

The data mining applied for the prediction of highway roughness due to overloaded trucks

Andri Irfan Rifai, author

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Abstrak

Currently, the quality of the Indonesian national road network is inadequate due to several constraints, including overcapacity and overloaded trucks. The high deterioration rate of the road infrastructure in developing countries along with major budgetary restrictions and high growth in traffic have led to an emerging need for improving the performance of the highway maintenance system. However, the high number of intervening factors and their complex effects require advanced tools to successfully solve this problem. The high learning capabilities of Data Mining (DM) are a powerful solution to this problem. In the past, these tools have been successfully applied to solve complex and multi-dimensional problems in various scientific fields. Therefore, it is expected that DM can be used to analyze the large amount of data regarding the pavement and traffic, identify the relationship between variables, and provide information regarding the prediction of the data. In this paper, we present a new approach to predict the International Roughness Index (IRI) of pavement based on DM techniques. DM was used to analyze the initial IRI data, including age, Equivalent Single Axle Load (ESAL), crack, potholes, rutting, and long cracks. This model was developed and verified using data from an Integrated Indonesia Road Management System (IIRMS) that was measured with the National Association of Australian State Road Authorities (NAASRA) roughness meter. The results of the proposed approach are compared with the IIRMS analytical model adapted to the IRI, and the advantages of the new approach are highlighted. We show that the novel data-driven model is able to learn (with high accuracy) the complex relationships between the IRI and the contributing factors of overloaded trucks.