THE CLIMATE CRUSADER

1. ABSTRACT:

Climate Crusader endeavours to confront the critical issues surrounding weather prediction and climate change analysis by pioneering the development of a sophisticated artificial intelligence (AI) platform. Through the utilization of state-of-the-art machine learning algorithms and extensive datasets, the project endeavours to elevate the precision and efficacy of weather forecasting while delving into the intricate mechanisms of climate change. By amalgamating a plethora of data streams and employing innovative analytical methodologies, Climate Crusader seeks to equip policymakers, scientists, and society with valuable insights to combat the effects of climate change and promote sustainable growth.

2. SYSTEM REQUIREMENTS:

HARDWARE REQUIREMENTS:

- High performance computing infrastructure with scalable storage.
- It includes historical weather data, climate models, and satellite imagery.

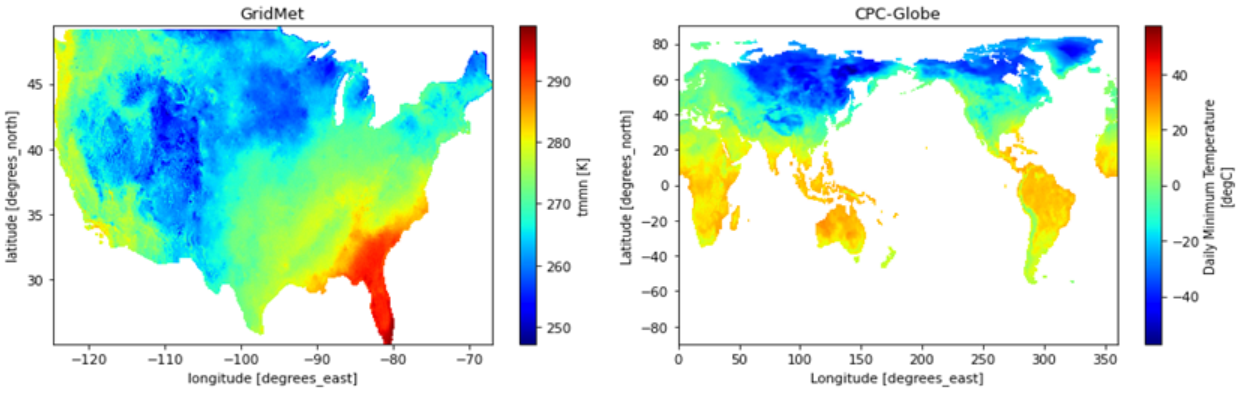
SOFTWARE REQUIREMENTS:

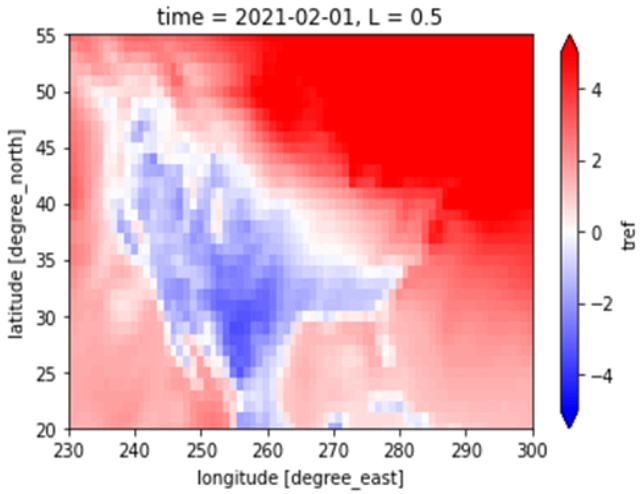
- Operating system compatible with OS such as Linux, Windows, or macOS.
- Programming Languages: Python, R.
- Frameworks and Libraries: TensorFlow, PyTorch, scikit-learn, Matplotlib etc.

