

## **Weather-Based Prediction of Wind Turbine Energy Output: A Next-Generation Approach to Renewable Energy Management**

[DATE]	28-02-2026
TEAM ID	LTVIP2026TMIDS90651
PROJECT NAME	Weather-Based Prediction of Wind Turbine Energy Output: A Next-Generation Approach to Renewable Energy Management
MAXIMUM MARKS	4 MARKS

### **6.4 - Model Building:**

There are several Machine learning algorithms to be used depending on the data you are going to process such as images, sound, text, and numerical values. The algorithms can be chosen according to the objective. As the dataset which we are using is a Regression dataset so you can use the following algorithms

- Linear Regression
- Random Forest Regression / Classification
- Decision Tree Regression / Classification

### **Choose the appropriate model:**

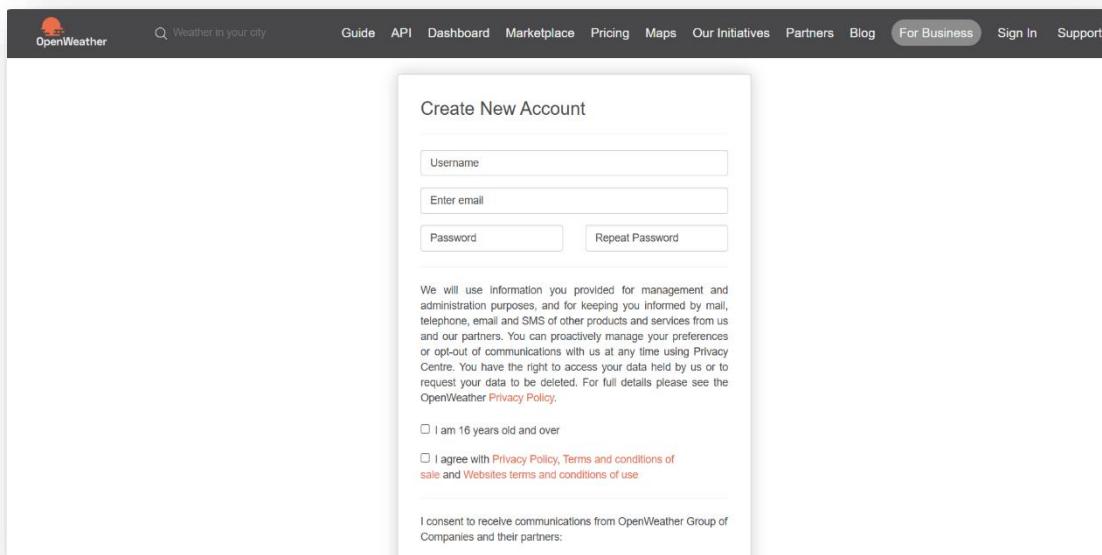
```
train_X, val_X, train_y, val_y = train_test_split(  
    X, y, test_size=0.25, shuffle=False)  
  
model = RandomForestRegressor(  
    n_estimators=300,  
    max_depth=6,  
    min_samples_leaf=5,  
    random_state=42,  
    n_jobs=-1  
)  
model.fit(train_X, train_y)  
  
preds = model.predict(val_X)  
  
print("MAE:", mean_absolute_error(val_y, preds))  
print("R2 :", r2_score(val_y, preds))
```

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## API Integration

**Step 1:** Signup for Open Weather API for current weather forecasting. To signup

Link: - [https://home.openweathermap.org/users/sign\\_up](https://home.openweathermap.org/users/sign_up)



**Step 2:** After verification and subscription within 24 hours the API key will be activated.

A screenshot of the OpenWeatherMap homepage. At the top, there is a red banner message: 'You have to verify your email to use OpenWeatherMap services. Please [click here](#) to get an email with the confirmation link.' Below the banner, the navigation bar includes links for New Products, Services, API keys, Billing plans, Payments, Block logs, My orders, My profile, and Ask a question. On the left side, there is a large image of a colorful sunset or sunrise. To the right of the image, the text 'Historical weather for any location' is displayed, followed by a description of the 'Time Machine' feature and download options. Two orange buttons at the bottom right are labeled 'Learn more' and 'Go to purchase'.

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**Step 3:** The API Key can be used to get the weather forecast of any of the cities known. The city is passed with parameter q and apikey is to be given with the parameter appid. An example for London city is shown below.

New Products	Services	API keys	Billing plans	Payments	Block logs	My orders	My profile	Ask a question
You can generate as many API keys as needed for your subscription. We accumulate the total load from all of them.								
Key	Name	Status	Actions	Create key				
ca19f9948cdf35afb03dce077bc1de23	Default	Active	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="text" value="API key name"/>	<input type="button" value="Generate"/>			
f54119f50d7337ac8de52db5cc2fb91	LIKHITHA	Active	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>					

