



GREEN GUARDIANS



Estimating Future Climate Change Impacts



MEET OUR TEAM!



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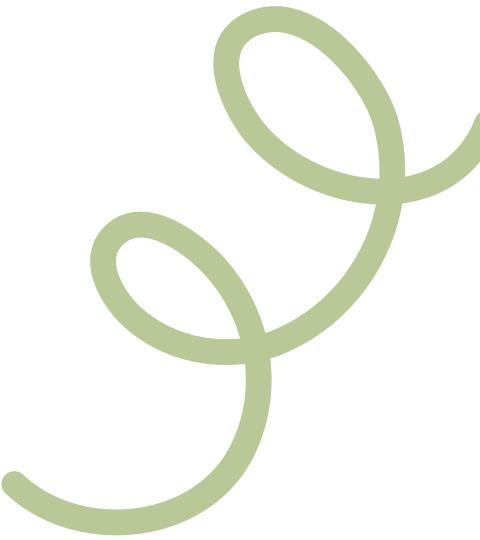
NERİMAN BERRA
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NEZAKET ZEYNEP KITAY

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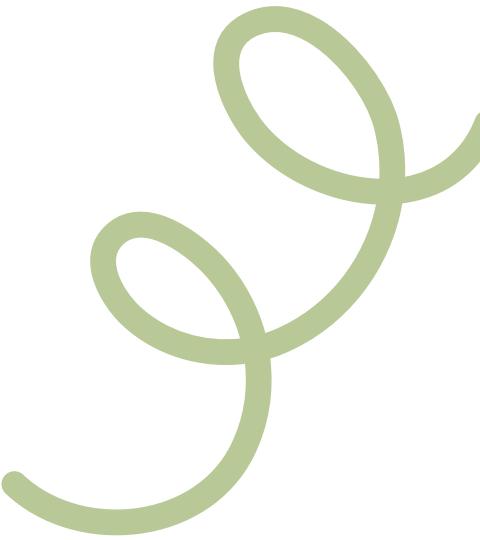


DATASET STORY

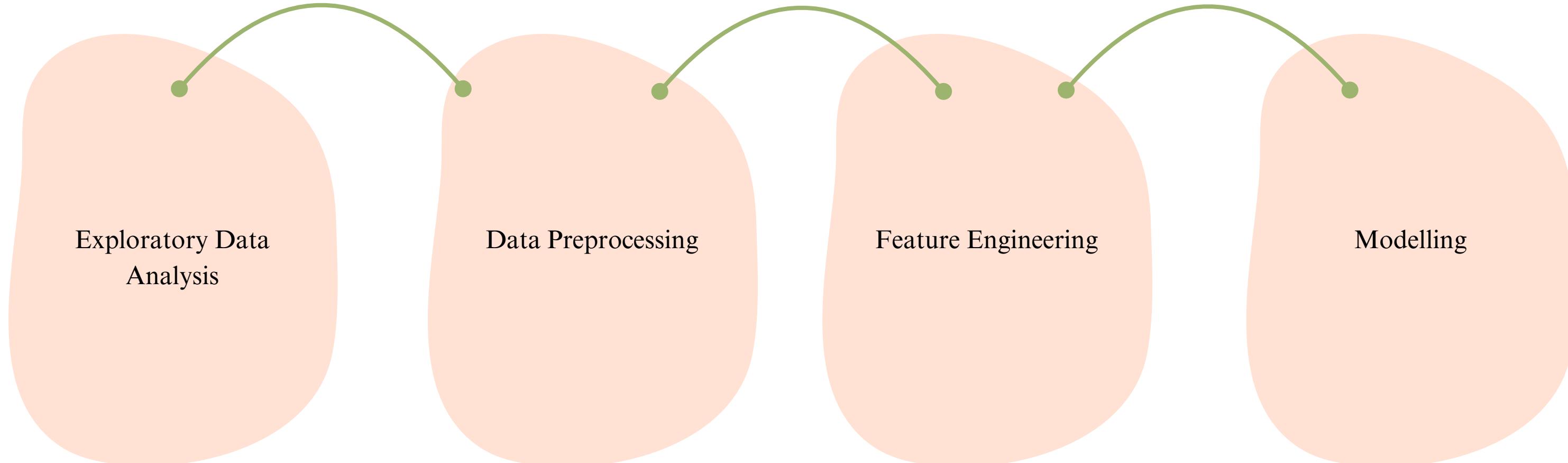
About Our Project

CMIP6 is a project that includes the results of global climate models developed by climate scientists around the world. This project simulates historical climate data and future climate scenarios. The CMIP6 dataset covers greenhouse gas emission scenarios, aerosols, and natural climate changes. This dataset provides detailed information on global temperatures, sea level changes, precipitation patterns, and other climate variables.





