Predicting the energy output of wind turbine based on weather condition

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General Description:

- **“WIND ENERGY IS INEXHAUSTIBLE AND INFINITELY RENEWABLE ENERGY”**. The current trend of using nuclear power and traditional sources of energy such as coal and oil is either considered unsafe or leads to a large amount of **CO2 emission**.
- **Wind energy plays an important role** in the supply of energy worldwide. The energy output of a wind farm is highly dependent on the wind conditions present at its site but that is **highly unpredictable**.
- That’s why to overcome this we propose **the ML model** through which wind energy output can be predicted more accurately and energy suppliers can **coordinate the collaborative production of different energy sources more efficiently** to avoid costly overproduction.

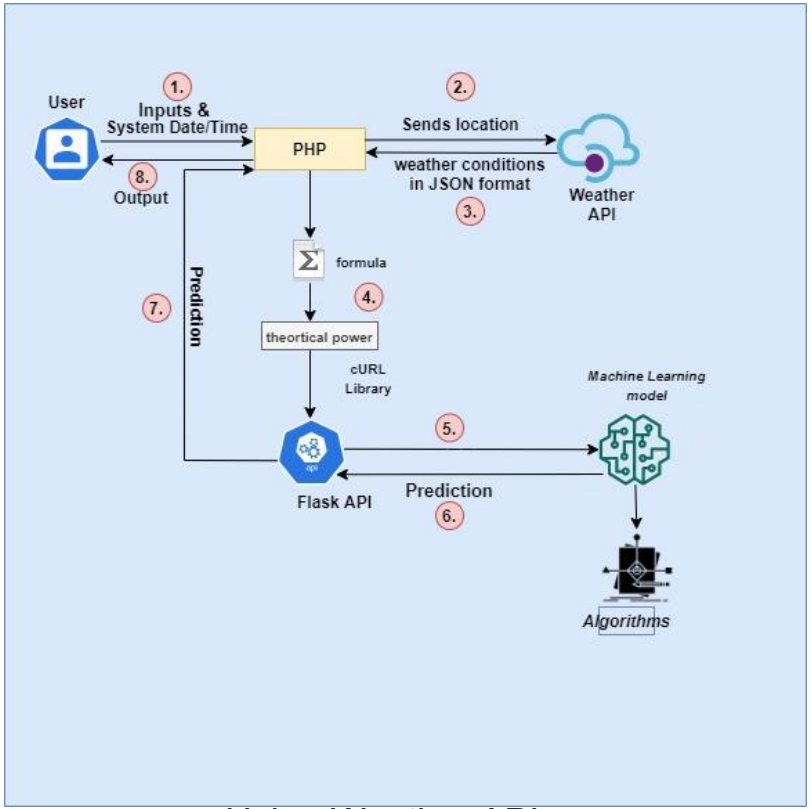
Business Impact:

- Majority of wind energy companies uses **costly machinery, high paid expertized employers and analyst's** for predicting the wind energy prediction but due proposed System consisting of ML model the company can **nullify the extra cost paid** for the machinery and other experts. As the ML model is trained over the large training dataset.
- Rather than normal ML algorithms and techniques, model using **Advanced Neural Network technique like LSTM Algorithm** which will **predict output more accurately and precisely** than other algorithms and previous techniques.
- **This leads to more efficiency and avoid costly evaluation.**

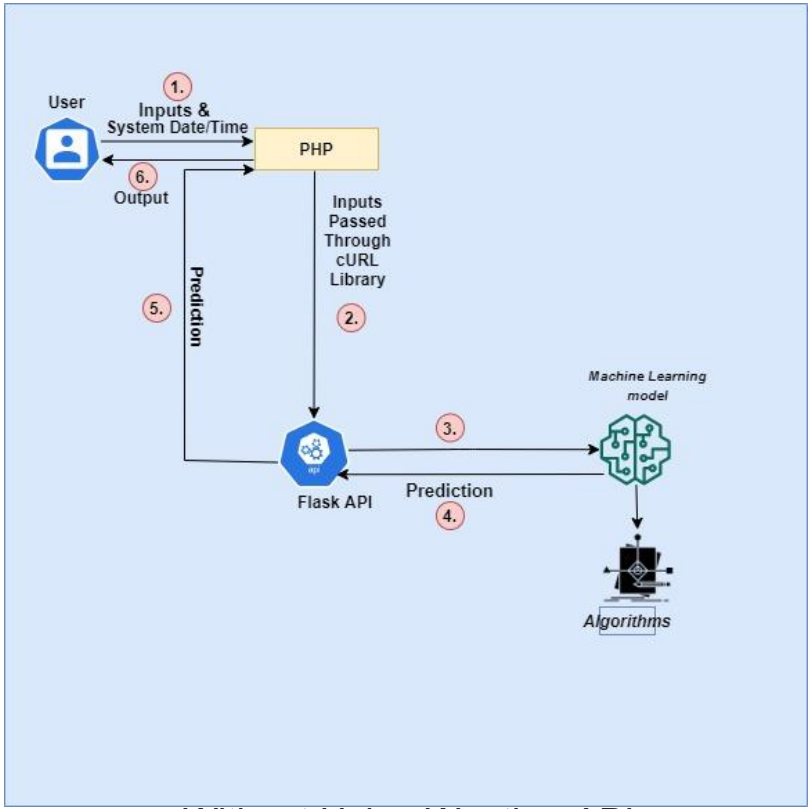
Novelty - Uniqueness:

- Rather than predicting wind energy output on the basis of generic knowledge, this system contains **LSTM Advance Neural Network** model which will predict energy output of wind turbine more accurately.
- As the model is deployed in converted to **Flask API** so the system is quite **consistent** enough to handle multiple requests at a time additionally system generates the output in the form of an understandable graph.
- Wind energy prediction of next 72 hours is shown to user. We can rely on Weather API for wind information or we take input from user

System Architecture:-



Using Weather API



Without Using Weather API

Technology Stack:

- **Front End**- HTML5, CSS, JS, Bootstrap
- **Web Framework**- Flask
- **Backend-** Python 3.7
- **ML Libraries/ APIs/ Framework-** Pandas, Tensorflow, Keras, Matplotlib, Numpy, Pickle, sklearn.ensemble, IBM Watson Studio
- **Database**-MySQL(5.6)
- **Operating System-** Windows/ Linux/ IOS

Scope Of Work:

- System's ML model ensures that it will **predict energy more accurately** rather than Domain expertise person and costly machinery.
- Also,it **generates graph using Matplotlib** library that can be easily understood by company person so, the company can save lots of money over the analysis part.
- As system is being deploy in **IBM Watson** so it **ensures consistency** of the model.
- The system includes good front end design with database like **MySQL which stores data** on the daily basis and can be **easily accessible** by firing query.