Estimation of Traffic Arrival Pattern at Signalized Intersection using ARIMA Model

Abstract

Traffic arrival pattern is an important parameter in delay estimation at signalized intersection. Usually, arrival pattern is assumed to be Poisson distribution. However, it varies widely under different volume-capacity ratio at signalized intersection of an arterial road. Therefore, conventional Poisson model cannot predict traffic pattern properly. A time series ARIMA model was proposed in this study to compare with Poisson model. A Paramics simulation model of Route 18 arterial road located in New Brunswick, New Jersey, USA was studied for the research purpose. Three intersections in Route 18—Naricon Place intersection, South Woodland Avenue intersection and West Ferris Street intersection—were considered where traffic arrivals were under dispersed, random and over dispersed under different simulation scenarios respectively. Later, traffic arrival patterns obtained from simulation were compared with Poisson and ARIMA model using SAS statistical software. Arrival headway, vehicle counts per signal cycle, variance to mean ratio were considered and statistical analysis were performed between two candidate models. Study found that, ARIMA model predicts arrival pattern more accurately than Poisson model.
References


Index Terms

Computer Science  Signal Processing

Keywords

Traffic arrival pattern, Signalized intersection, Poisson, ARIMA, Paramics simulation.