Reconstructing Monthly Temperature Time Series in Jaffna: A Neural Network Approach

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Abstract: The meteorological station in Jaffna $80^{238}_{92}02'E, 9^{238}_{92}41'N$ which is the main meteorology station to maintain weather records for the northern peninsula experienced difficulties in collecting data during the period from 1984 to 2000 due to hostilities in the region. Although the weather observations were resumed in 2001, no estimates of missing observations have been reported. This paper presents a neural network approach of reconstructing a serially complete data set of monthly temperature records at the Jaffna meteorology station based on the data available at 4 neighbouring stations. The standard departures of monthly temperature values calculated from stations in Mannar, Anuradhapura, Puttalam and Trincomalee were used as the input to the neural network model to estimate the standard departure of monthly temperature at Jaffna which was converted back to monthly temperature values by using the long-term mean monthly temperature and standard deviation in Jaffna. The neural network was trained using the data from 1931 to 1960 (30 years) and the output of the model was tested using data from 1961 to 1980 (20 years). The accuracy of reconstruction obtained through the neural network model based on the standard deviation between the difference in actual and estimated values was $\pm 0.31^0$C. The neural network was applied to reconstruct the missing data in Jaffna during the period 1981 to 2000 where large gaps in weather observations are reported.

Keywords: Neural Networks, Temperature Reconstruction