Enhancing Bug Report Prioritization Using Deep Learning-Based Ensemble Approach

Dissanayake D.N.A.[1] [*], and Rupasingha R.A.H.M.[2]

[1,2]Department of Economics & Statistics, Faculy of Social Sciencess & Languages, Sabaragamuwa University of Sri Lanka, Sri Lanka
[*]nihinsadissanayake@gmail.com

Bug priority prediction is a time-consuming manual operation, yet it is crucial to the software development process. After reviewing each report, developers should assign a priority number. The study's main goal is to improve predicted performance by automating the current manual priority allocation process utilizing a combination of machine learning techniques. The majority of researchers use one or two feature extraction methods and no studies done to compare the outcomes of combining different feature extraction techniques with ensemble methods with Long Short-Term Memory (LSTM) and Artificial Neural Networks (ANN). To fill this research gap, Bugzilla gathered more than 20,000 bug reports. After preprocessing by stemming and tokenization, LSTM with feature vectorization techniques was used in conjunction with Word2Vec, GloVe, and Term Frequency-Inverse Document Frequency. Using the aforementioned feature vectors, a parallel ANN is utilized to construct another model for result comparison. Following the creation of three LSTM models utilizing three feature vectors, the results of each model were compared and combined to create an even better model known as an ensemble model. The findings of LSTM individual models, an ensemble model, and an ANN model were then compared in order to determine which model is best for bug prioritizing. Accuracy, precision, recall, and f-measure were used as evaluations along with MAE and MSE. The accuracy of the LSTM-TF-IDF model was 88.94%, the LSTM-gloVe model was 89.58%, the LSTM-word2vec model was 84.84%, and the ANN model was 80.28%. In addition, the accuracy of the ensemble model was 92%. The ensemble model achieves the lower error rates and highest values of other evaluation methods. The results of this study will help developers and programmers address errors more rapidly than in the past. In the future, data from other sources will be gathered and utilized by deep algorithms to improve accuracy.

Keywords: *ANN, Deep learning, Ensemble model, LSTM, Priority prediction*