3. TOOLS AND VERSIONS:

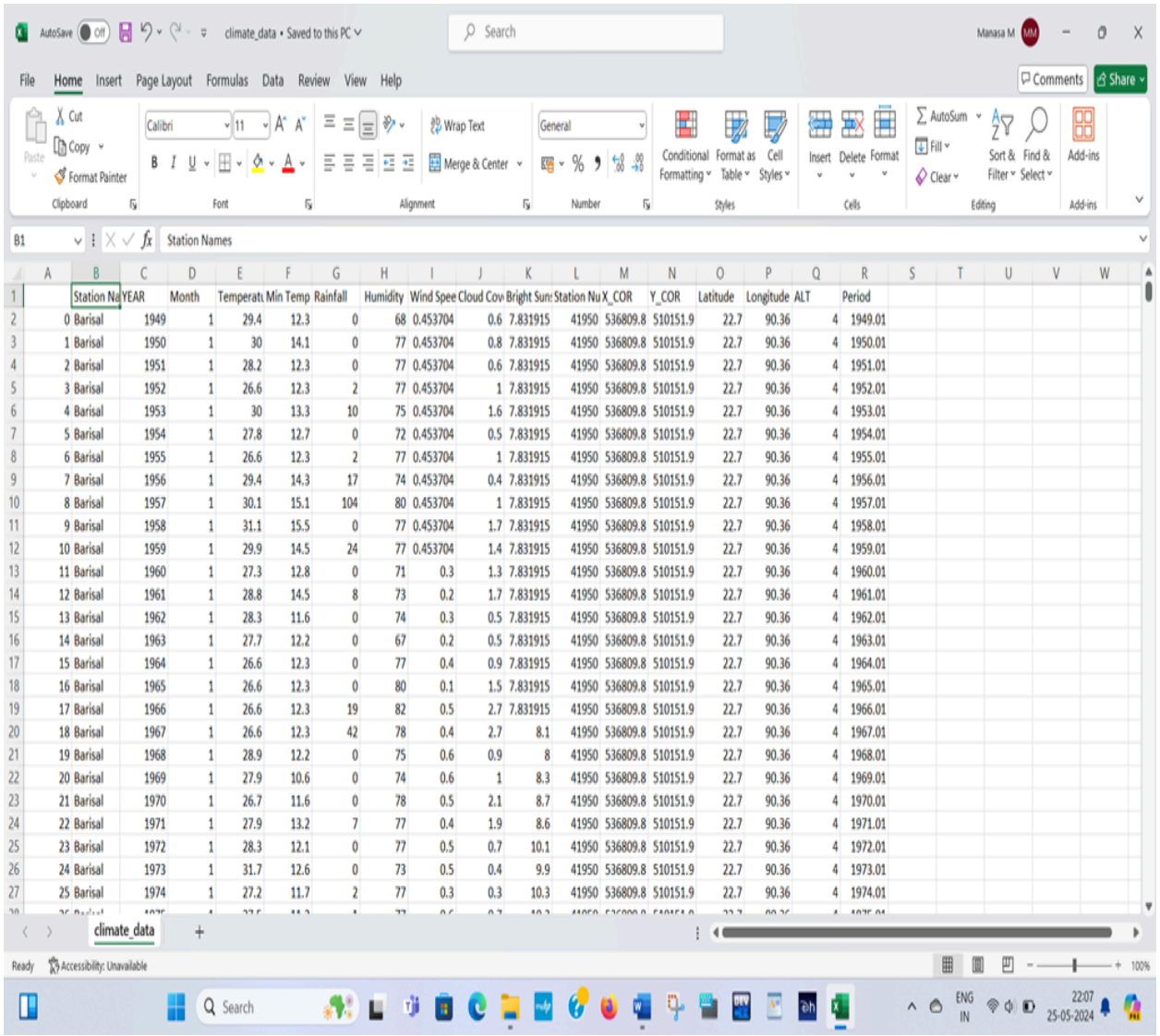
- Python version 3.8
- R version 4.0
- TensorFlow version 2.5
- Scikit-learn version 0.24
- SQLite version 3.3
- Matplotlib version 3.4

