

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:

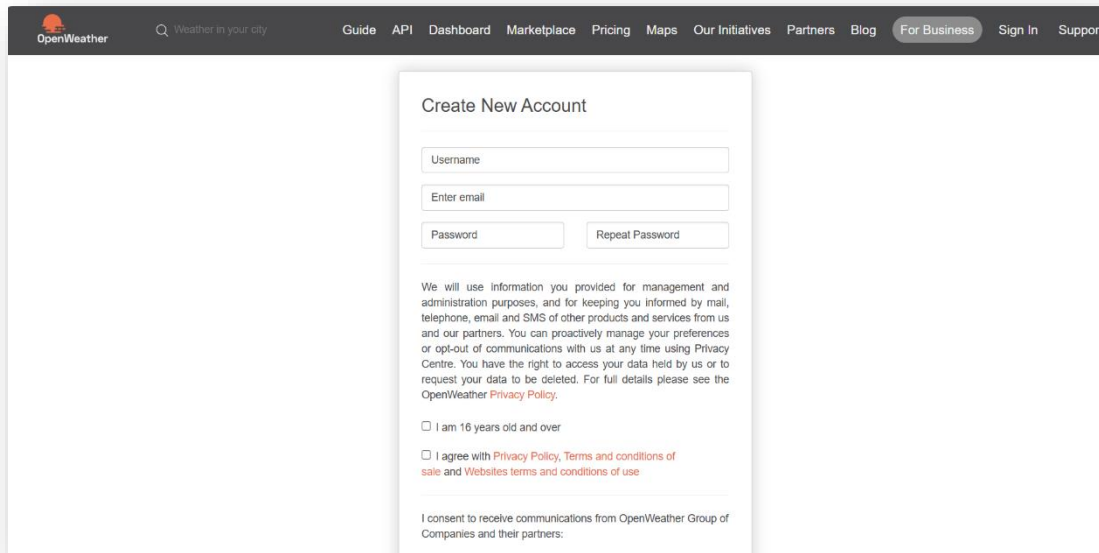
```
train_X, val_X, train_y, val_y = train_test_split(
X, y, test_size=0.25, shuffle=False)
model = RandomForestRegressor(
n_estimators=300,
max_depth=6,
min_samples_leaf=5,
random_state=42,
n_jobs=-1
)
model.fit(train_X, train_y)
preds = model.predict(val_X)
print("MAE:", mean_absolute_error(val_y,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

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API Integration

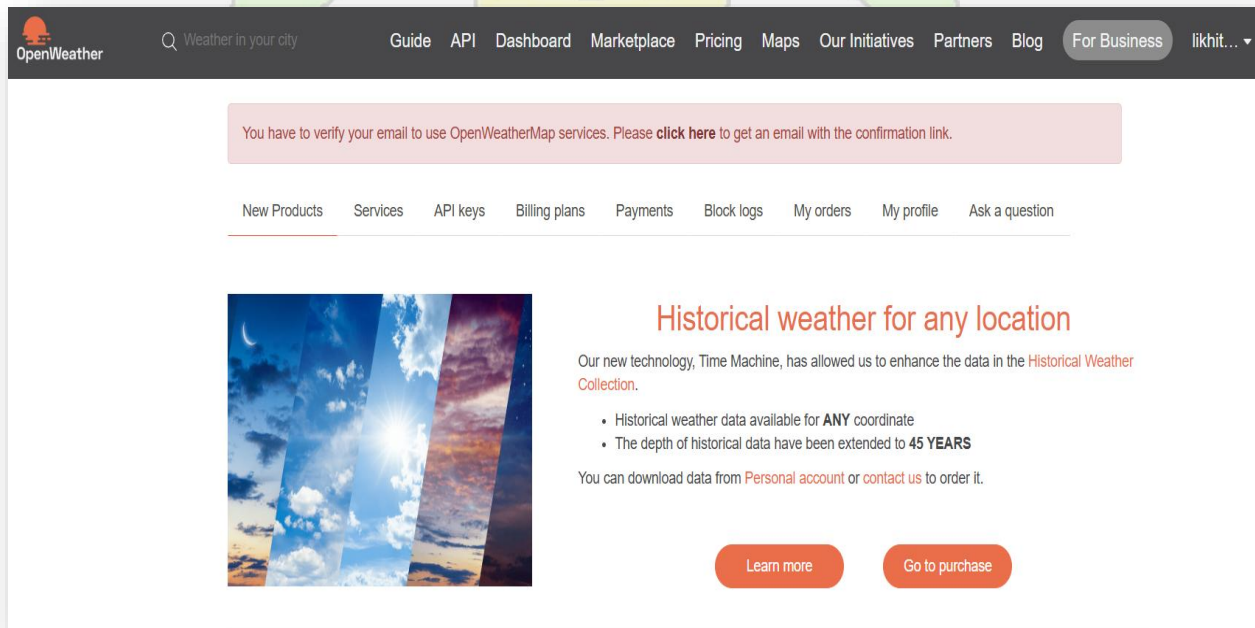
Step 1: Signup for Open Weather API for current weather forecasting. To signup

Link: - https://home.openweathermap.org/users/sign_up



The screenshot shows the 'Create New Account' form on the OpenWeather website. The form includes input fields for 'Username', 'Enter email', 'Password', and 'Repeat Password'. Below these fields is a paragraph of text explaining the use of user information for management and administration purposes, and for keeping the user informed by mail, telephone, email and SMS of other products and services from us and our partners. It also mentions that users can manage their preferences or opt-out of communications with us at any time using the Privacy Centre. Below this text are two checkboxes: 'I am 16 years old and over' and 'I agree with Privacy Policy, Terms and conditions of sale and Websites terms and conditions of use'. At the bottom, there is a line of text stating 'I consent to receive communications from OpenWeather Group of Companies and their partners:'.

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



The screenshot shows the 'Historical weather for any location' page on the OpenWeather website. The page features a navigation bar with links to 'Guide', 'API', 'Dashboard', 'Marketplace', 'Pricing', 'Maps', 'Our Initiatives', 'Partners', 'Blog', 'For Business', and 'likhit...'. Below the navigation bar is a pink banner with the text: 'You have to verify your email to use OpenWeatherMap services. Please [click here](#) to get an email with the confirmation link.' Below the banner is a section titled 'Historical weather for any location' with a subheading 'Our new technology, Time Machine, has allowed us to enhance the data in the Historical Weather Collection.' This section includes two bullet points: 'Historical weather data available for ANY coordinate' and 'The depth of historical data have been extended to 45 YEARS'. Below the bullet points is a line of text stating 'You can download data from Personal account or [contact us](#) to order it.' At the bottom of the section are two buttons: '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.

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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 type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="text" value="API key name"/> <input type="button" value="Generate"/>
f54119f50d7337ac8de52db5cc2fbd91	LIKHITHA	Active	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	