ROADMAP



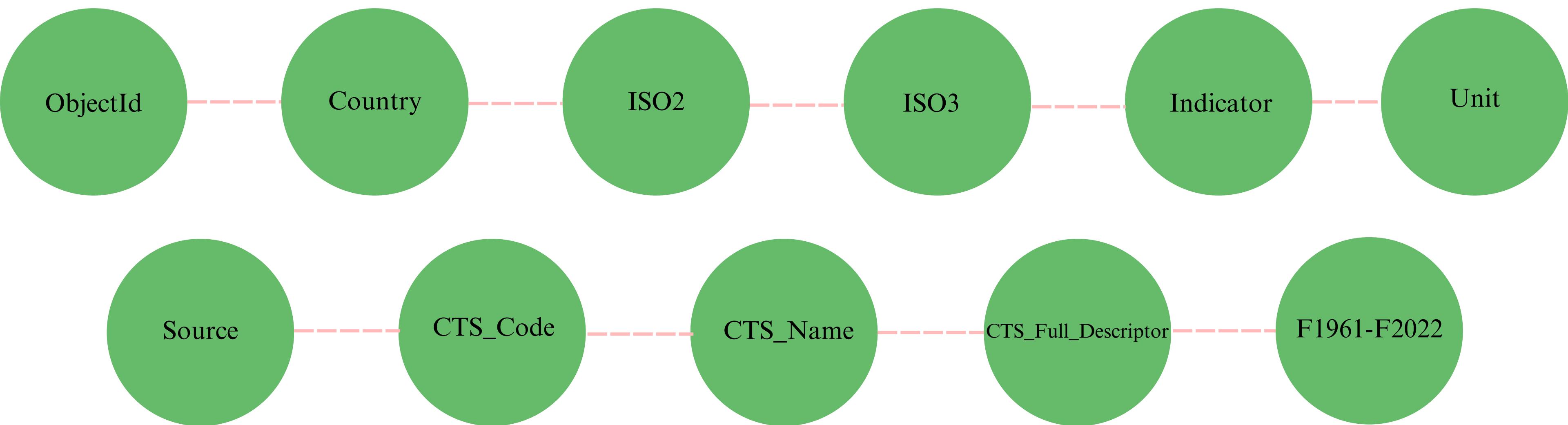


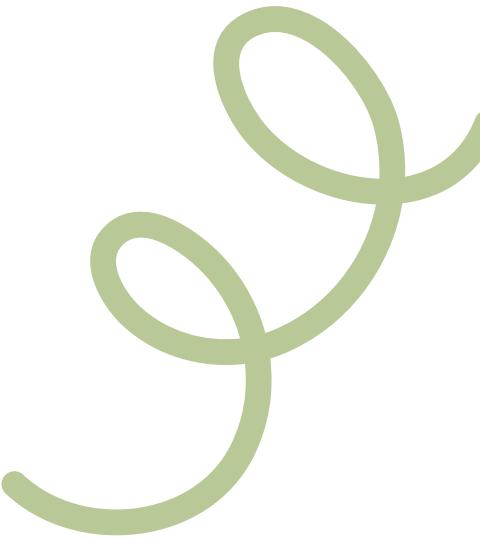
Dataset Overview

CMIP6 - ANNUAL SURFACE TEMPERATURE CHANGE DATASET

Number of Rows: 225

Number of Columns: 72





PROBLEM DEFINITION

The aim of the project is to develop an artificial intelligence model to analyze the effects of global warming and climate change using the annual surface temperature change dataset, which is part of the CMIP6 dataset. In this direction, the following questions will be answered:

