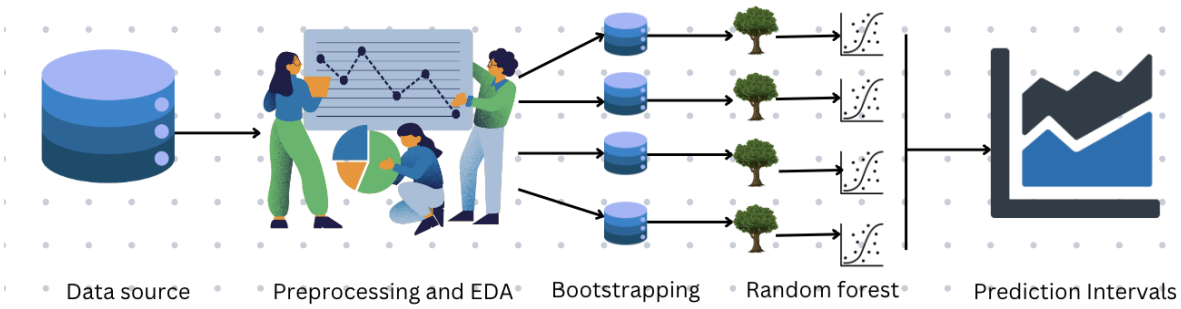
THE UNIVERSITY OF CHICAGO
DATA SCIENCE INSTITUTE

Invenergy, a leader in the renewable energy industry, aims to refine its wind power forecasting model. The variability of power generation by wind turbines, arising from weather conditions such as unfavorable winds or ice accumulation on turbine blades, poses significant challenges. It is essential to estimate energy production based on weather forecasts in order to intently commit energy in the day-ahead market.

In response, a team of University of Chicago students, working through the Data Science Clinic, assisted Invenergy in developing a weather-based forecasting model for predicting power output. The team proposed a model that uses Random Forest Regression and prediction intervals to provide a range of possible power outputs. The methodology encompasses bootstrapping and applies noise simulation to account for the inherent uncertainty in weather forecasting.



The outcome entails hourly and daily prediction intervals that provide a comprehensive outlook of expected wind power generation. As the expense of buying back power can weigh heavily on operational costs, this insight is crucial for mitigating the risk of overcommitting energy supply.

While the accuracy of these predictions requires improvement, it serves as a foundational step towards building a robust monitoring system. Such a system could preemptively account for any extreme weather events in the power output predictions, potentially enhancing profitability and operational efficiency.