World Academy of Science, Engineering and Technology
International Journal of Computer and Systems Engineering
Vol:17, No:02, 2023

# A Multilayer Perceptron Neural Network Model Optimized by Genetic Algorithm for Significant Wave Height Prediction

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**Abstract :** The significant wave height prediction is an issue of great interest in the field of coastal activities because of the non-linear behavior of the wave height and its complexity of prediction. This study aims to present a machine learning model to forecast the significant wave height of the oceanographic wave measuring buoys anchored at Mooloolaba of the Queensland Government Data. Modeling was performed by a multilayer perceptron neural network-genetic algorithm (GA-MLP), considering Relu(x) as the activation function of the MLPNN. The GA is in charge of optimized the MLPNN hyperparameters (learning rate, hidden layers, neurons, and activation functions) and wrapper feature selection for the window width size. Results are assessed using Mean Square Error (MSE), Root Mean Square Error (RMSE), and Mean Absolute Error (MAE). The GAMLPNN algorithm was performed with a population size of thirty individuals for eight generations for the prediction optimization of 5 steps forward, obtaining a performance evaluation of 0.00104 MSE, 0.03222 RMSE, 0.02338 MAE, and 0.71163% of MAPE. The results of the analysis suggest that the MLPNNGA model is effective in predicting significant wave height in a one-step forecast with distant time windows, presenting 0.00014 MSE, 0.01180 RMSE, 0.00912 MAE, and 0.52500% of MAPE with 0.99940 of correlation factor. The GA-MLP algorithm was compared with the ARIMA forecasting model, presenting better performance criteria in all performance criteria, validating the potential of this algorithm.

**Keywords :** significant wave height, machine learning optimization, multilayer perceptron neural networks, evolutionary algorithms
**Conference Title :** ICGAEC 2023 : International Conference on Genetic Algorithms and Evolutionary Computation
**Conference Location :** Paris, France
**Conference Dates :** February 06-07, 2023