INTISARI

MODEL PEMBELAJARAN *QUADRATIC INTERPOLATION FLOWER POLLINATION NEURAL NETWORK* STUDI KASUS IDENTIFIKASI PENYAKIT BABI

Oleh

Yulianto Triwahyuadi Polly
16/405317/SPA/00574

Multi-Layer Perceptron (MLP) merupakan salah satu Jaringan Syaraf Tiruan (JST) yang berbentuk jaringan *multi-layer*. *Multi-Layer Perceptron* digunakan untuk kepentingan klasifikasi selama dua dekade terakhir dan cukup banyak penerapannya pada berbagai domain masalah di kehidupan nyata. Pembelajaran klasifikasi dengan MLP menggunakan metode *backpropagation* maupun *Flower Pollination Algorithm* (FPA) masih memperlihatkan adanya kemungkinan terjadinya konvergensi prematur. Penelitian ini mengembangkan model pembelajaran pada MLP dengan menerapkan FPA termodifikasi dalam proses *update* bobot agar terhindar dari konvergensi prematur. Memodifikasi FPA dilakukan terhadap parameter *step vector* pada FPA yaitu *Levy* distribution, dan diganti dengan *Quadratic Interpolation Flower Pollination* (QIFP). *Flower Pollination Algorithm* dengan QIFP dikenal sebagai algoritma *Quadratic Interpolation Flower Pollination Neural Network* (QIFPNN). *Quadratic Interpolation Flower Pollination Neural Network*, *Flower Pollination Neural Network* (FPNN), dan *Backpropagation Neural Network* (BPNN), serta dua algoritma meta-heuristik lainnya yaitu *Bat Neural Network* (BANN) dan *Particle Swarm Optimization Neural Network* (PSONN) digunakan untuk melatih MLP pada kasus nyata identifikasi penyakit babi dan lima *dataset* UCI *Machine Learning Repository*. Model pembelajaran QIFPNN adalah yang terbaik di antara semua pembanding karena lebih konsisten diuji pada beragam *dataset* dan tidak rentan terhadap pengaruh variasi karakteristik *dataset* sehingga dapat mewakili berbagai kasus yang ada. Rata-rata akurasi klasifikasi dari QIFPNN unggul di 3 *dataset* yaitu "penyakit babi", "Lung cancer", dan "Vertebral column" secara berurutan 81,0729%, 88,7500%, dan 91,8922%, sedangkan BPNN unggul pada 3 *dataset* yaitu *dataset* "Iris", "Wine" dan "Glass" secara berurutan 99,0714%, 100%, dan 74,5426%. Pada *dataset* di mana BPNN unggul, QIFPNN menempati peringkat kedua, sedangkan pada *dataset* di mana QIFPNN unggul, BPNN menempati peringkat terakhir dari 5 metode yang diuji. Membuktikan bahwa konsep interpolasi kuadratik yang diadopsi oleh model pembelajaran QIFPNN adalah konsep terbaik bila dibandingkan dengan konsep *levy distribution* pada FPNN dan konsep *gradient descent* pada BPNN serta algoritma pembanding lainnya.

Kata kunci: *flower pollination algorithm*, *quadratic interpolation flower pollination neural network*, jaringan syaraf tiruan, klasifikasi, penyakit babi.

ABSTRACT

QUADRATIC INTERPOLATION FLOWER POLLINATION NEURAL NETWORK TRAINING MODEL CASE STUDY IDENTIFICATION OF SWINE DISEASES

By

Yulianto Triwahyuadi Polly
16/405317/SPA/00574

Multi-Layer Perceptron (MLP) is one of the Artificial Neural Networks (ANN) in the form of a multi-layer network. The Multi-Layer Perceptron has been used for classification purposes for the last two decades and has had a wide range of applications in real-life problem domains. Classification learning with MLP using the backpropagation method and Flower Pollination Algorithm (FPA) still shows the possibility of premature convergence. This study develops a learning model in MLP by applying a modified FPA in the process of updating the weights to avoid premature convergence. Modifying the FPA is carried out on the step vector parameter in the FPA, namely Levy distribution, and replaced with Quadratic Interpolation Flower Pollination (QIFP). Flower Pollination Algorithm with QIFP is known as Quadratic Interpolation Flower Pollination Neural Network (QIFPNN) algorithm. Quadratic Interpolation Flower Pollination Neural Network, Flower Pollination Neural Network (FPNN), and Backpropagation Neural Network (BPNN), as well as two other meta-heuristic algorithms namely Bat Neural Network (BANN) and Particle Swarm Optimization Neural Network (PSONN) were used to train MLP in the real case identification of swine disease and five UCI Machine Learning Repository datasets. The QIFPNN learning model is the best among all comparisons because it is more consistently tested on various datasets and is not susceptible to the influence of variations in dataset characteristics so that it can represent various existing cases. The average classification accuracy of QIFPNN excels in 3 datasets namely "swine disease", "Lung cancer", and "Vertebral column" respectively 81.0729%, 88.7500% and 91.8922%, while BPNN excels at 3 dataset namely the dataset "Iris", "Wine" and "Glass" respectively 99.0714%, 100% and 74.5426%. In the dataset where BPNN excels, QIFPNN ranks second, while in the dataset where QIFPNN excels, BPNN ranks last out of the 5 methods tested. Proving that the quadratic interpolation concept adopted by the QIFPNN learning model is the best concept when compared to the levy distribution concept in FPNN and the gradient descent concept in BPNN and other comparison algorithms.

Keywords: flower pollination algorithm, quadratic interpolation flower pollination neural network, artificial neural network, classification, swine disease.