted recall survey. Nine types of travel modes were identified as commute main mode: drive car, car sharing, drive motorcycle, motorcycle sharing, taxi, train, bus, company bus, and informal transit. Company bus and informal transit were not used as primary modes, but they were used as alternative modes. Informal transits are competitors of regular buses and indispensable. Therefore, they have to be accepted and legalized. About 17 % of the respondents reported that they did not use the same main mode for commuting but they used varied main mode. This proves that dynamic behavior of commute main mode choice exists. 33.2 % of the commute trips observed during survey period used car, 32.4 % used motorcycle, 17.6 % used bus, 12.6 % used train, and the remaining 4.2 % used other modes.

5. Reference

[1] Stopher, P. R. (2008) Collecting and processing data from mobile technologies, paper presented at 8th International Conference on Survey Methods in Transport, Annecy, May 2008.

[2] Schüssler, N. and K. W. Axhausen (2009) Processing GPS raw data without additional information, Transportation Research Record, 2105, 28–36.

[3] E. Cohen, E. Halperin, H. Kaplan, and U. Zwick, "Reachability and Distance Queries via 2-Hop Labels," Proc. Ann. ACM-SIAM Symp. Discrete Algorithms (SODA), pp. 937-946, 2002.

[4] R. Schenkel, A. Theobald, and G. Weikum, "Hopi: An Efficient Connection Index for Complex xml Document Collections," Proc. Int'l Conf. Extending Database Technology (EDBT), pp. 237-255, 2004.

[5] R. Schenkel, A. Theobald, and G. Weikum, "Efficient Creation and Incremental Maintenance of the Hopi Index for Complex XML Document Collections," Proc. Int'l Conf. Data Eng. (ICDE), pp. 360-371, 2005.

[6] J. Cheng, J.X. Yu, X. Lin, H. Wang, and P.S. Yu, "Fast Computation of Reachability Labeling for Large Graphs," Proc. Int'l Conf. Extending Database Technology (EDBT), pp. 961-979,2006.

[7] J. Cheng, J.X. Yu, X. Lin, H. Wang, and P.S. Yu, "Fast Computing Reachability Labelings for Large Graphs with High Compression Rate," Proc. Int'l Conf. Extending Database Technology (EDBT), pp. 193-204, 2008.

[8] R. Bramandia, B. Choi, and W.K. Ng, "On Incremental Maintenance of 2-Hop Labeling of Graphs," Proc. Int'l Conf. World Wide Web (WWW), pp. 845-854, 2008.

ISSN: 2320-1363

[9] R. Jin, Y. Xiang, N. Ruan, and D. Fuhry, "3-Hop: A High-Compression Indexing Scheme for Reachability Query," Proc.ACM SIGMOD Int'l Conf. Management of Data, pp. 813-826, 2009.

[10] R. Agrawal, A. Borgida, and H.V. Jagadish, "Efficient Management of Transitive Relationships in Large Data and Knowledge Bases," Proc. ACM SIGMOD Int'l Conf. Management of Data, pp. 253-262, 1989.

[11] H. Wang, H. He, J. Yang, P.S. Yu, and J.X. Yu, "Dual Labeling: Answering Graph Reachability Queries in Constant Time," Proc. Int'l Conf. Data Eng. (ICDE), p. 75, 2006.

[12] S. Tril and U. Leser, "Fast and Practical Indexing and Querying of Very Large Graphs," Proc. ACM SIGMOD Int'l Conf. Management of Data, pp. 845-856, 2007.