**Wind Speed Prediction Documentation**

**Introduction**

The Wind Speed Prediction project is a web application that predicts wind speed based on input parameters such as humidity, barometer reading, temperature, and wind direction. It utilizes a machine learning model trained on historical weather data to make accurate predictions. This documentation provides an overview of the project, including its architecture, functionality, and instructions for setup and usage.

**Table of Contents**

- Architecture Overview

- Dependencies

- Installation and Setup

- Usage

- File Descriptions

- Conclusion

1. **Architecture Overview**

The project follows a client-server architecture, with the web application implemented using Flask, a Python web framework. The machine learning model used for wind speed prediction is a RandomForestRegressor from the scikit-learn library. The trained model is serialized using pickle and stored as a file ('model.pkl').

The Flask application receives user input through a web form and validates the input values. If the input is valid, the application preprocesses the input data, feeds it into the trained model, and returns the predicted wind speed to the user.

1. **Dependencies**

The project relies on the following dependencies:

- Python (version 3.x)

- Flask (version 1.x)

- NumPy (version 1.x)

- pandas (version 1.x)

- scikit-learn (version 0.24)

1. **Installation and Setup**

To set up the project, follow these steps:

1. Clone the project repository from [GitHub URL].

2. Ensure that Python 3.x is installed on your system.

3. Install the required dependencies by running the following command:

```

pip install flask numpy pandas scikit-learn

```

4. Download the 'MET.csv' dataset and place it in the project directory.

5. Run the Flask application using the following command:

```

python app.py

```

6. Access the application by opening a web browser and navigating to `http://localhost:5000`.

**4. Usage**

1. Open a web browser and access the application at `http://localhost:5000`.

2. Fill in the input fields with the desired values for humidity, barometer reading, temperature, and wind direction.

3. Click the "Submit" button to initiate the wind speed prediction.

4. If any validation errors occur, error messages will be displayed indicating the issue with the input values.

5. If the input values are valid, the predicted wind speed will be shown on the web page.

1. **File Descriptions**

The project consists of the following files:

- `app.py`: The main Flask application script that handles user requests and invokes the machine learning model for wind speed prediction.

- `model.pkl`: A serialized version of the trained RandomForestRegressor model, generated from the 'MET.csv' dataset.

- `MET.csv`: The dataset containing historical weather data used to train the model.

1. **Conclusion**

The Wind Speed Prediction project provides a simple web interface for users to obtain wind speed predictions based on various weather parameters. By leveraging machine learning and Flask, the project offers an accessible way to utilize predictive modelling for weather-related applications. The documentation provides a comprehensive guide to set up and use the application effectively.

Feel free to customize this documentation to fit the specifics of your project. It should provide a clear and concise overview of the project, its functionality, and instructions for installation and usage.