A Generalized Piecewise Regression for Transportation Models

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Abstract

This paper introduces a new piecewise regression methodology that can be used when linear regression fails to represent data. Effort can be saved to determine the best non-linear model shape using this methodology. Therefore, in this paper a nonlinear relationship is introduced using only one independent variable by a simple and direct way. The new approach depends on dividing the data set into several groups and then estimating the best line or segment for each group to perform a continuous broken line. The locations of breakpoints are determined by minimizing the sum of squared errors while the number of segments is determined by maximizing the adjusted coefficient of determination. The proposed approach can be used in many transportation applications such as trip generation models, zonal trip rates, nonlinear correlation coefficient, accident modeling, and traffic characteristics models. The proposed approach was tested against many practical examples and found that it can describe most of the transportation relationships properly and can decrease the number of variables used in the transportation modeling process. The proposed approach can be extended in the future to get the nonlinear relationship using more than one independent variable to cover the rest of
transportation applications.

References

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Index Terms

Computer Science

Applied Sciences
Keywords

Linear regression, segmented regression, nonlinear relationships, trip generation models, accident models.