Forecasting Droughts Using Artificial Neural Networks

Gayan Illeperuma and <u>Upul Sonnadara</u>
Department of Physics, University of Colombo, Colombo 3, Sri Lanka

This study was carried out to examine the possibility of using artificial neural networks as a tool to forecast droughts in Sri Lanka. Predictions were made using the Standardized Precipitation Index (SPI) as the drought monitoring index. Monthly rainfall recorded at 13 climatological stations covering both Wet and Dry zones over a long time period have been used as the input to train and test the neural networks. The analysis covers rainfall data recorded over the time span from 1870 to 1980.

The SPI was computed by fitting a probability density function to the frequency distribution of monthly precipitation records of each station. The developed neural network model was tested for SPIs with time scale of 1-6 months. For lead time of 3 months, the average correlation coefficient was found to be 0.90 with the lowest being 0.84 for Nuwara Eliya and highest being 0.94 for Batticaloa.

In general, the accuracy of the predictions was higher for the stations in the dry zone compared to the stations in the wet zone. The model predictions were superior for the period from May to July (which is the first part of the South-West Monsoon season) compared to the rest of the year. The accuracy of predictions increased with the shorter lead times. The results of this work shows that neural network models trained on SPI can be used to forecast droughts in advance.