CLIMATE CHANGE ANALYSIS REPORT

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INTRODUCTION

- This report analyzes the causes, patterns, and impacts of climate change using available global datasets. It explores long-term temperature trends, CO_2 emissions, and other environmental indicators to assess how human activities have influenced global climate patterns.

OBJECTIVES

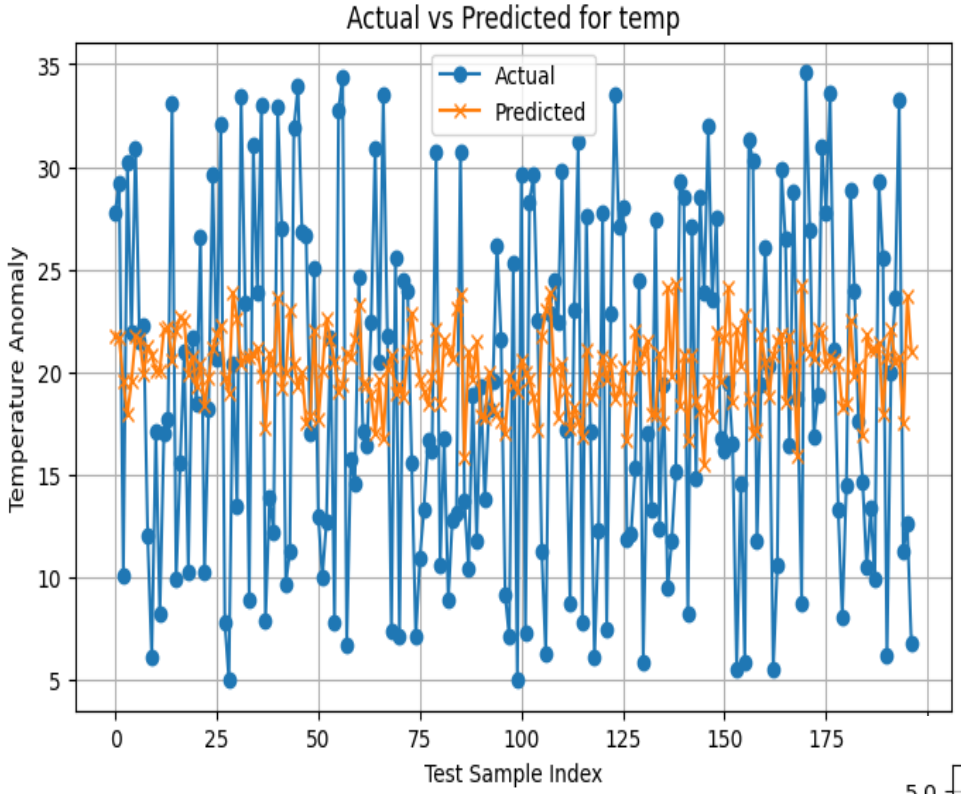
- 1. Understand global temperature rise trends over decades.
- 2. Analyze CO_2 emission data and its relationship with temperature.
- 3. Explore regional variations and climate anomalies.
- 4. Identify key factors driving global warming.
- 5. Provide actionable insights for climate policy and sustainability.