4. CLIMATE CHANGE DATA:





5. DATA SET USED IN OUR CODE:



climate_data • Saved to this PC

	Station Na	YEAR	Month	Temperatu	Min Temp	Rainfall	Humidity	Wind Spee	Cloud Cov	Bright Sun	Station Nu	X_COR	Y_COR	Latitude	Longitude	ALT	Period
2	0 Barisal	1949	1	29.4	12.3	0	68	0.453704	0.6	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1949.01
3	1 Barisal	1950	1	30	14.1	0	77	0.453704	0.8	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1950.01
4	2 Barisal	1951	1	28.2	12.3	0	77	0.453704	0.6	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1951.01
5	3 Barisal	1952	1	26.6	12.3	2	77	0.453704	1	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1952.01
6	4 Barisal	1953	1	30	13.3	10	75	0.453704	1.6	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1953.01
7	5 Barisal	1954	1	27.8	12.7	0	72	0.453704	0.5	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1954.01
8	6 Barisal	1955	1	26.6	12.3	2	77	0.453704	1	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1955.01
9	7 Barisal	1956	1	29.4	14.3	17	74	0.453704	0.4	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1956.01
10	8 Barisal	1957	1	30.1	15.1	104	80	0.453704	1	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1957.01
11	9 Barisal	1958	1	31.1	15.5	0	77	0.453704	1.7	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1958.01
12	10 Barisal	1959	1	29.9	14.5	24	77	0.453704	1.4	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1959.01
13	11 Barisal	1960	1	27.3	12.8	0	71	0.3	1.3	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1960.01
14	12 Barisal	1961	1	28.8	14.5	8	73	0.2	1.7	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1961.01
15	13 Barisal	1962	1	28.3	11.6	0	74	0.3	0.5	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1962.01
16	14 Barisal	1963	1	27.7	12.2	0	67	0.2	0.5	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1963.01
17	15 Barisal	1964	1	26.6	12.3	0	77	0.4	0.9	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1964.01
18	16 Barisal	1965	1	26.6	12.3	0	80	0.1	1.5	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1965.01
19	17 Barisal	1966	1	26.6	12.3	19	82	0.5	2.7	7.831915	41950	536809.8	510151.9	22.7	90.36	4	1966.01
20	18 Barisal	1967	1	26.6	12.3	42	78	0.4	2.7	8.1	41950	536809.8	510151.9	22.7	90.36	4	1967.01
21	19 Barisal	1968	1	28.9	12.2	0	75	0.6	0.9	8	41950	536809.8	510151.9	22.7	90.36	4	1968.01
22	20 Barisal	1969	1	27.9	10.6	0	74	0.6	1	8.3	41950	536809.8	510151.9	22.7	90.36	4	1969.01
23	21 Barisal	1970	1	26.7	11.6	0	78	0.5	2.1	8.7	41950	536809.8	510151.9	22.7	90.36	4	1970.01
24	22 Barisal	1971	1	27.9	13.2	7	77	0.4	1.9	8.6	41950	536809.8	510151.9	22.7	90.36	4	1971.01
25	23 Barisal	1972	1	28.3	12.1	0	77	0.5	0.7	10.1	41950	536809.8	510151.9	22.7	90.36	4	1972.01
26	24 Barisal	1973	1	31.7	12.6	0	73	0.5	0.4	9.9	41950	536809.8	510151.9	22.7	90.36	4	1973.01
27	25 Barisal	1974	1	27.2	11.7	2	77	0.3	0.3	10.3	41950	536809.8	510151.9	22.7	90.36	4	1974.01

6. CODE IMPLEMENTATION:

weather.py - C:/Users/mural/weather.py (3.9.13)

