

A new approach for the mid-term wind power forecast: Method of the Micro-regimes

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The method of the Micro-regimes is a novel and flexible non-parametric statistical approach that allows to improve the forecasting horizon from one to several day-ahead offering a high level of adaptability with the different casuistic of the wind farms while providing a competitive level of accuracy.

The proposed method establishes non-parametric statistical relationships between the predictand and the NWP related predictors at the level of the lowest granularity of the data i.e. Micro-regimes. Each one identifies similar predictand-predictors behavior patterns in the past to make the prediction.

The approach has been developed and optimized in the framework of the mid-term wind power prediction but their applicability could be extended easily to any observed meteorological variable. Other complex and sophisticated approaches require high computational resources, depend on the daily updates and need homogeneity of the temporal series to obtain optimized results making difficult their operational applicability. The method of the Micro-regimes offers some advantages in front of these other approaches. First, it is a technique capable of having memory of past situations hence, in the mid-term forecast, the dependence with the observations updates decreases as increase the training period. Second, this novel approach is versatile in terms of the different problems associated with the availability of real data and it is able to adapt easily to the particular situation of each wind farm. Third, simplicity of the approach allows quick install process for new projects with low computational requirements. Notwithstanding, the method may be less reliable when it tries to reproduce low frequency patterns that have not been adequately sampled.

The method of the Micro-regimes has been subjected to a thorough validation process in several wind farms scenarios over Europe with different localizations, terrain complexities, training periods and availability of the operational data from the wind farm. The results show competitive levels of accuracy and reliability and are comparables to other statistical approaches used nowadays. Furthermore, different studies have been developed: forecast per wind turbine generator, ramps forecast and solar forecasting among others.

We will discuss about these different studies and validations of the novel approach in the mid-term forecast of the wind power. As conclusion, the Micro-regimes are a simple and versatile methodology with a high adaptability around the different situations of the observational data provided by the wind farms with competitive levels of accuracy.