National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Analyzing the temporal rainfall variability over hundred Indian cities through deep learning approach
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Venue	: ER-303 Dept. Class Room
Date and Time	: 05 Jan 2024 (5:00 PM)

Abstract : Applications of rainfall analysis and forecasting, range from disaster management to agriculture, making it an essential component of modern-day research. With the increasing impacts of climate change, it is anticipated that in the near future, frequent and extreme rainfall events would trigger severe floods, landslides, etc. Therefore, it is extremely important to make a precise prediction so that the intensity of the impacts on life and property could be reduced. The dynamic nature of the Indian monsoon makes it volatile and difficult to predict. Initially, rainfall forecasting began with numerical weather prediction models, but in recent times, with the advancement of AI/ML applications in weather and climate science, it has become reasonably popular for such studies. Thus, the present work focuses on the use of climatological rainfall data sets for the analysis and prediction of monthly, seasonal, and annual rainfall patterns across India, by considering city-specific information. Deep learning (DL) approaches like Long Short Term Memory (LSTM), Bi-directional LSTM (BiLSTM), Gated Recurrent Unit (GRU), and Convolution 1D LSTM (Conv1DLSTM) are considered for long-term rainfall prediction over hundred selected smart cities of India based on their location. Performance indicators like root means square error (RMSE) are computed to test the model training accuracy. The initial results from the comparison of the considered DL models indicated that for univariate forecasting of accumulated monthly rainfall, BiLSTM performed better while for bivariate forecasting, GRU performed better than the others. Prior to the forecasting using DL models, city-based trend analysis of rainfall is performed using the Modified Mann-Kendall test. The current study would demonstrate the results obtained from the univariate and bivariate analysis and forecasting till 2031 by considering a city-based approach.