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Editorial: Evolutionary Algorithms in Water Resources

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Evolutionary algorithms and allied fields are getting more visibility as well as familiarity due to their numerous flexibilities such as handling high-dimensional non-linear problems and more. Accordingly, IWA Publishing's *H2Open Journal* played a major role to initiate a special issue on Evolutionary Algorithms in Water Resources, which in our opinion will help budding researchers to formulate their research problems. Ten papers (three on optimization, five on machine learning algorithms, one on Internet of Things, one on remote sensing) are part of the special issue, details of which are as follows.

Janga Reddy and Nagesh Kumar (Reddy & Kumar 2020) reviewed extensively on Evolutionary Algorithms and Swarm Intelligence and their applications in water resources engineering. Their paper also highlighted challenges, improvements needed and opportunities for future applications. Gurav & Regulwar (2020) developed a Multi Objective Fuzzy Linear Programming based irrigation planning model to case study Jayakwadi Project Stage I, India. The proposed model effectively considered the uncertainty in decision parameters/variables. Nandi and Janga Reddy (Nandi & Reddy 2020) evaluated the performance of genetic algorithm (GA), shuffled complex evolution (SCE), differential evolution (DE), and self-adaptive DE (SaDE) algorithms for the parameter calibration of a variable infiltration capacity (VIC) model. The methodology is tested on the upper Tungabhadra River basin in India. It is concluded that SaDE facilitates an effective calibration of the VIC model with higher reliability and faster convergence to optimal solutions as compared to the other methods.

Bhar & Bakshi (2020) proposed a three-layered Feed-Forward Back Propagation (FFBP) based artificial neural network (ANN) for simulation of tidal water level for the Hooghly estuary, India. It is concluded that developed ANN models can be used to generate complete cycles of water level data at the remote station, for both spring and neap cycles. Chaudhary & Dhanya (2020) examined the applicability of Classification and Regression Tree (CART) for bias-correction of Integrated Multi-Satellite Retrievals for Global Precipitation Mission (IMERG) precipitation dataset over India. Better performance of the CART model over Linear Scaling (LS) and Equidistant Cumulative Distribution Matching (EDCDF) was observed over India. Moradi *et al.* (2020) used multivariate linear regression, support vector regression, and Gaussian process regression to predict variations in dissolved organic carbon (DOC) concentrations in an Australian catchment. Experimental results showed that the forecasting capability of the support vector regression model outperforms those of other kernel-based models, thereby generating more accurate results. Naidu *et al.* (2020) studied the hydrological responses under climate change using various machine learning algorithms over a semi-arid river basin in India. They used data driven algorithms and various downscaling algorithms. The annual average precipitation was predicted to increase by about 13.12% with temperature increase of 0.6 °C for the period of 2061–2080 compared to the observed period of 1951–1989 with MIROC Global Climate Model outputs. Samantaray & Ghose (2020) applied integration of support vector machine (SVM) with firefly algorithm (FFA) and phase space reconstruction (PSR)

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(SVM-FFA-PSR), SVM, SVM-FFA for runoff prediction for five watersheds of Balangir, Odisha, India and found that SVM-FFA-PSR is satisfactory.

Krishnaveni *et al.* (2020) developed an Internet of Things (IoT) based device by integrating sensors and microcontroller that send the real time tank water level data to the cloud. Methodology is applied to Melnelli big tank in Arcot taluk of Vellore district, TamilNadu, India for remote monitoring of tank water level dynamics.

Surwase *et al.* (2020) developed a mechanism to compare the HEC-RAS flood model with the flood footprints extracted from Synthetic Aperture Radar (SAR) image using multi-segmentation and Otsu's thresholding technique. Test data are flood witnessed in Mahanadi River in Odisha stretched between Tikarpara and Mundali during September 2008 and found that model result is satisfactory.

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