COMPARISON OF THREE ADVANCED MCP TECHNIQUES

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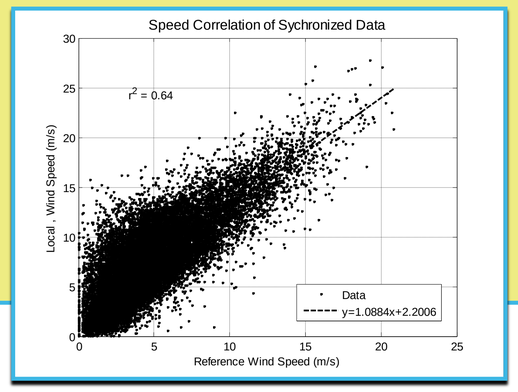
GENIVAR

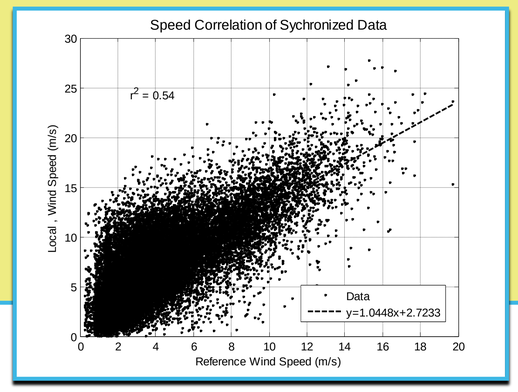
How can we improve on standard MCP techniques?

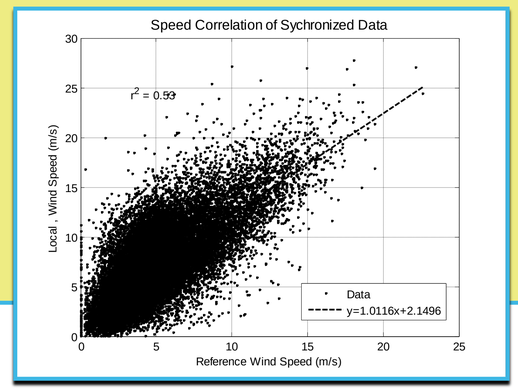
ABSTRACT

The measure-correlate-predict process is a fundamental component of a wind resource assessment analysis. The generation of a long-term hindcast estimate of the wind resource is critical in order to take into consideration the natural inter-annual variability of the wind resource; however, this is a process which can introduce significant uncertainty into the resource assessment process.
Several unique and advanced MCP processes were compared, including a non-linear weighted regression approach (GENIVAR's Weibull Transformation technique), a distribution matching technique, and a Fuzzy Logic process. This poster outlines advantages and limitations of these approaches and shows a selection of validation techniques based on blind tests. The incorporation of validated and site-appropriate MCP techniques can serve to significantly reduce error and uncertainty in wind resource assessment.

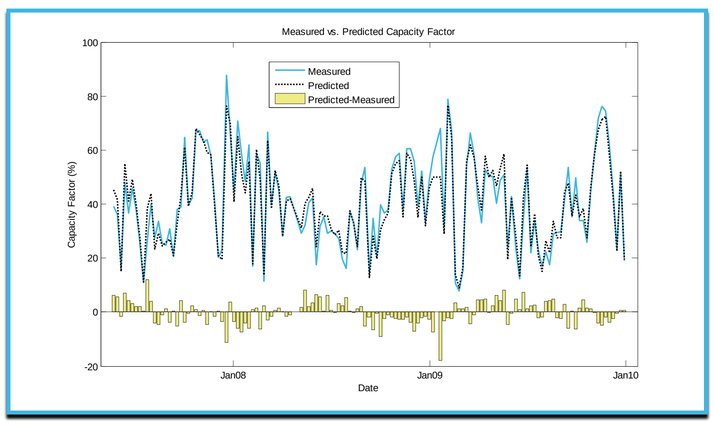
THREE REFERENCE SITES WITH POOR CORRELATIONS

