SCHOLARLY PUBLICATIONS
School of Civil Engineering
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Journal Name: Accident Analysis and Prevention **IF: 5.7**

Title: Pedestrian crash risk analysis using extreme value models: New insights and evidence

Author: Ankunda A., Ali Y., Mohanty M.

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Abstract: Facilitating proactive pedestrian safety management, the application of extreme value theory (EVT) models has gained popularity due to its extrapolation capabilities of estimating crashes from their precursors (i.e., conflicts). However, past studies either applied EVT models for crash risk analysis of autonomous vehicle–pedestrian interactions or human-driven vehicle–pedestrian interactions at signalised intersections. However, our understanding of human-driven vehicle–pedestrian interactions remains elusive because of scant evidence of (i) EVT models' application for heterogeneous traffic conditions, (ii) appropriate set of determinants, (iii) which EVT approach to be used, and (iv) which conflict measure is appropriate. Addressing these issues, the objective of this study is to investigate pedestrian crash risk analysis in heterogeneous and disordered traffic conditions, where drivers do not follow lane disciplines. Eleven-hour video recording was collected from a busy pedestrian crossing at a midblock location in India and processed using artificial intelligence techniques. Vehicle-pedestrian interactions are characterised by two conflict measures (i.e., post encroachment time and gap time) and modelled using block maxima and peak over threshold approaches. To handle the non-stationarity of pedestrian conflict extremes, several explanatory variables are included in the models, which are estimated using the maximum likelihood estimation procedure. Modelling results indicate that the EVT models provide reasonable estimates of historical crash records at the study location. From the EVT models, a few key insights related to vehicle–pedestrian interactions are as follows. Firstly, a comparison of EVT models shows that the peak over threshold model outperforms the block maxima model. Secondly, post encroachment time conflict measure is found to be appropriate for modelling vehicle–pedestrian interactions compared to gap time. Thirdly, pedestrian crash risk significantly increases when they interact with two-wheelers in contrast with interactions involving buses where the crash risk decreases. Fourthly, pedestrian crash risk decreases when they cross in groups compared to crossing individually. Finally, pedestrian crash risk is positively related to average vehicle speed, pedestrian speed, and five-minute post encroachment time counts less than 1.5 s. Further, different block sizes are tested for the block maxima model, and the five-minute block size yields the most accurate and precise pedestrian crash estimates. These findings demonstrate the applicability of extreme value analysis for heterogeneous and disordered traffic conditions, thereby facilitating proactive safety management in disordered and undisciplined lane conditions.

URL: https://www.sciencedirect.com/science/article/pii/S0001457524001787

Journal Name: Journal of Hydrology-Regional Studies **IF: 4.7**

Title: Streamflow prediction model for agriculture dominated tropical watershed using machine learning and hierarchical predictor selection algorithms

Author: Kartick, GM; Jena, S; Ramadas, M; Padhi, J; Satapathy, DP

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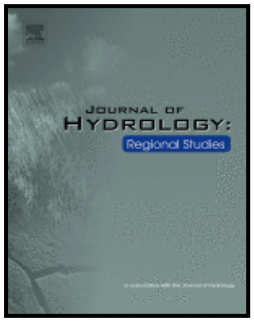
Abstract: Study region: Rana watershed, located in the mid-Mahanadi River basin in the state of Odisha, India. Study focus: This study attempted to develop a generalizable machine learning (ML)-based streamflow prediction model implementing prediction selection algorithms to the physiographic characteristics, and hydro-meteorological data collected for Rana Watershed. New hydrological insights: The pertinent predictors identified were land use/ land cover (LULC), one and two-day lagged rainfall, one-day lagged PET, and one-day lagged streamflow and its categorized flow regime. The random forest algorithm, which outperformed the other five algorithms evaluated, was trained using identified predictors to develop a streamflow prediction model called "stRFlow". The mean absolute error, root mean squared error, coefficient of determination, and Nash-Sutcliffe efficiency during training were 0.753 m^3/s, 3.584 m^3/s, 0.973, and 0.972 and testing were 2.829 m^3/s, 10.503 m^3/s, 0.855, and 0.851, respectively. The Kling-Gupta efficiency was found to be 0.96 and 0.92 during training and testing, respectively. There was an enhancement to model proficiency with the addition of LULC to temporal predictors. Moreover, the partial auto-correlation factor for the streamflow and examining the categorization of specific lagged flow regimes enhanced the predictive capacities of "stRFlow". Results depict the potential of stRFlow and the framework in streamflow modeling in similar hydroclimatic regions with applicability for practical and reliable streamflow predictions globally.



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