

GIS Congress 2019- GIS Modeling Approach to Determine the Most Efficient Delivery Routes for Fresh Product using Real Time Data- M Abousaeidi-Islamic Azad University

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Abstract

This study involves the adoption of the Geographic Information System (GIS) modelling approach to determine the quickest routes for fresh vegetable delivery. During transport, fresh vegetables mainly deteriorate on account of temperature and delivery time. Nonetheless, little attention has been directed to transportation issues in most areas within Kuala Lumpur. In addition, perishable food normally has a short shelf life, thus timely delivery significantly affects delivery costs. Therefore, selecting efficient routes would consequently reduce the total transportation costs. This study includes a review of the main factors that lead to the deterioration of fresh vegetables in tropical countries such as Malaysia. The regression model applied in this study to determine the parameters that affect route selection with respect to the fastest delivery of fresh vegetables is also presented. With the goal of realizing the shortest time for delivery route planning, impedance functions will be integrated by taking into account the parameters emphasized in this study. For the purpose of this research, ArcGIS software was adopted to solve the problem of complex networks. The final output is a map of optimal routes with the best drive times based on variables derived from the regression analysis. GPS has recently become available for routing applications. Because it provides real-time spatial and time measurements, it has an increasing use in conducting different transportation studies. This article presents the application of GPS in collecting travel time, speed, and delay information of major roads. When combined with GIS (geographic information systems), GPS data can be matched with spatial map features such as highways and roads for monitoring traffic conditions on those links.

Recently, GPS (Global Positioning System) technologies have been increasingly used in various applications of transportation planning and operations. When combined with GIS (geographic information systems), GPS data can be matched with spatial map features such as highways and roads for monitoring traffic conditions on those links. As one such application, (GPS-GIS-ITS integrated system for travel time surveys) was developed. GIS travel time collects and analyses traffic conditions of links by monitoring speed of probe vehicle(s) and then estimates travel time data both in static

and dynamic modes. The static mode refers to the case of offline processing of GPS data from previously dispatched GPS-equipped vehicles to specified road links. The dynamic mode refers to the real time monitoring of speed on the links using a GPS-wireless Internet- equipped probe vehicle. GIS travel time is tested in various field tests and the results are found to be promising. Furthermore, the GIS travel time is to be extended by incorporating more complex dynamic algorithms to provide reliable real time traffic conditions. This paper sets a framework of the extended GIS application integrating ITS that contains algorithm to monitor traffic conditions by processing massive data from multiple GPS probes or GPS-enabled-cell-phones in real time. The algorithm involves identifying the traveling mode based on patterns found in relatively short time frame

Integrated Traffic Management Systems (ITMS) need reliable, accurate, and real-time data. Travel time, speed, and delay are three of the most important factors used in ITMS for monitoring, quantifying, and controlling congestion. GPS has recently become available for routing applications. Because it provides real-time spatial and time measurements, it has an increasing use

in conducting different transportation studies. Benefiting from the Geographic Information System's dynamic segmentation tool, our travel time, delay, and speed information were integrated with other relevant traffic data.

The selected routes are chosen in several phases, based on the distance, driving time, average speed, population density, landuse, car volume- real time data from internet and time-frames as impedances. The final output is a map with the best drive time based on variables derived from the network analysis. A GIS was employed to quantify the factors on each link in the network that contribute to the evaluation criteria for a possible route.

Visual representation of the information via various maps is the new method for this kind of research to predict the fastest routes for distribution of fresh products to reduce the total

distribution cost and meet more demands for such perishable production. What makes this model useful is the fact that a transport manager can change the hypermarket locations based on demands from each market every day. The directions will duly change according to the numbers of markets, time patterns and current situation of selected roads. The main contribution of the developed model as compared to the existing models on route efficiency based on travel time relates to its capability in capturing data from different fields to solve the distribution problem. This diversity includes the data from social and spatial aspects as well as traffic and transportation fields. The novelty is to integrate the social data such as population and spatial data such as land use in developing the spatial database management system. The contribution is to connect this information with digital road networks to solve the distribution problem to select the most efficient and effective route for delivery purpose. The final output of this research is producing different maps integrated with road networks for decision makers.

Main Goals:

- 1) Traffic data and real time data integrated for transportation planning
- 2) GIS Modeling integrating ITS technology for effective management in routing and transportation issue.
- 3) To develop a database Management System for road network using ArcGIS software