Short Term Forecasting based on Hybrid Least Squares Support Vector Machines

Zuriani Mustaffa[1], Mohd Herwan Sulaiman[2], Ferda Ernawan[1], and Noorhuzaimi@Karimah Mohd Noor[1]

[1] Soft Computing & Intelligent System Research Group, Faculty of Computer Systems & Software Engineering, Universiti Malaysia Pahang, 26300 Gambang, Kuantan, Pahang, Malaysia

[2] Faculty of Electrical Engineering & Electronics, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia

Corresponding author Email: zuriani@ump.edu.my

Flood is one of the common natural disasters that have caused universal damage throughout the world. Due to that matter, reliable flood forecasting is crucial for the purpose of preventing loss of life and minimizing property damage. In this study, hybrid Least Squares Support Vector Machines (LSSVM) with four meta-heuristic algorithms viz. Grey Wolf Optimizer (GWO-LSSVM), Cuckoo Search (CS-LSSVM), Genetic Algorithm (GA-LSSVM) and Differential Evolution (DE-LSSVM) are presented for a week ahead water level forecasting. The employed meta-heuristic algorithms are individually served as an optimization tool for LSSVM and later, the forecasting is proceeded by LSSVM. This study assesses the performance of each hybrid algorithms based on three statistical indices viz. Mean Square Error (MSE), Root Mean Square Percentage Error (RMSPE) and Theil's U which is realized on raw and normalized data set. Later, the performance of each identified hybrid algorithm is analyzed and discussed. From the simulations, it is demonstrated that all the identified algorithms are able to produce better forecasting result by using normalized time series data.