

Literature Survey :

Existing Problem:

Wind energy plays increasing role in the supply of energy world-wide. The energy-output of a wind farm is highly dependent on the weather conditions present at its site. If the output is predicted more accurately, the energy suppliers can coordinate the collaborative production of different energy sources more efficiently to avoid costly overproduction. In this paper, we do energy prediction based on weather data and analyse the important parameters as well as their correlation on the energy output.

Proposed Solution:

Our aim is to map weather data to energy production. We wish to show that even data that is publicly available for weather stations close to wind farms can be used to give a good prediction of the energy output. Furthermore, we examine the impact of different weather conditions on the energy output of the wind farms. We are building an IBM Watson Auto AI Machine Learning technique to predict the energy output of wind turbine. We deploy the model on IBM cloud to get scoring end point. It can be used as API in mobile app or web app building. We are developing a web application which is built using node red service. We use the scoring end point to give user input values to the deployed model. The model prediction is then showcased on User Interface to predict the energy output of wind turbine.

References:

- 1] B. G. Brown, R. W. Katz, and A. H. Murphy. Time series models to simulate and forecast wind speed and wind power. *Journal of Climate and Applied Meteorology*, 23(8):1184–1195, 1984.
- [2] Evolved Analytics LLC. Data Modeler 8.0. Evolved Analytics LLC, 2010. URL www.evolved-analytics.com.
- [3] A. M. Foley, P. G. Leahy, A. Marvuglia, and E. J. McKeogh. Current methods and advances in forecasting of wind power generation. *Renewable Energy*, 37:1–8, 2012.

- [4] R. Jursa and K. Rohrig. Short-term wind power forecasting using evolutionary algorithms for the automated specification of artificial intelligence models. *International Journal of Forecasting*, 24:694–709, 2008.
- [5] M. Kotanchek, G. Smits, and E. Vladislavleva. Pursuing the Pareto paradigm: Tournaments, algorithm variations & ordinal optimization. In *Genetic Programming Theory and Practice IV*, volume 5 of *Genetic and Evolutionary Computation*, chapter 12, pages 167–186. Springer, 11-13 May 2006. ISBN 0-387-33375-4.
- [6] J. R. Koza. *Genetic Programming II: Automatic Discovery of Reusable Programs*. MIT Press, Cambridge Massachusetts, May 1994. ISBN 0-262-11189-6.
- [7] O. Kramer and F. Gieseke. Analysis of wind energy time series with kernel methods and neural networks. In *Seventh International Conference on Natural Computation (ICNC)*, pages 2381–2385, 2011.
- [8] O. Kramer and F. Gieseke. Short-term wind energy forecasting using support vector regression. In *International Conference on Soft Computing Models in Industrial and Environmental Applications*, pages 271–280. Springer, 2011.
- [9] A. Kusiak, H. Zheng, and Z. Song. Short-term prediction of wind farm power: A data mining approach. *IEEE Transactions on Energy Conversion*, 24(1):125 – 136, 2009.
- [10] R. Poli, W. B. Langdon, and N. F. McPhee. *A Field Guide to Genetic Programming*. lulu.com, 2008. ISBN 978-1-4092-0073-4.
- [11] M. Schmidt and H. Lipson. Age-fitness Pareto optimization. In *Genetic Programming Theory and Practice VIII*, *Genetic and Evolutionary Computation*, chapter 8, pages 129–146. Springer, 2010.
- [12] I. S´anchez. Short-term prediction of wind energy production. *International Journal of Forecasting*, 22(1):43 – 56, 2006.
- [13] M. Webb and S. Scuglia. *Wind power: A favoured climate change response*. Global Economic Research: Fiscal Pulse (Scotiabank), 2007.