Abstract

Rainfall-runoff modelling is one of the most well-known applications of hydrology. The goal of rainfall runoff modelling is to simulate the peak river flow caused by an actual or hypothetical rainfall force. In existing methods, the rainfall runoff relationships are quantified to predict the daily streamflow of each catchment from its landscape attributes to measure the daily rainfall. However, the structural model error, infiltration rate, and the steep slopes of the hill affect the prediction process. To tackle these issues, this study proposed a novel rainfall prognostic model-based artificial framework, which predicts day-to-day rainfall to prevent environmental disasters. The day-to-day predictions minimize the risks to life and property also manages the agricultural farms in a better way because the possibility of rainfall has been estimated earlier. Furthermore, the posterior fire-breathing network is utilized to estimate model errors in the computational runoff by using time-dependent and random noise to the model's internal storage to solve the uncertainty problem. Since the model errors are estimated, there are limits to the infiltration rate thus a prophetic multilayer network is utilized which relies on the soil runoff levels. Moreover, the network measures the dynamics of soil moisture to regulate the infiltration rate according to the rural or urban section. Moreover, to measure the surface water from the steep slopes, the system offered a well-ordered selective genetic algorithm to calculate the velocity of runoff in different bend areas to overcome the numerical problem. Thus, the model results showed that the work effectively predicts the rainfall from the investigation of model errors, infiltration rates, and velocity to achieve a better prediction range in the rainfall.

River discharge prediction is a critical subject in water resource engineering concerns. The HEC-HMS model and random forest (RF) models have been successfully used in discharge forecasting problems. In this research HEC-HMS model and RF were applied to forecast daily discharge for M.H. Halli gauge Station which lies in Karnataka state region in India. For calibration and validation of the models, the recorded daily rainfall, temperature and discharge which is available for fifteen years (2003–2017) was divided into two sets. The output of the HEC-HMS model was compared with the recorded data of the discharge, the residual time series values, which resulted from the comparison, was solved by using the RF approach. The root means square error (RMSE), mean absolute error (MAE), and coefficient of determination (R^2) for M.H. Halli station using HEC-HMS model were found to be more

efficient than RF model in forecasting the daily discharge. The current study's findings supported the proposed methodology's applicability for precise discharge modeling.

Stream flow forecasting issues have been effectively solved using the M5P tree model and the SWAT (Soil and Water Assessment Tool). For the purposes of this study, the SWAT model and a hybrid M5P tree model were used to forecast the daily stream flow for the MH Halli gauge stations located along the Hemvati River in the Indian state of Karnataka. The recorded daily flow, which was accessible for fifteen years (2003-2017), was split into two sets in order to calibrate and validate the models. The SWAT model's output was compared to the stream flow data that had been acquired, and the residual time series values that emerged from the comparison were then resolved using the M5P model tree. When predicting the daily stream flow of the basin, the hybrid M5P tree model outperformed the SWAT model in terms of root means square error (RMSE), coefficient of determination (R^2), Nash-Sutcliffe Efficiency (NSE), and degree of agreement (d) for MH Halli stations.