File Edit Format Run Options Window Help

```
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error

# Load climate data
data = pd.read_csv('climate_data.csv')

# Extract features (X) and target variable (y)
X = data[['Temperature', 'Humidity']]
y = data['Rainfall']

# Split data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

# Train linear regression model
model = LinearRegression()
model.fit(X_train, y_train)

# Make predictions
y_pred = model.predict(X_test)

# Calculate Mean Squared Error
mse = mean_squared_error(y_test, y_pred)
print("Mean Squared Error:", mse)

# Visualize actual vs. predicted rainfall
plt.scatter(y_test, y_pred)
plt.xlabel('Actual Rainfall (mm)')
plt.ylabel('Predicted Rainfall (mm)')
plt.title('Actual vs. Predicted Rainfall')
plt.show()
```

7. OUTPUT:

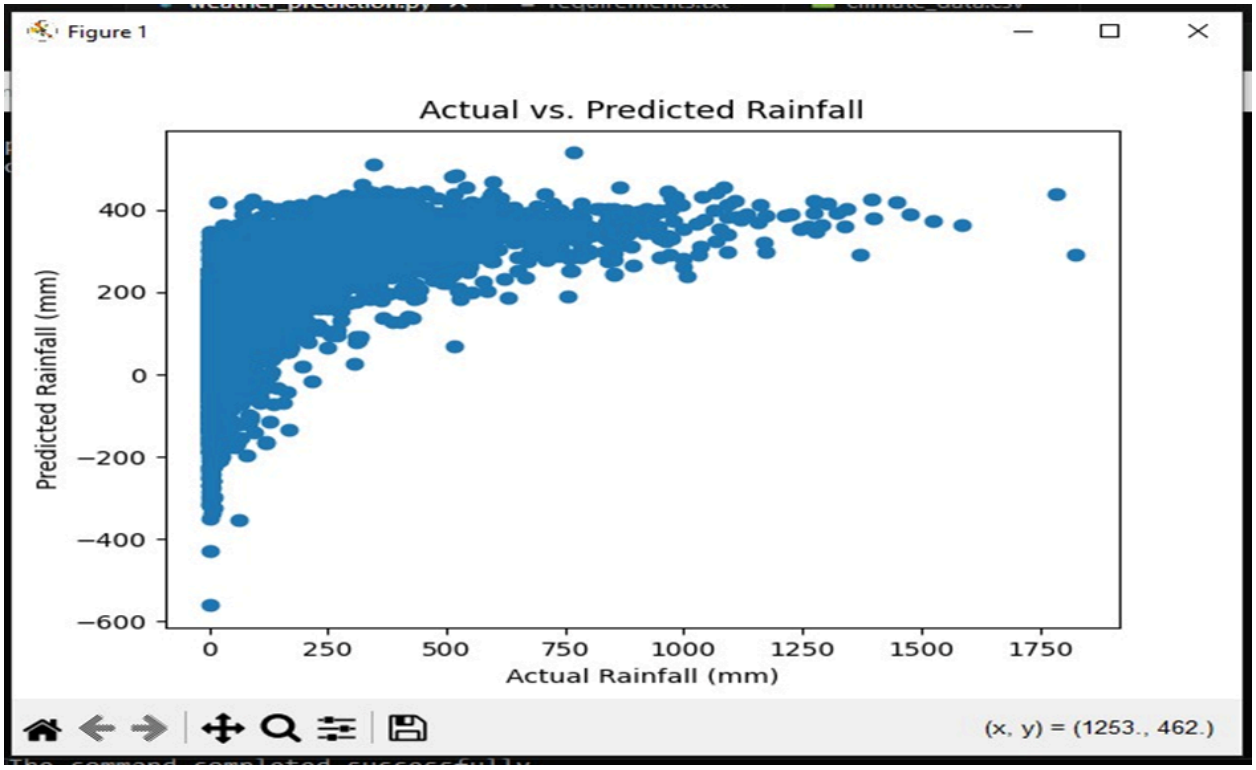
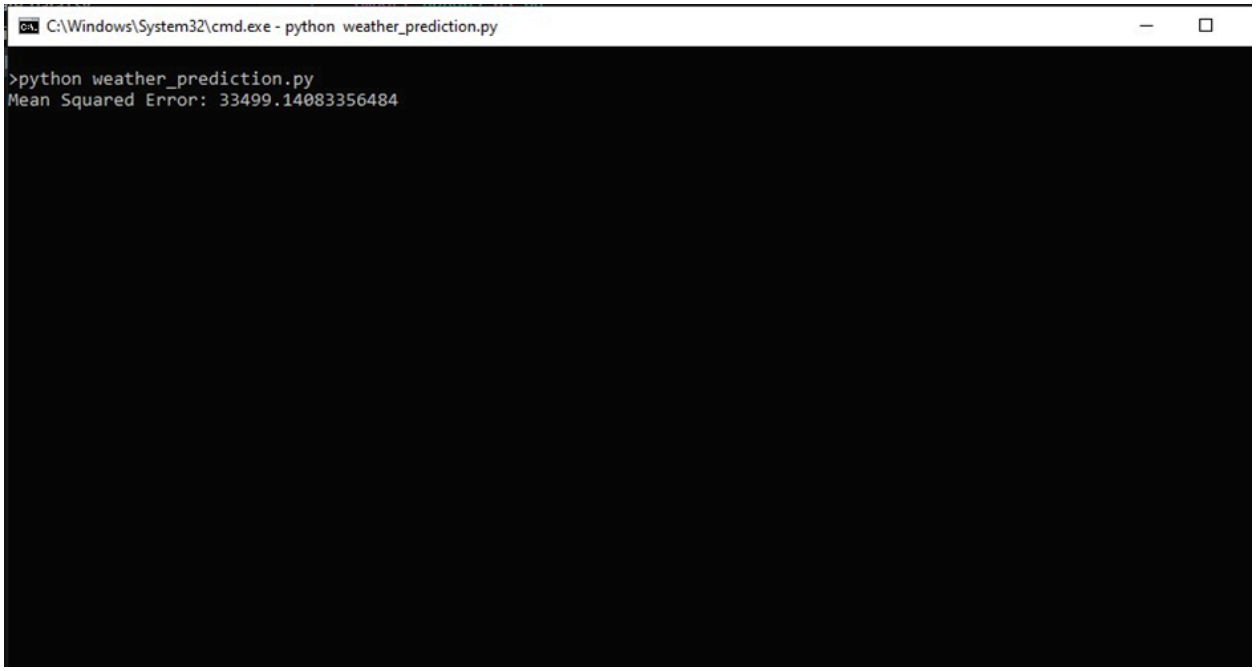


