Machine Learning Framework for Analyzing Disaster-Tweets

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Abstract:
During natural disasters and catastrophes, Twitter is becoming a more popular source of information exchange. It is primarily used to share the status of disaster recovery efforts initiated by humanitarian and disaster relief organizations, to report and request or provide volunteer services, and to update on the scope of geographic phenomena. This paper supports the creation of future automated crisis management systems as well as the planning and preparation of effective disaster responses by teams working on disaster mitigation. This work focuses on developing a comprehensive framework for text processing and analysis on tweets posted in Twitter during natural catastrophes using natural language processing techniques. Disaster-related tweets are categorized into precautionary tweets, educational tweets, and recovery tweets. The algorithms which are used to develop the framework are Naïve Bayes based on Bayes theorem, Logistic Regression based on Sigmoid function, Random Forest based on decision trees, Extreme Gradient Boosting is based on bagging and boosting, Support Vector Machine is based on hyperplane. Five performance metrics, namely, accuracy, precision, recall, F1-score, and time, are calculated to assess how well the algorithms perform. The data set is split into training set and testing set as 75:25, 63:37, and 50:50. This comparison is to provide insights about the performance of algorithms in terms of efficiency with time bound actions and reactions.

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