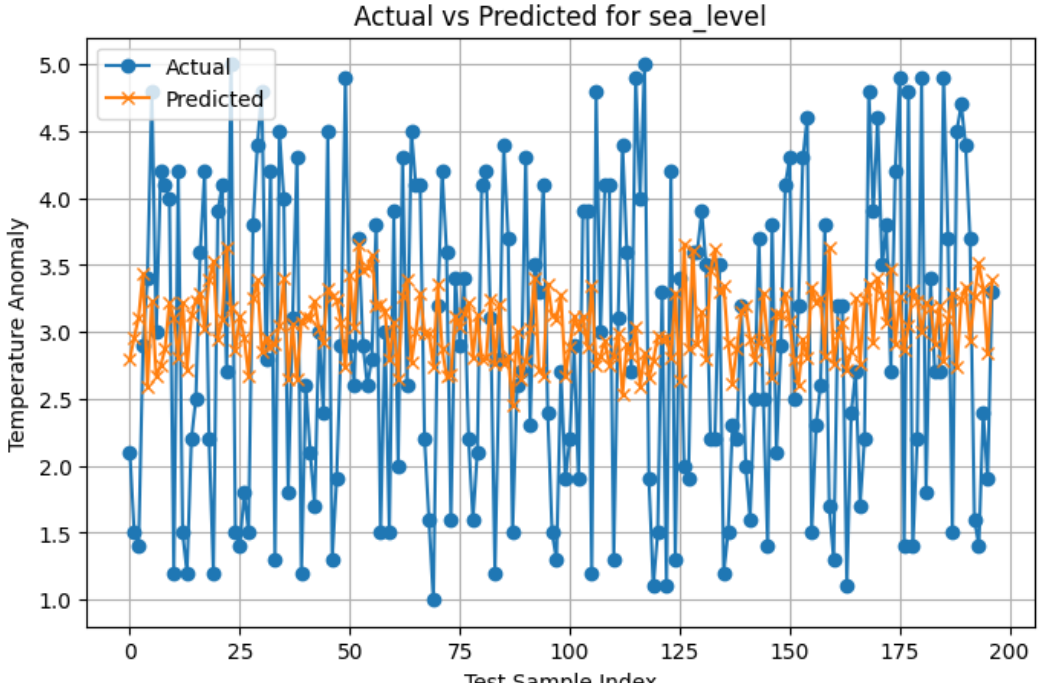
DATA OVERVIEW

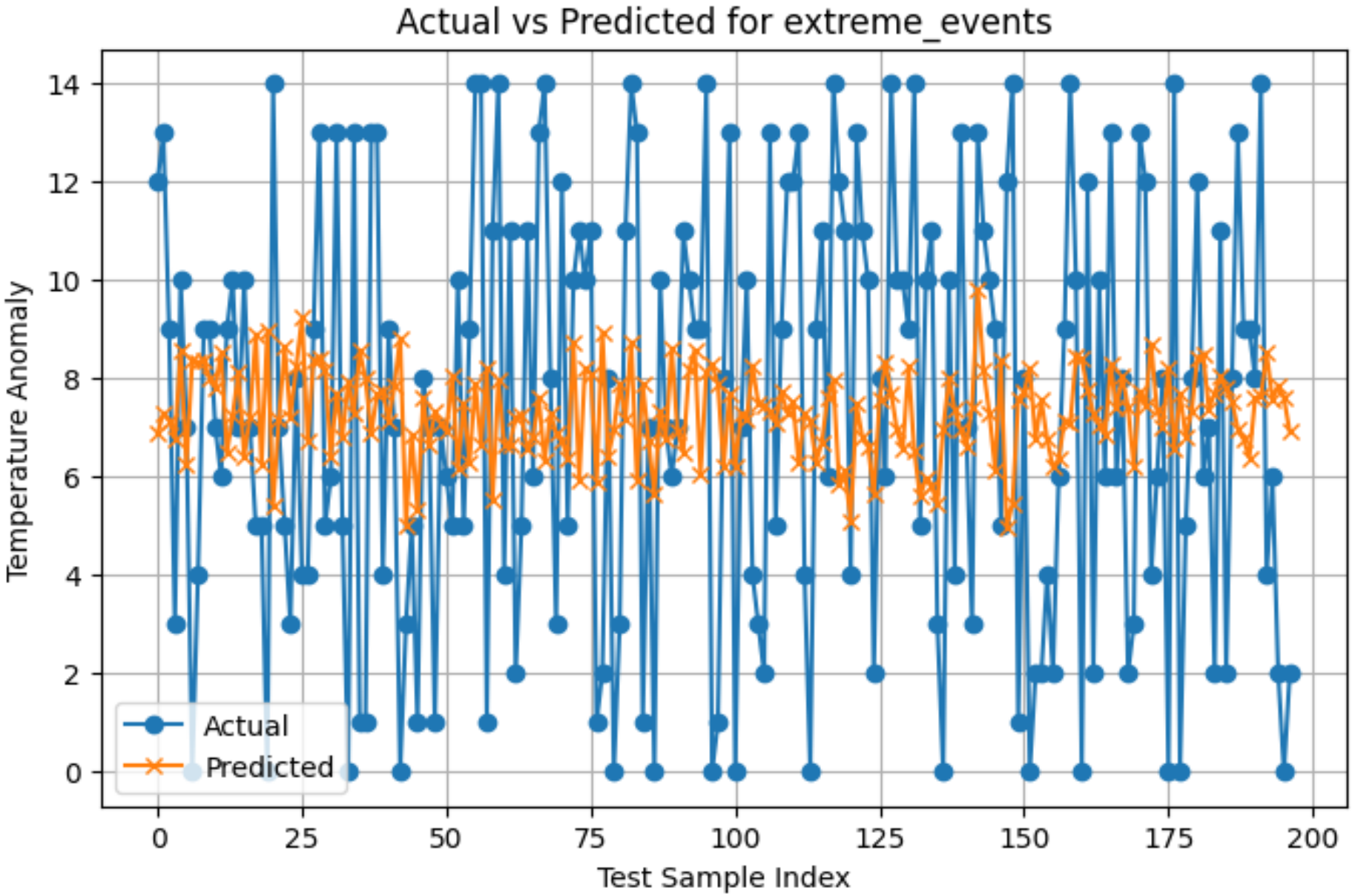
- • Source: Global Climate Datasets (NASA, NOAA, World Bank)
- • Variables: Global surface temperature, CO_2 concentration, sea level rise, ice cover.
- • Period: 1880 - 2023
- • Tools Used: Python, Pandas, Matplotlib, Seaborn, NumPy.
- • Goal: To visualize patterns and measure correlation between greenhouse gas emissions and temperature anomalies.

