A Neural Network Based Rainfall Forecasting System Using Multiple Stations

H.D.P Weerasinghe[1], H.L. Premaratne[2] and D.U.J. Sonnadara[1]
[1] Department of Physics, University of Colombo, Sri Lanka
[2] University of Colombo School of Computing, Sri Lanka

ABSTRACT

This paper presents an implementation of a robust neural network based rainfall forecasting system based on a cluster of weather stations in the dry zone of Sri Lanka.

The implemented network was based on a Feed-forward back propagation technique. A total of ten neighbouring weather stations having long periods of precipitation data were used to train and test the model. Twenty years of daily rainfall data were used to train the network and ten years of daily rainfall data were used to test the accuracy of the model. The model was trained separately to predict the rainy days during the North-East monsoon season. Instead of extracting two states such as 'rain' or 'no rain', the model was further improved to predict at many sub levels using Fuzzy Logic.

The model consists of ten separate neural networks which were combined to form one model to predict the status of the daily rainfall at each station. When rainfall of previous three days in the nearest three neighbouring stations was taken into account, the rainfall occurrence model was able to make predictions within 72% - 83% accuracy. Predicting the North-East monsoon rainfall accuracy was within 68% - 76% and the fuzzy classification overall accuracy was within 75% - 87%.