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Seasonally fitted probability functions changing weights for combining vegetation indices forecasting models

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Normalized Difference Vegetation Index (NDVI) serves as a significant reference for crop health monitoring. NDVI time series forecasting is a critical issue because of the importance of the involving fields, e.g., food scarcity, climate changes and biodiversity. Therefore, several forecasting models have been suggested and implemented in the literature. Herein, we propose a combination of forecasts using seasonally fitted probability functions changing weights. Contrary to commonly suggested combination models, this one does not rely on overall error measures and/or features, but on time slots similarities between probability density function (PDF) of real observations and forecasts. It is validated with 18 years MOD13Q1 NDVI time series describing a cereal canopy area that belongs to the northwestern of Tunisia. Additionally, the chosen forecasting models are Box Jenkins and Neural Network model. The forecasting accuracy was assessed using the root mean square error (RMSE). According to the results, each season had a different best-fit probability distribution function. Overall, these latter are: Gamma, Beta, Weillbul, and Extreme Generalised Value (EGV). Moreover, the suggested model has shown better forecasting accuracy than individual models, hybrid models and commonly used combining tool (RMSE respectively, 0.003, 0.45, 0.35, 0.38). Interestingly, another seasonally varying weights were determined based on the normal distribution. But, our suggested model showed better forecasting accuracy than this latter (RMSE of normally distributed changing weights= 0.30).