

Requirement Analysis

1. Data flow diagram:

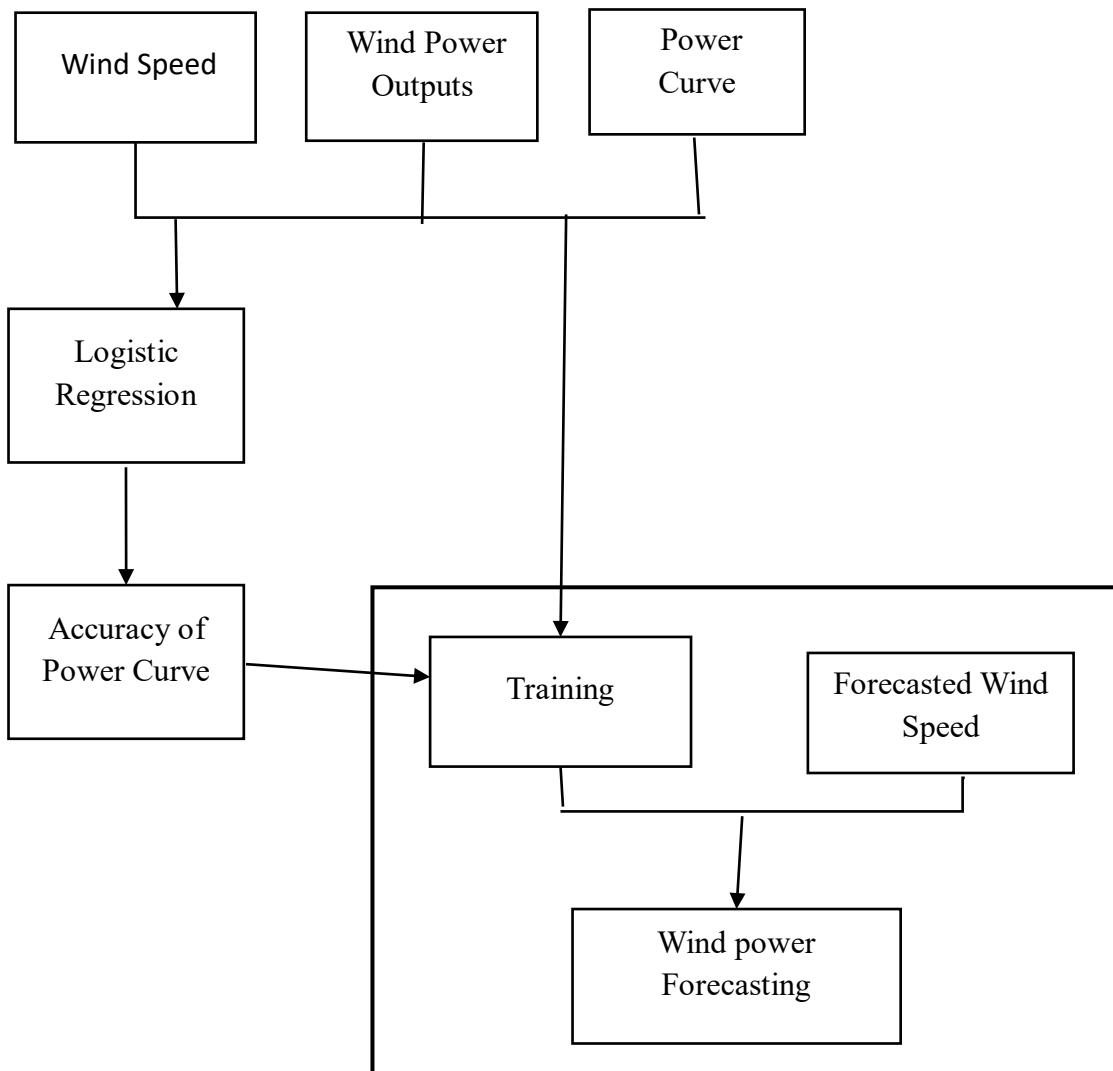


Fig-1: Project Architecture

2. solution requirements:

1. Functional Requirements

- Users can enter weather details like wind speed, direction, temperature, and pressure.
- The system cleans and prepares the data automatically.
- It uses a trained machine learning model to predict wind turbine power output.
- The predicted result is shown on the screen.

- The system saves and loads the trained model for future use.
- It can check how accurate the model is using MAE, RMSE, and R² score.

2. Non-Functional Requirements

- **Accurate** – The prediction should be correct and reliable.
- **Fast** – The result should be generated quickly.
- **Reliable** – It should handle wrong or missing inputs properly.
- **Scalable** – It should support future upgrades like real-time weather API.
- **Easy to Use** – The interface should be simple and clear.
- **Secure** – Data and model files should be protected.

3. Hardware Requirements

- Computer or Laptop (Minimum 4GB RAM)
- Internet connection (if using weather API)

4. Software Requirements

- Python (3.x)
- Libraries: Pandas, NumPy, Scikit-learn, XGBoost, TensorFlow/Keras
- Flask or FastAPI (Backend)
- HTML or Streamlit (Frontend)
- VS Code or Jupyter Notebook

5. Data Requirements

- Past weather data
- Past wind turbine energy data
- Clean and processed dataset for training

6. Output Requirements

- Predicted wind turbine energy value

3. Technology stocks:

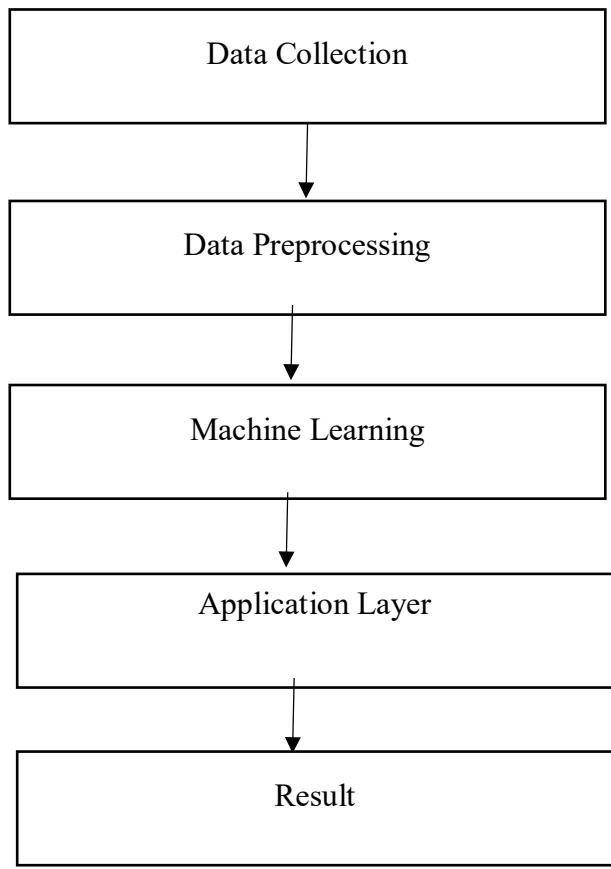


Fig-2: Project Flow