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**Titolo articolo:** Econometric and Machine Learning Methods to Identify Pedestrian Crash Patterns.

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**Abstract:** Walking plays an important role in overcoming many challenges nowadays, and governments and local authorities are encouraging healthy and environmentally sustainable lifestyles. Nevertheless, pedestrians are the most vulnerable road users and crashes with pedestrian involvement are a serious concern. Thus, the identification of pedestrian crash patterns is crucial to identify appropriate safety countermeasures. The aims of the study are (1) to identify the road infrastructure, environmental, vehicle, and driver-related patterns that are associated with an overrepresentation of pedestrian crashes, and (2) to identify safety countermeasures to mitigate the detected pedestrian crash patterns. The analysis carried out an econometric model, namely the mixed logit model, and the association rules and the classification tree algorithm, as machine learning tools, to analyse the patterns contributing to the overrepresentation of pedestrian crashes in Italy. The dataset consists of 874,847 crashes—including 101,032 pedestrian crashes—that occurred in Italy from 2014 to 2018. The methodological approach adopted in the study was effective in uncovering relations among road infrastructure, environmental, vehicle, and driver-related patterns, and the overrepresentation of pedestrian crashes. The mixed logit provided a clue on the impact of each pattern on the pedestrian crash occurrence, whereas the association rules and the classification tree detected the associations among the patterns with insights on how the co-occurrence of more factors could be detrimental to pedestrian safety. Drivers' behaviour and psychophysical state turned out to be crucial patterns related to pedestrian crashes' overrepresentation. Based on the identified crash patterns, safety countermeasures have been proposed.

**Keywords:** random parameter multinomial logit; rule discovery; CART; pedestrian crash occurrence; contributory factors.

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