On the Uncertainty of Wind Power Generation

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September 22, 2019

Introduction

Integration of renewable resources into the urban power grid is a challenge due to uncertainties in power production. We focus on wind power. Reliable wind power production forecasting is crucial to:

- **Optimization of the price of electricity** for different users such as electric utilities, Transmission system operator (TSOs), Electricity Service providers (ESPs), Independent power producers (IPPs), and energy traders.
- **Allocation of energy reserves** such as water levels in dams or oil and gas reserves.
- **Operation scheduling** of conventional power plants.
- **Maintenance planning** such as that of power plants components and transmission lines.

Status quo

Wind power forecasts can be generally categorized as follows:

- physical models
- statistical methods
- artificial intelligence methods
- spatial correlation methods
- persistence models
- other hybrid approaches

The output of such methods is usually a **deterministic forecast**. Occasionally probabilistic forecasts are produced through uncertainty propagation in the data, parameters or through forecast ensembles. However, little has been done in terms of producing **data driven probabilistic forecasts** based on real-world performance of forecasting models.

Data

Lets dive in a real data set. This is data from Uruguay based on **10 minute observation interval**.

Figure 1: title

Have a better data set ? send it our way.