Application of Fuzzy Regression Methodology in Transportation Engineering

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Abstract

Signalized intersection is one of the vital components of the entire road network. The operational conditions of intersections considerably affect the performance of the whole road network system. The performance level of signalized intersection is measured in terms of Level of Service (LOS). Existing studies on LOS at signalized intersections are based on conventional linear regression (CLR) techniques and those models failed to estimate accurate LOS of signalized intersections due to basic assumptions of CLR methods. This paper explores the fundamentals of most popular fuzzy linear regression (FLR) techniques and the application of FLR methods in developing the LOS model at signalized intersections. The proposed methodology derived in two steps. First step, membership function developed and the fuzzy input values defuzzified in crisp value by applying the centroid method. Second step, the fuzzy least square method is applied to develop the required model. The proposed methodology is applied in Pedestrian LOS model development. Finally, mean absolute percentage error values are compared between conventional regression and fuzzy regression models and the results shown that fuzzy regression models provide more precise and reliable solutions. The proposed new methodology can be used to develop a LOS model in the transportation field.

Keywords: Fuzzy regression model, Fuzzy Least Square, Transportation Engineering, LOS

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