**Ensemble Feed-Forward Neural Network and Support Vector Machine**

**for Prediction of Multiclass Malaria Infection**

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ABSTRACT

Globally, recent researches are focusing on developing appropriate and robust algorithms to provide robust health care system that is versatile and accurate. Existing malaria models are plagued with low rate of convergence, over-fittings, limited generalization due to restriction to binary cases prediction, proneness to local minimum errors in finding reliable testing output due to complexity of features in the feature space which is black box in nature. This study adopts a stacking method of heterogeneous ensemble learning of Artificial Neural Network (ANN) and Support Vector Machine (SVM) algorithms to predict multiclass, symptomatic and climatic malaria infection. ANN produced 48.33% Accuracy (Acc), 60.61% Sensitivity (Ss) and 45.58% Specificity (Sp). SVM with Gaussian kernel function (rbf) gave better performance result of 85.60% Accuracy (Acc), 84.06% Sensitivity (Ss) and 86.09%, Specificity (Sp). Consequently, to improve prediction performance, a stacking method was introduced to ensemble SVM with ANN. The proposed ensemble malaria model was tuned on different threshold but at threshold value 0.60, the ensemble model gave an optimum Accuracy (Acc) of 99.86%, sensitivity (Ss) 100%, specificity (Sp) 98.68% and mean square error 0.14. The ensemble model experimental results indicate that stacked multiple classifiers produces better result than a single model. This research demonstrated the efficiency of heterogeneous stacking ensemble model on effects of climatic variations on multiclass malaria infection classification**.** Also, the model reduces the complexity, over-fitting, low rate of convergence and proneness to local minimum error problems of multiclass malaria infection in comparison with previous related models.

Keywords: artificial neural network, data mining, ensemble, malaria infection, support vector machine