

## **Analysis of algorithms variation in multilayer perceptron neural network for agarwood oil qualities classification**

*N. S. A. Zubir<sup>a</sup>, M. A. Abas<sup>b</sup>, Nurlaila Ismail<sup>a</sup>, Nor Azah M. Ali<sup>b</sup>, M. H. F. Rahiman<sup>a</sup>, N. K. Mun<sup>a</sup>, N. T. Saiful<sup>c</sup>, M. N. Taib<sup>a</sup>*

<sup>a</sup> Faculty of Electrical Engineering UiTM Shah Alam, Selangor, Malaysia

<sup>b</sup> Natural Product Program Forest Research Institute of Malaysia (FRIM) Kepong, Selangor, Malaysia

<sup>c</sup> Faculty of Industrial and Science Technology (FIST), University Malaysia Pahang (UMP)

### **ABSTRACT**

This study investigates the performance of the Multilayer Perceptron (MLP) classifier in discriminating the qualities of agarwood oil significant compounds by different qualities based on three training algorithms namely Scaled Conjugate Gradient (SCG), Levenberg-Marquardt (LM) and Resilient Backpropagation (RP) Neural Network by using Matlab version 2013a. The dataset used in this study were obtained at Forest Research Institute Malaysia (FRIM) and University Malaysia Pahang (UMP). Further, the areas (abundances, %) of chemical compounds is set as an input and the quality represented (high or low) as an output. The MLP performance was examined with different number of hidden neurons which is in the ranged of 1 to 10. Their performances were observed to accurately found the best technique of optimization to apply to the model. It was found that the LM is effective in reducing the error by enhancing the number of hidden neurons during the network development. The MSE of LM is the smallest among SCG and RP. Besides that, the accuracy of training, validation and testing of LM performed the best accuracy (100%).

### **KEYWORDS**

Levenberg-Marquardt (LM); Forest Research Institute Malaysia (FRIM); Scaled Conjugate Gradient (SCG); Resilient Backpropagation (RP)

## **ACKNOWLEDGMENT**

The author would like to acknowledge PICO and Advanced Signal Processing (ASP) group for the guidance and encouragement in finishing this research. The author would also like to thank Faculty of Electrical Engineering, UiTM Shah Alam, Natural Product Program Forest Research Institute of Malaysia (FRIM) and Faculty of Industrial and Science Technology (FIST) UMP for data collection and analysis. Besides that LESTARI Grant no *(600-IRMI/DANA 5/3/LESTARI (0172/2016)* for my financial support