KEY INSIGHTS

- • Average global temperature has increased by approximately 1.2°C since pre-industrial times.
- • CO_2 concentration crossed 420 ppm in 2023 – the highest in human history.
- • Industrial and transportation sectors are primary contributors to greenhouse gas emissions.
- • Arctic ice cover has reduced by 40% over the last 40 years.
- • Developing nations are more vulnerable to the impacts of climate change.

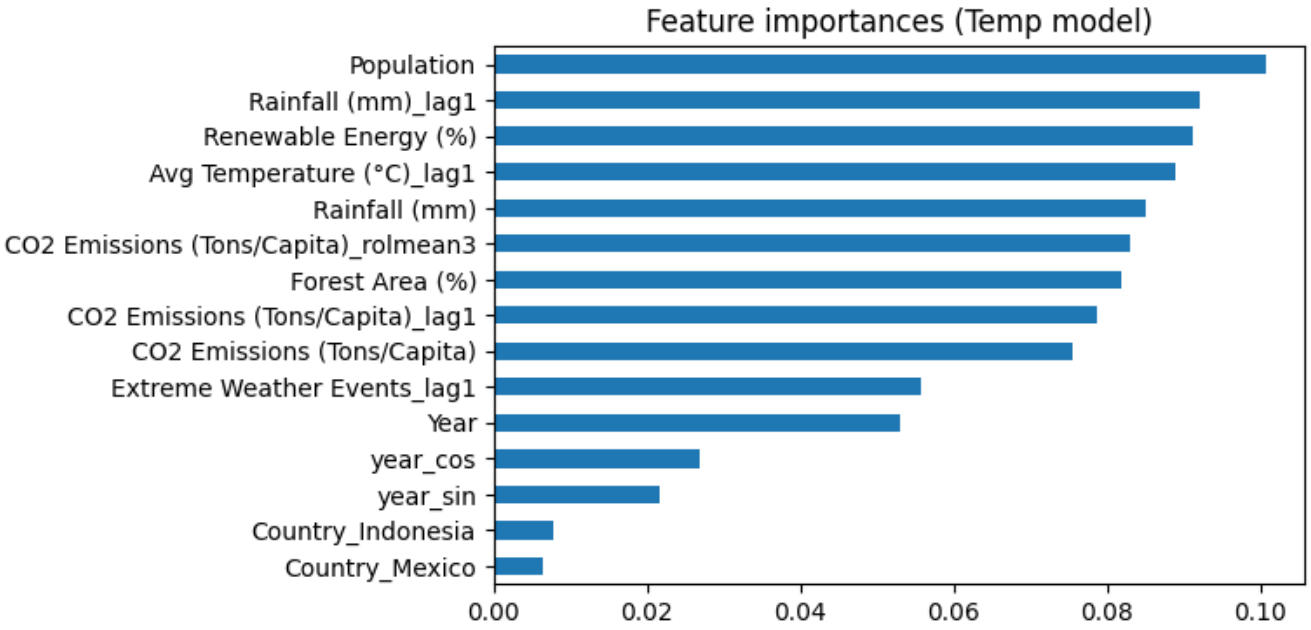

Actual vs Predicted for temp
Actual
Predicted
Temperature Anomaly
Test Sample Index
35
30
25
20
15
10
5
0
25
50
75
100
125
150
175

