Forecasting daily potential evapotranspiration using machine learning and limited climatic data

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Resumen: Abstract: Anticipating, or forecasting near-term irrigation demands is a requirement for improved management of conveyance and delivery systems. The most important component of a forecasting regime for irrigation is a simple, yet reliable, approach for forecasting crop water demands, which in this paper is represented by the reference or potential evapotranspiration (ETo). In most cases, weather data in the area is limited to a reduced number of variables measured, therefore current or future ETo estimation is restricted. This paper summarizes the results of testing of two proposed forecasting ETo schemes under the mentioned conditions. The first or “direct” approach involved forecasting ETo using historically computed ETo values. The second or “indirect” approach involved forecasting the required weather parameters for the ETo calculation based on historical data and then computing ETo. An statistical machine learning algorithm, the Multivariate Relevance Vector Machine

(MVRVM) is applied to both of the forecastings schemes. The general ETo model used is the 1985 Hargreaves Equation which requires only minimum and maximum daily air temperatures and is thus well suited to regions lacking more comprehensive climatic data. The utility and practicality of the forecasting methodology is demonstrated with an application to an irrigation project in Central Utah. To determine the advantage and suitability of the applied algorithm, another learning machine, the Multilayer Perceptron (MLP), is used for comparison purposes. The robustness and stability of the proposed schemes are tested by the application of the bootstrap analysis. [ABSTRACT FROM AUTHOR]

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