Oral Presentation

Title of presentation: Using Optimisation Method for Input Data Selection in AI-Based Time-Series Flood Forecasting Models

Author: Farzad Piadeh,
School of Computing and Engineering

Supervisors: Dr Kourosh Behzadian
School of Computing and Engineering

Professor Amir Alani
School of Computing and Engineering

Abstract

Data-driven models for real-time flood forecasting generally use time-series input data by using specific range of input data for each iteration of both training and validation processes. However, little is known about the preparation and classification of these input datasets to achieve the best model performance. To overcome this, the present study aims to propose an input variable selection method based on the shuffled frog leaping algorithm to obtain the best dataset of input data. This population-based heuristic approach consists of a set of virtual frogs partitioned into several groups to find the best time-series dataset through both exploitation and exploration processes. The methodology is applied to a real-world case study and compared with conventional methods such as autocorrelation, cross-correlation, and cross-covariance techniques. nonlinear autoregressive network with exogenous inputs is used as AI-based model and root mean square error, normalised Nash–Sutcliffe coefficient, computation time, iteration number, and overflow loss are selected for performance assessment. All models are run 5-times with different seeds for 1-step, 4-step, 8-step and 12-step ahead lead times. The results show that the proposed method can improve all considered indicators, such as overflow loss and computation time, especially for longer lead times e.g., 12-step ahead of prediction. This proposed method suggests a new horizon to provide more reliable and accurate predicted data through better training/validation of time-series models.