

LSTM Temperature Forecasting

This project implements a Long Short-Term Memory (LSTM) neural network to predict daily minimum temperatures based on historical weather data. The code is dynamic and can be reused for other time-series forecasting tasks.

Features

- Data Preprocessing: Handles non-numeric and missing values.
- LSTM Model: Uses past 30 days to predict the next day's temperature.
- Performance Metrics: Evaluates using MAE, MSE, and RMSE.
- Interactive Plot: Visualizes predictions with Plotly.
- CSV Output: Saves predictions and errors to LSTM_model_output.csv.

Dependencies and Installation

1. Clone the Repository:

```
git clone https://github.com/<your-username>/lstm-weather-forecast.git  
cd lstm-weather-forecast
```

2. Set Up the Virtual Environment and Install Dependencies:

```
python -m venv venv  
source venv/bin/activate # On Windows: venv\Scripts\activate  
pip install tensorflow pandas numpy matplotlib scikit-learn plotly
```

Usage

1. Prepare Your Dataset:

Place your CSV file in the project directory. Ensure the temperature column is the second column.

2. Run the Forecasting Script:

```
python weather.py
```

3. View Results:

- Predictions and actual temperatures are saved in LSTM_model_output.csv.
- An interactive Plotly graph will display in your browser.

Example Output

- CSV Output (LSTM_model_output.csv):

Date	Actual Value	Predicted Value	Absolute Error
------	--------------	-----------------	----------------

1990-01-01	10.5	11.2	0.7
------------	------	------	-----

1990-01-02	13.4	12.9	0.5
------------	------	------	-----

- Performance Metrics (Console):

Mean Absolute Error (MAE): 0.3456

Mean Squared Error (MSE): 0.2456

Root Mean Squared Error (RMSE): 0.4956

Contributing

Feel free to fork this project, submit issues, or open pull requests. Contributions are welcome!

License

This project is licensed under the MIT License - see the LICENSE file for details.