Neural Network based Cyclist Crash modelling

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For achieving a sustainable transportation system, the cycling mode share has to increase by many folds. However, it is considered as a risky mode of travel. In this paper, we have investigated the Cyclist Road crashes. We are primarily concerned with the modelling aspect of road safety. The various highway agencies recommended crash prediction models are mainly based upon the probabilistic function of the traffic flow. We have also tested the hypothesis that the age of the trip maker affects its safety interaction in the natural road environment, which it is subjected to. The crash prediction model was constructed with the age group as the predicted variable . This was applied as a case study in Tyne and Wear County in North England. The MultiLayre Perceptron neural network with one hidden layer was utilized. The dataset was divided 70% for training ,25% testing and 5% for validation process. There were four types of variables used for constructing the crash prediction model, i). Spatial variables (Month, Day and Hour of the journey), ii). Infrastructure parameters (Road type, Speed limit, type of Road Class, Junction type and Control,) iii). Environment conditions (Lighting, Meteorological conditions, vehicular flow), and iv). Personal Attributes (Gender and purpose of Journey). The results demonstrated that the present crash prediction models are not able to model the limitations of the cyclists. The results have not only demonstrated that the age of the trip maker affects the safety, but also constructed a crash prediction based upon this variable. A reasonably accurate model was constructed. The age of the trip maker affects the way ,it interacts with the infrastructure. The age group for which the infrastructure or the prevalent conditions can be most unsafe can be determined using this model. Also, vice versa the infrastructure design/planning can be undertaken based upon the age group that the infrastructure is intended to be used by. This research can help in a better understanding of the cyclist crashes and increased modelling capabilities. This model can help in better Cyclist infrastructure modelling and contribute towards developing a sustainable transportation system. The limitation of the study is the black box nature of neural networks