Development and comparison of hybrid rainfall prediction model

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Abstract: Rainfall prediction is very essential for every country because it decides each country. Since weather affects everyone irrespective of political boundaries, the application of Information and Communication Technologies (ICT) has helped to establish and share data and best practices adopted by developed countries and standard operating procedures to all. Considering the present availability of technology, data reception tools and computational power, researchers are developing different direct and indirect high resolution approaches like: deterministic approach using numerical weather models for rainfall prediction for short and medium range forecasting; and statistical approach using neural networks, fuzzy classification systems and genetic algorithms.

The present work is an attempt to develop and evaluate three hybrid rainfall forecasting model: Neural Networks and Fuzzy Expert System, Domain Expert System (DES) and Neural Networks (NN) and combination of Fuzzy Expert System and Data Mining using observations from Automatic Weather Stations (AWS) collected from National Climatic Data Centre (NCDC) for the period 2000-2014. The three statistical models were developed using WEKA & Java and MATLAB, respectively. Past works have commonly used five critical meteorological parameters like: Temperature, Dew Point, Mean Sea-Level pressure (MSLP), Wind speed, Humidity to correlate it with precipitation. In the present study, the data and the techniques were evaluated for four selected cities in India located in four different geographical regions of the country. The results were quite interesting and the rainfall prediction made combination through Neural Network and Fuzzy Expert System for all four regions were reasonably accurate compared to the other models.