# An Algorithm for Determining Optimum Link Traffic Volume Counts for Estimation of Origin-Destination Matrix

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## Abstract

Travel demand information is one of the most important inputs in transportation planning. Today, the access to origin-destination (OD) matrix using traffic volume count information has caught the researchers' attention because these methods can estimate OD matrices based on the flow volume in the links of network with a high accuracy at a much lower cost over a short time. In such algorithms, the number and location of links are one of the main parameters for traffic volume count; hence a better OD matrix can be achieved by choosing the optimum links. In this paper, an algorithm is presented to determine the number and location of optimum links for traffic volume count. The method specifies the minimum links to cover the maximum elements of OD matrix. This algorithm is especially useful for the estimation of ODM through gradient method, because only the O-D pairs covered by link traffic counts are adjusted and estimated in the gradient method. The algorithm is then scripted via EMME/2 and FoxPro and implemented for a large-scale real network (Mashhad). The results show that about 95% of the ODM can be covered and then adjusted by counting only 8% of the links in the network of Mashhad.

*Keywords:* Travel Demand; Origin-Destination Matrix (ODM); Link Traffic Counts; Traffic Assignment; Optimum Links.

## 1. Introduction

Travel demand information expressed in form of origin-destination (OD) matrices are one of the most important and essential inputs in transportation planning and engineering, considered as the basic information for design and management of transportation systems. The access to such information is very difficult and requires a lot of time, money and human resources. However, it is possible to easily access the flow volume in the network links with a high accuracy at a very low cost. Hence, in recent years, many researchers have focused on the estimation of ODMs from the flow volume in the network links. Among a variety of approaches presented for estimating the ODM using traffic volume count data, the gradient method proposed by Spiess [1] is more effective to solve real problems on large scales. The Spice mathematical model is as follows:

$$\min z(g) = \frac{1}{2} \sum_{a \in A^\wedge} (v_a - v_a^\wedge)^2$$

$$S.f \quad \begin{aligned} V &= assign(g) \\ g &\geq O \end{aligned}$$

(1)