

Abstract

# Structural Equation Modeling & Artificial Intelligence-based Perceived Motorcycle Risk Prediction in Bangladesh's Urban Driving Environment

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**Abstract:** According to data from the BUET Accident Research Institute (ARI, BUET), in 2022, motorbikes accounted for 62% of all vehicles on the road, with 26 accidents occurring for every 10,000 motorcycles making up the majority of all traffic accidents in Bangladesh. This is due to their accessibility, affordability, and ride-sharing use. Hence, it is essential to investigate the risk factors that contribute to motorcycle accidents, how they affect risk assessment, and how to develop the necessary policy implications.

Data on perceived risk were gathered for this study from 1,559 participants in offline and online questionnaire surveys. Demographic data together with ratings on the perceived risk of 37 precursors to motorcycling accidents in the setting of Dhaka were gathered. Then ten combined attributes were identified from all precursors. With a 73% prediction accuracy, the Random Forest algorithm has been utilized to predict perceived risk. Moreover, the contribution of different precursors on safety status has been demonstrated by structural equation modeling. Lastly, different contour maps for features' correlation, heat map, deployment of result using flask in public server for user interface (which allows model accessible to a wider audience & receive predictions), and policy implications have been analyzed in this study. In conclusion, any developing country's urban context will benefit greatly from the provided prediction tools for accident analysis and prevention.

**Keywords:** Random Forest; Structural Equation Modeling; Questionnaire Survey

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