Origin-Destination (O-D) Matrix Generating and Analytical System for Road Side Surveys in Sri Lanka

P.D.J.S. Siriwardana

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Dissertation submitted to the Faculty of Information Technology, University of Moratuwa, Sri Lanka for the partial fulfillment of the requirements of the Master of Science /Post Graduate Diploma in Information Technology.

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Declaration

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

Name of the student Signature of the student

Date

Supervised by

Name of supervisor Signature of supervisor

Date

Dedication

This thesis is dedicated to my parent S.C. De Silva and I. S. D. De Silva and my wife S.C.P De Silva who gave me much assistance and introduced me to the joy of reading, enabling such a study to take place today.

Acknowledgement

My special gratitude is offered to Mr. D.K. Withanage, my supervisor of the research project, for providing me with required guidance and support in the successful completion of this final document.

Also I kindly thanks to the Prof. J.M.S.J. Bandara, at the Transportation Engineering Division of Civil Engineering Department of University of Moratuwa for providing me the necessary information and guidance in developing the system.

Also I am kindly reminding my parents, wife and friends who encouraged me to work on this project and again thanking them for the assistance and help given in whatever way to make this project a success.

Abstract

Transportation is one of the most development factors in Sri Lanka recently. Therefore it has also become the basic area for conducting research. Common classes of traffic engineering and transportation planning problems revolve around the estimation of an Origin-Destination (O-D) matrix for a road network. The O-D matrix is estimated using traffic counts on the link and interview data conducted by the Transportation Engineering Division at University of Moratuwa and Road Development Authority.

Much needed information are available in past O-D surveys conducted by both institute regularly but not consistently carry out O-D surveys for different project purposes. As no proper methodology is available for updating existing information (O-D data) and due to the difficulty of combining different O-D survey results easily, time and money is unnecessarily spent on collecting data over and over again. Sampling is one approach used to survey the origin-destination (O-D) trip matrix. However, when the sampling rate is not sufficiently large compared to the population, the sampling data may have missing values in O-D pairs and that makes the O-D matrix incomplete. There is no proper repository system to store these data sources. Besides, Preparing an O-D matrix manually from all surveyed data set by preventing the double counting and sample size issues is another disadvantage.

This research introduce a GIS based systematic model by extending network analysis features of ArcGIS 10.1 and Arcobject to generate O-D matrix by minimizing the double counting error. In addition to them the system provide the facilitate to manage and maintain the all past O-D information, getting them updated regularly with new O-D data and updating the O-D matrix and retrieve it by integrating with Database Management System . The model is expected to provide the suitable method for locating places for new O-D survey through the concept of minimum path and step-wise circular method. In addition, the system is introduced to provide statistical and analytical outcome from current and past data including traffic flow and usage of travel mode, distribution of trip, and attraction of trip in divisional secretary areas.

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