Figure 1
Actual vs. Predicted Rainfall
Predicted Rainfall (mm)
400
200
0
−200
−400
−600
0
250
500
750
1000
1250
1500
1750
Actual Rainfall (mm)
(x, y) = (1253., 462.)


C:\Windows\System32\cmd.exe - python weather_prediction.py
>python weather_prediction.py
Mean Squared Error: 33499.14083356484

8. FUTURE SCOPE:

The future scope of our project involves advancing AI capabilities to revolutionize weather prediction and climate change analysis. This includes further refining algorithms to enhance the accuracy and reliability of weather forecasts, utilizing machine learning techniques to uncover deeper insights into climate change trends, and developing innovative tools for predicting and mitigating the impacts of extreme weather events. Additionally, we aim to collaborate with researchers, governments, and organizations globally to expand the reach and effectiveness of our AI-driven solutions, ultimately contributing to a more sustainable and resilient future for our planet.

9. CONCLUSION:

In conclusion, our project stands at the forefront of leveraging AI technology to address critical environmental challenges. By harnessing the power of data and machine learning, we have made significant strides in advancing weather prediction accuracy and understanding climate change dynamics. As we look to the future, we remain committed to pushing the boundaries of innovation, fostering collaboration, and empowering communities worldwide to mitigate the impacts of climate change. Together, we can make a profound difference in safeguarding our planet for generations to come.