

Prediction of Road Crash Attributes and Exploring Imbalance Learning Methods

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ABSTRACT

Road crashes remain a major global challenge, with devastating consequences for individuals, families, and societies. Accurately predicting road crash attributes, like severity and type, can inform targeted safety interventions and enhance preventive measures. However, traditional machine learning models often struggle with the imbalanced nature of crash data, where severe crashes represent a small minority. This manuscript delves into a novel framework for predicting road crash attributes while addressing the crucial challenge of data imbalance. We propose a two-pronged approach Multi-task Learning with Feature Selection: We leverage multi-task learning to simultaneously predict multiple crash attributes, leveraging shared information among tasks. This approach improves performance on less frequent severe crashes by boosting their learning signal, and Exploration of Imbalance Learning Methods: We explore and compare various imbalance learning techniques, including data-level and algorithm-level approaches. We assess the effectiveness of each method in handling the class imbalance issue in road crash data and evaluate their impact on both overall accuracy and performance on the minority class of severe crashes.

Keywords: Road Safety, Deep Learning, Neural Networks

How to Cite

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