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## Development of Traffic Volume Forecasting Using Multiple Regression Analysis and Artificial Neural Network

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#### Abstract

The purpose of this study is to develop a model for traffic volume forecasting of the road network in Anamorava Region. The description of the current traffic volumes is enabled using PTV Visum software, which is used as an input data gained through manual and automatic counting of vehicles and interviewing traffic participants. In order to develop the forecasting model, there has been the necessity to establish a data set relying on time series which enables interface between demographic, socio-economic variables and traffic volumes. At the beginning models have been developed by MLR and ANN methods using original data on variables. In order to eliminate high correlation between variables appeared by individual models, PCA method, which transforms variables to principal components (PCs), has been employed. These PCs are used as input in order to develop combined models PCA-MLR and PCA-RBF in which the minimization of errors in traffic volumes forecasting is significantly confirmed. The obtained results are compared to performance indicators such R<sup>2</sup>, MAE, MSE and MAPE and the outcome of this undertaking is that the model PCA-RBF provides minor errors in forecasting.

Keywords: Traffic Volume; Forecasting Model; Multiple Regression Analysis; Artificial Neural Network; Principal Component Analysis.

#### **1. Introduction**

Transport planning requires the use of demographic and social economic variables in order to estimate traffic volume forecasting for a particular country or region [1]. In recent years traffic volume has been increasing by an annual average of 4.13% in the main road network of Anamorava region, causing a decrease in the service level and resulting in longer travel times, in a decrease of road safety etc. [2]. Road traffic plays an important role in this region because it is the one connection to the country and through its community trips are carried out. This increase has a direct impact in traffic volume forecasting which can be done through forecasting methods such as: econometric regressions, travel-demand modelling and neural network modelling [3].

Many researchers have dealt with the development of models to traffic volume forecast. Morf and Houska (1958) [4] have developed a model to forecast the traffic in rural areas in the State of Illinois (USA) using Multiple Regression Analysis (MLR) method. Tennant (1975) has developed a model for the assessment of traffic volumes in rural area in developing countries including some socio-economic variables, using land and principles of traffic generation in the region of Mali in Kenia. MLR method is used in order to find variables with higher impact which has been the employment followed by vehicle ownership [5].

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