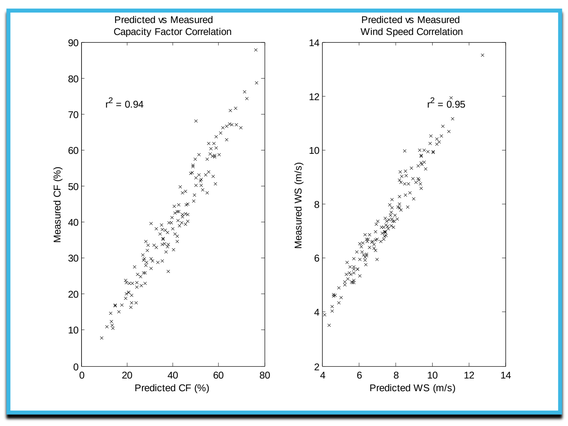


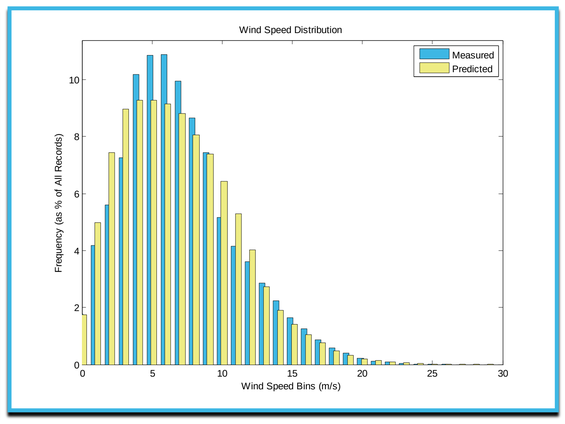




NON-LINEAR WEIGHTED REGRESSION

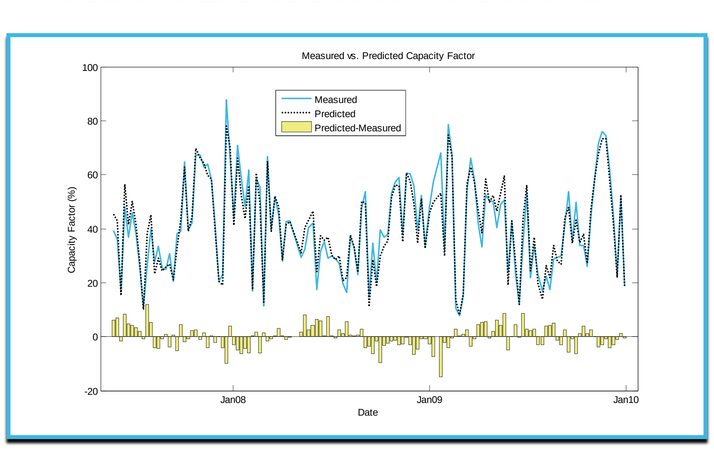


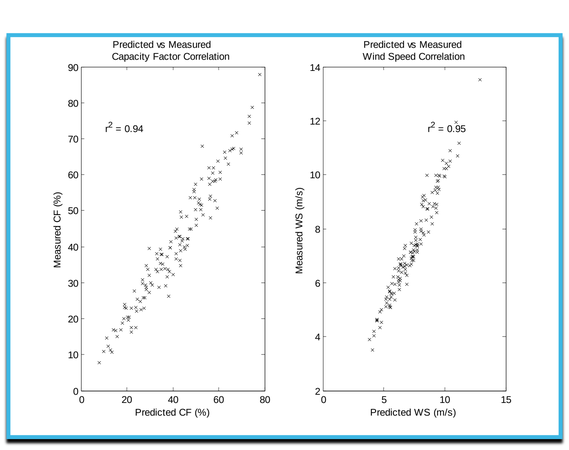


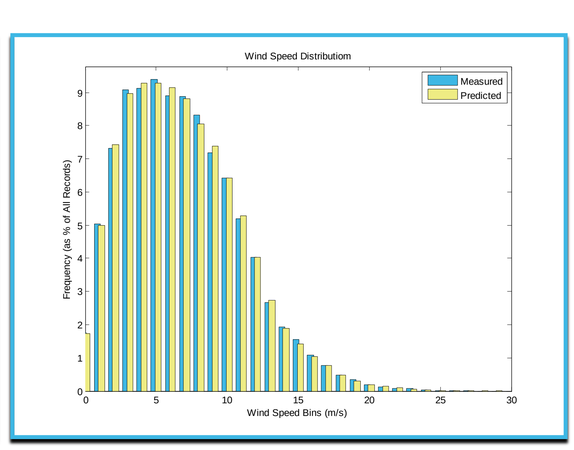


- Applies a transformation to the reference wind speed based on a non-linear weighted regression
- Minimizes error in the yield
- Does not require a high linear correlation between the wind speeds for a good prediction
- Will require two separate prediction if strong seasonality is present

DISTRIBUTION MATCHING

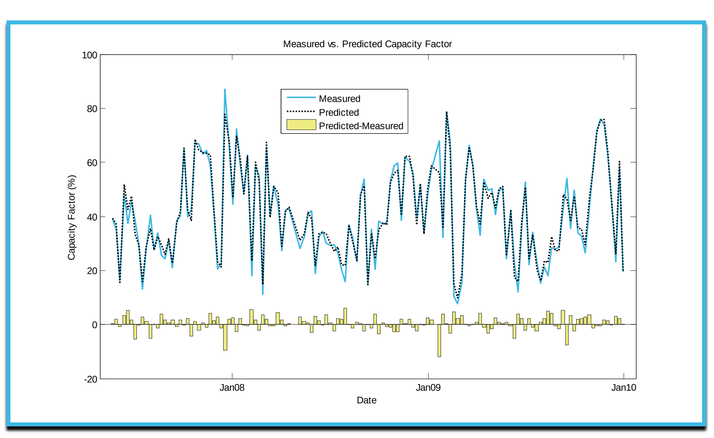


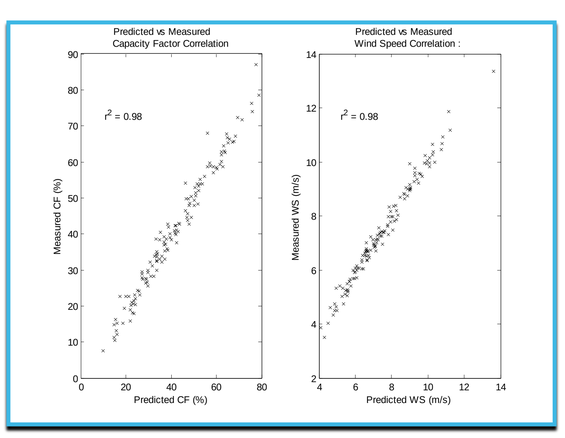


