Comparisons of hybridized model for one season ahead air temperature prediction

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ABSTRACT: Season ahead information about air temperature will give knowledge about drought detection and climate monitoring. For farmers and producers, it gives valuable information for planning their activities in future. Comparison of hybrid (wavelet-ANFIS) and hybrid (wavelet-SVM) for prediction of one season ahead air temperature is proposed in this study. In the study seven stations observed meteorological data is used. Approximated decomposed subseries data from the wavelet is used as input for Adaptive Neuro Fuzzy Inference system (ANFIS) and Support Vector Machine (SVM). Comparison of hybridized wavelet-ANFIS method, hybridized wavelet-SVM method is made. Out of Seven stations for Hiriyur station three month ahead (one season) prediction is working better with CC of 0.913 compare to other models.

Keywords: *ANFIS, Wavelet, SVM, Air temperature, Decomposition, Approximation.*

INTRODUCTION

Drastic change of air temperature in recent years has made researchers more curious. Since many applications like agriculture (Abdel-Aal., 2004), vector borne diseases (Thomson et al., 1996; Goetz et al., 2000), epidemic forecasting (Bian et al., 2006), weather forecasting, climate change(Bocchiola et al., 2010; Kittel et al., 2011) depends on air temperature. For above analysis one season ahead air temperature prediction crucial.

For prediction of temperature many soft computing models are applied in the last decades. For fast and accurate results Neural computing techniques are majorly used. Adaptive Neuro-Fuzzy Inference System (ANFIS) is a better approach in improving of Neuro-fuzzy in case of modelling nonlinear functions. The ANFIS learns the features by example data set and adjusts the system parameters according to a given error criterion (Jang J-SR., 1992., and Jang J-SR., 1993). Another method is Support Vector Machine (SVM) which works on Structural Risk Minimization (SRM) principle (Gunn, 1998). Wavelet decomposition decomposes time series data into a different time and scale of wavelet transformation. But in recent times, many hybrid models are performing better and faster compare to single model approach(Moosavi et al., 2013).

In this study, it is intended to check the accuracy of the models in prediction of one season ahead air temperature for the seven station of Karnataka located in India.

METHODOLOGY

Wavelet Analysis

The Wavelet Series are just like Continuous Wavelet Transform (CWT) and it requires a significant amount of time and resources, depending on the results required. $\psi(t)$ is the mother wavelet or the basis function (Eq. 1). The Continuous Wavelet Transform (CWT) is provided by Eq. (2), where f(t) is the signal to be analyzed. The transformation used in the wavelet functions are derived from the mother wavelet through translation (shifting) and scaling (dilation or compression)(Yarar., 2014).

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