

Daily Weather Realization Conditioned on ENSO Phase Using k-NN Approach

Gerrit Hoogenboom & **Mohammad Bannayan**

Department of Biological and Agricultural Engineering, University of Georgia, Griffin, GA

Quantification of the response of any agricultural system beyond their current condition to weather requires predicting realizations of future weather conditions. Previously we developed and employed weather analogue as a tool to provide a future realization of daily weather data. The weather analogue is based on the k-nearest neighbor (k-NN) approach which is rooted in pattern recognition. Based on this approach, the model recognizes the most similar pattern to the available data of the target year among the same sequence of historical data. Daily weather data of the selected year as the *best match* would be considered for the remainder of the target year. The goal of this study was to verify the k-NN approach for the prediction of daily weather sequences. This method can be employed on the assumption that the weather during the target year is analogous to the weather recorded in the past. We used the nearest-neighbor resampling method for the simultaneous prediction of daily radiation, maximum and minimum temperature, and precipitation for multiple locations. The sites for which this approach was tested included 10 different locations in Georgia and sixteen locations in the USA, Europe, Africa, and Asia, representing different climatic regions. The k-NN approach was able to reproduce a similar pattern of the target year from the observed historical weather data. The results from this study showed that this weather analogue program can be a valuable tool for realization of any weather dependent function. Among study weather variables precipitation prediction was less accurate compared to other parameters. As precipitation differs between the warm and cold ENSO phases, we implemented a new feature in the tool to condition the future realization based on ENSO phase. At present the Weather analogue is able to find the best match not only based on all available historical weather data but also conditioned on cold, warm or neutral years. This scrutiny could potentially increase the accuracy of our precipitation prediction, which will be evaluated with long-term historical data from the southeastern USA.

Contact information: Mohammad Bannayan, Department of Biological and Agricultural Engineering, University of Georgia, Griffin, GA 30223, USA,
Phone: 1-770-229-3436, Fax: 1-770-228-7218, E-mail: bannayan@uga.edu