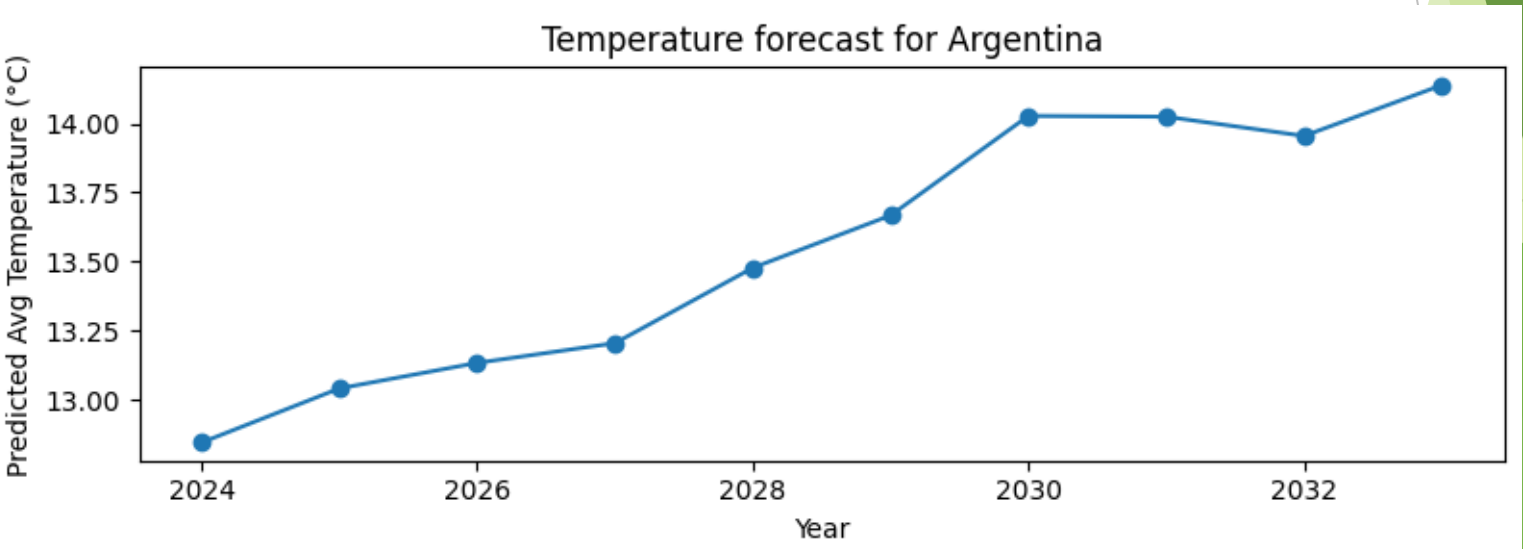

Actual vs Predicted for sea_level
Actual
Predicted
Temperature Anomaly
Test Sample Index
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0
25
50
75
100
125
150
175
200


Actual vs Predicted for extreme_events
Temperature Anomaly
Test Sample Index
Actual
Predicted
0
2
4
6
8
10
12
14
0
25
50
75
100
125
150
175
200

GRAPHICAL INSIGHTS

- • Rising CO_2 levels show a direct correlation with global temperature increase.
- • Visualization of CO_2 vs Temperature demonstrates a clear upward trend.
- • Sea levels and temperature anomalies both show consistent upward trajectories over the last century.


Feature importances (Temp model)
Population
Rainfall (mm)_lag1
Renewable Energy (%)
Avg Temperature (°C)_lag1
Rainfall (mm)
CO2 Emissions (Tons/Capita)_rolmean3
Forest Area (%)
CO2 Emissions (Tons/Capita)_lag1
CO2 Emissions (Tons/Capita)
Extreme Weather Events_lag1
Year
year_cos
year_sin
Country_Indonesia
Country_Mexico
0.00
0.02
0.04
0.06
0.08
0.10


Temperature forecast for Argentina
Predicted Avg Temperature (°C)
14.00
13.75
13.50
13.25
13.00
2024
2026
2028
2030
2032
Year

POLICY RECOMMENDATIONS

- 1. Reduce dependence on fossil fuels by accelerating renewable energy adoption.
- 2. Implement stricter emission regulations and promote green technologies.
- 3. Strengthen international climate agreements and accountability frameworks.
- 4. Encourage corporate sustainability and carbon offset programs.
- 5. Promote reforestation and carbon capture technologies.

CONCLUSION

- The data clearly indicates that human activity has accelerated climate change, resulting in increased global temperatures, sea-level rise, and loss of biodiversity. Immediate, coordinated global action is essential to mitigate further impacts and transition toward a sustainable future.

REFERENCES

- Code and data set link- https://github.com/preeti2207ranjan/Unified-Mentor-Internship-Projects
- Dataset- https://www.kaggle.com/datasets/bhadramohit/climate-change
- https://learn.unifiedmentor.com/view/courses/um-data-science-internship