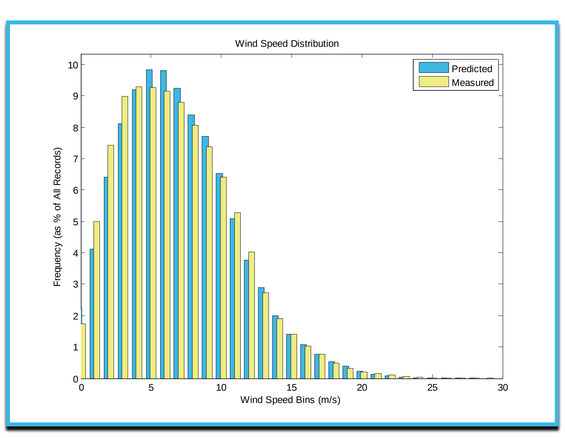


- Applies a transformation to the reference wind speed based on the actual distributions of the wind speed at the sites
- Perfectly matches on-site distribution for concurrent period
- Requires sufficient data to fully characterize the wind speed distribution

FUZZY LOGIC







- Uses data from more than one site
- Takes into consideration more inputs: wind directions, time of day and month of the year
- Can be used to predict wind directions
- Seasonality accounted for in the prediction
- Requires sufficient data to adequately fill the above cases
- Current implementation minimizes error on in wind speed not in yield