Estimation of Origin – Destination Matrix from Traffic Counts Based On Fuzzy Logic

Ebrahim Nabizade Gangeraj [a], Gholam ali Behzadi [b*], Reza Behzad [c]

[a] *MSc, Department of Civil Engineering, Shomal University, Iran.*

[b] *Assistant Professor, Department of Civil Engineering, Ayatollah Amoli Branch, Islamic Azad University, Iran.*

[c] *Ph. D Sudent, Department of Civil Engineering, University of Science and Technology, Iran.*

Abstract

Determining trip demand matrix is among the basic data in transportation planning. This matrix is derived by surveys, interviews with citizens or questionnaires that required time, money and manpower. Thus, in recent years, demand estimation methods based on network information is taken into consideration. In these methods with the information including: volume, travel time, capacity of the links and initial demand matrix it is possible to estimate the demand matrix. In this paper, we removed the additional parameters in previous studies and used a simple solution to estimate the matrix. This paper proposes a Fuzzy-PFE estimation method that allows to improve the estimation performances of PFE estimator. The objective function presented based on the reduction of travel time and travel time of routs in networks is uncertain. The method is developed by fuzzy sets theory and fuzzy programming that seems to be convenient theoretical framework to represent uncertainty in the available data. The new model is the removal of iterative process of origin - destination matrix estimation using travel time and increase convergence of the model for the large-scale and congested networks by applying little changes in the basic model. In this paper we used TRANSCAD Software to determine the shortest path in the network and optimization of objective function is performed by CPLEX.

Keywords: Origin – Destination Matrix; Traffic Volume; Fuzzy Logic; CPLEX.

1. Introduction

Traditional methods of estimating ODM are through large scale sampled surveys like home interview survey, roadside interview and license plate method conducted once in every 1-2 decades. But in situations of financial constraints these surveys become impossible to conduct. And by the time the survey data are collected and processed, the O-D data obtained become obsolete [1]. Effective and theoretically consist methodologies have been proposed to estimate origin-destination matrices by using aggregate data such as traffic counts and /or demand counts. The use of information derived from traffic counts is attractive because they are cheap, easy and immediate data to collect. Usually, the basic information required by these classical methodologies are an initial estimate of the O_D matrix (i.e. target O-D demand) and a set of traffic counts observed on the links of the considered network [2].

Actually, in addition to the target demand and traffic counts, other sources of information could be available (i.e. expert knowledge about demand flows and link flows, spot data on trip matrix, outdated trip matrices) as well as data can be collected with different methods. This information in general is affected by a level of uncertainty or can be