Project Initialization and Planning Phase

Date	18 July 2024
Team ID	xxxxxx
Project Title	Predicting The Energy Output Of Wind Turbine Based On Weather Condition
Maximum Marks	3 Marks

Project Proposal (Proposed Solution) template

This project proposal outlines a solution to address a specific problem. With a clear objective, defined scope, and a concise problem statement, the proposed solution details the approach, key features, and resource requirements, including hardware, software, and personnel.

Project Overview	
Objective	The primary objective is to predict the energy output of wind turbines based on weather conditions using advanced machine learning techniques, enabling better management and optimization of energy production.
Scope	The project encompasses the analysis of historical weather and energy output data, development of predictive models, and implementation of these models to forecast energy production, aiding in operational decision-making and grid integration.
Problem Statement	
Description	The project aims to address the problem of predicting wind turbine energy output based on variable weather conditions. Accurate predictions are challenging due to the fluctuating nature of weather, which impacts energy production forecasting. This issue affects energy management, maintenance scheduling, and grid integration.
Impact	Solving this problem will improve the accuracy of energy output forecasts, leading to more efficient energy management, optimized maintenance scheduling, and better grid integration. This will enhance operational efficiency, reduce costs, and contribute to effective energy production and distribution.
Proposed Solution	

Approach	The methodology involves analyzing historical weather and energy output data to develop predictive machine learning models. Techniques such as data preprocessing, feature selection, and model training will be employed. Models like Random Forest Regressor and Gradient Boosting will be utilized to forecast energy output based on current weather conditions. The approach includes validating and tuning the models to ensure accuracy and reliability.
Key Features	- **Predictive Modeling:** Utilizes advanced machine learning algorithms to forecast energy output. - **Historical Data Analysis:** Incorporates historical weather and performance data to enhance model accuracy. - **Real-time Predictions:** Provides timely forecasts to support operational decisions and grid integration. - **Dynamic Adjustments:** Adapts to varying weather conditions for more accurate and responsive energy production predictions.

Resource Requirements

Resource Type	**Description**	**Specification/Allocation**
Hardware		
Computing Resources	CPU/GPU specifications, number of cores	NVIDIA GeForce GTX 1650
Memory	RAM specifications	8 GB
Storage	Disk space for data, models, and logs	1 TB SSD
Software		
Frameworks	Python frameworks	Flask
Libraries	Additional libraries	scikit-learn, pandas, numpy, matplotlib, seaborn
Development Environment	IDE, version control	Vs code

Data		
Data	Source, size, format	Kaggle dataset, 50530, csv