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SPATIO-TEMPORAL STATISTICAL ANALYSIS AND DEEP LEARNING TECHNIQUES FOR TRAFFIC ACCIDENTS PREDICTION

Abstract

Trac accidents impose signicant problems in our daily life due to the huge social, environmental, and economic expenses associated with them. The rapid development in data science, geographic data collection, and processing methods encourage researchers to evaluate, delineate trac accident hotspots, and to eectively predict and estimate trac accidents. Moreover, the pattern and association of hot and cold spots distribution can be examined to identify features with the most spatio-temporal eect on trac accidents. In this study, Kaggle trac accidents dataset that covers United Kingdom for the time period between 2012-2014, with more than four hundred thousand event associated with twelve features, will be investigated. These features consist of location, time, month, day of week, weather conditions, light conditions, road surface, road type, and area (urban or rural). The methodology consists of three main techniques. First, Moran's I method of spatial autocorrelation, and Getis-Ord Gi* statistics will be used to examine and relate trac accidents dataset in terms of spatial and temporal features. The spatial statistics and cluster investigation will result in accident hot and cold spots. Feature weights will be assigned according to statistically signicant distribution of accident features along with Z-score values. Second, weighted features will be used as inputs for a Deep FFNN (DFFNN). For this purpose, sigmoid is used as an activation function. Additionally, the same inputs will also be tested using SVM in order to compare the results at a later stage. Finally, the performance of the proposed DFFNN will be evaluated based on its accuracy, misclassication rate, precision, prevalence, histogram of errors, and confusion matrix.