



Modelling passenger car equivalency at an urban mid-block using stream speed as measure of equivalence

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Abstract

The effect of traffic volume and its composition on Passenger Car Equivalency (PCE) of different vehicle types in a mixed traffic stream is investigated taking an urban mid-block section as the case study. The reduction in stream speed caused by marginal increment in traffic volume by a vehicle type is compared with that of caused by an old technology car, for the estimation of PCE of that vehicle type. A Neural Network (NN) approach is explored for capturing the underlying non-linear effects of traffic volume and its composition level on the stream speed. It is found that PCE of a vehicle type varies in a non-linear manner with total traffic volume and compositional share of that vehicle type in the traffic stream. The speed model using NN technique alone could establish the variation of PCE with vehicle type, traffic volume and its composition.

Keywords: Stream Speed; Heterogeneous/Mixed traffic; Neural Network; Passenger Car Equivalency; Measure of Equivalence.

Introduction

The growing congestion level on urban roads and its resulting delay, fuel loss, environmental degradation etc. is a major concern to transportation engineers. Urban traffic in most of the developing countries is heterogeneous in nature. Therefore, conversion of heterogeneous traffic into a stream of homogeneous one by using appropriate Passenger Car Equivalency (PCE) values is an elementary step for analyzing mixed traffic, and formulating traffic management measures for mitigation of congestion on urban roads. Besides this, appropriate PCE values are also used for capacity analysis as well as traffic engineering research and applications.

Highway Capacity Manual (HCM) (TRB 1994, 2000) defines PCE as “The number of passenger cars that are displaced by a single heavy vehicle of a particular type under prevailing roadway, traffic and control conditions”. PCE is also defined as the number of passenger cars having the same impedance effect as a vehicle of a given type under a

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