

Artificial Neural Network for Forecasting of Daily Reservoir Inflow: Case Study of the Kotmale Reservoir in Sri Lanka

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Abstract : The knowledge of water inflow figures is paramount in decision making on the allocation for consumption for numerous purposes; irrigation, hydropower, domestic and industrial usage, and flood control. The understanding of how reservoir inflows are affected by different climatic and hydrological conditions is crucial to enable effective water management and downstream flood control. In this research, we propose a method using a Long Short Term Memory (LSTM) Artificial Neural Network (ANN) to assist the aforesaid decision-making process. The Kotmale reservoir, which is the uppermost reservoir in the Mahaweli reservoir complex in Sri Lanka, was used as the test bed for this research. The ANN uses the runoff in the Kotmale reservoir catchment area and the effect of Sea Surface Temperatures (SST) to make a forecast for seven days ahead. Three types of ANN are tested; Multi-Layer Perceptron (MLP), Convolutional Neural Network (CNN), and LSTM. The extensive field trials and validation endeavors found that the LSTM ANN provides superior performance in the aspects of accuracy and latency.

Keywords : convolutional neural network, CNN, inflow, long short-term memory, LSTM, multi-layer perceptron, MLP, neural network

Conference Title : ICMLT 2020 : International Conference on Machine Learning and Technology

Conference Location : Singapore, SG

Conference Dates : September 08-09, 2020