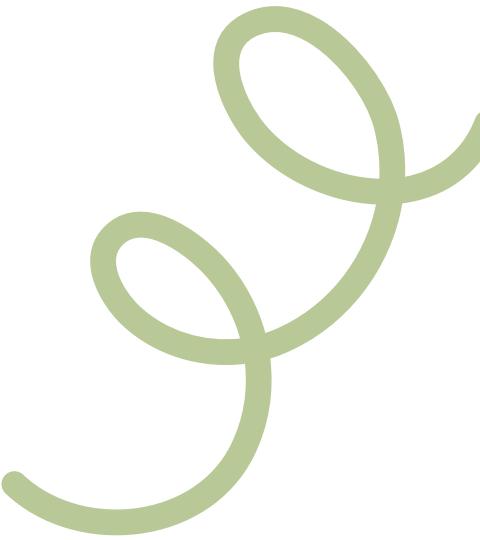


Predicting Future Trends with Historical Climate Data:

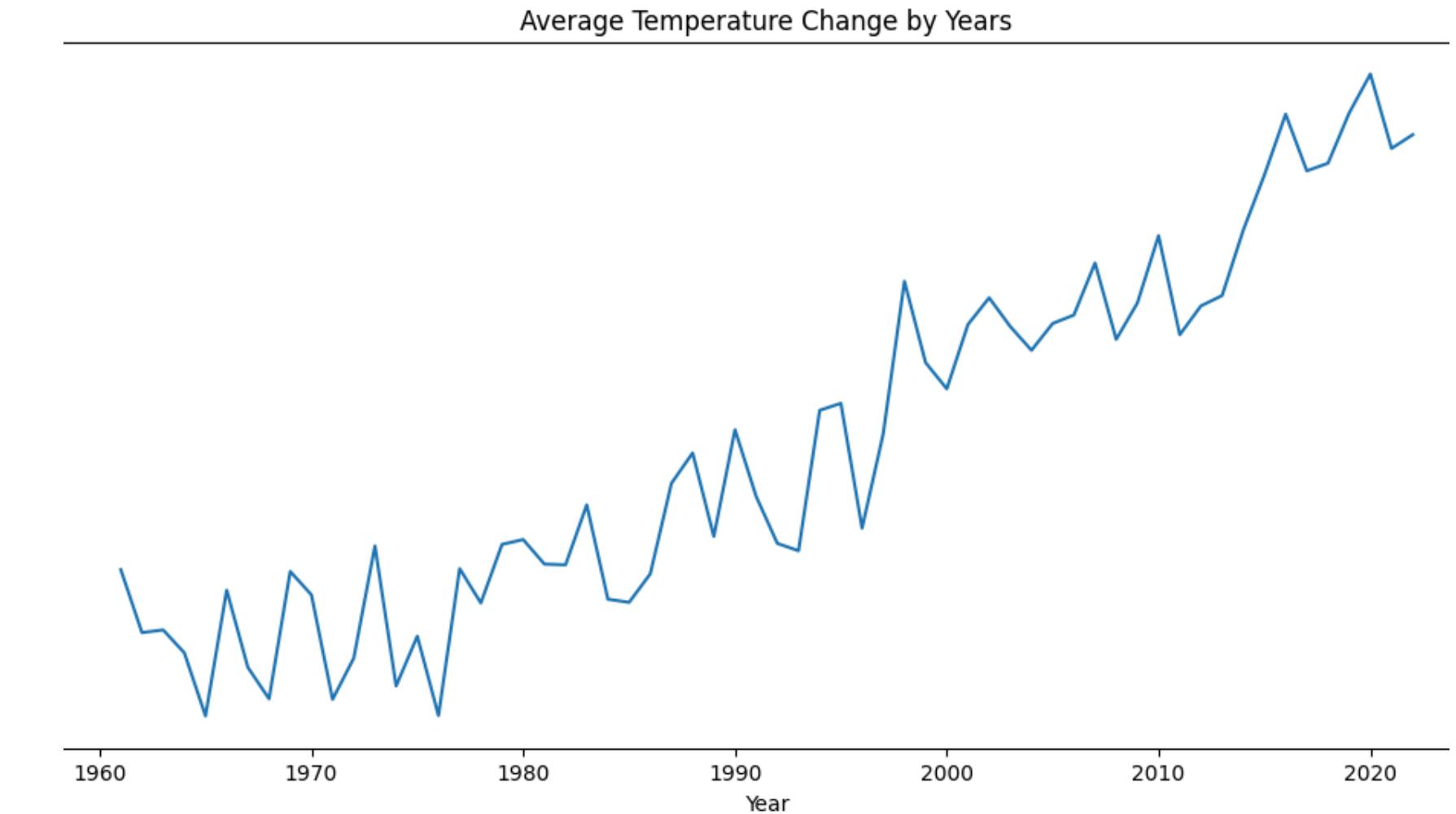
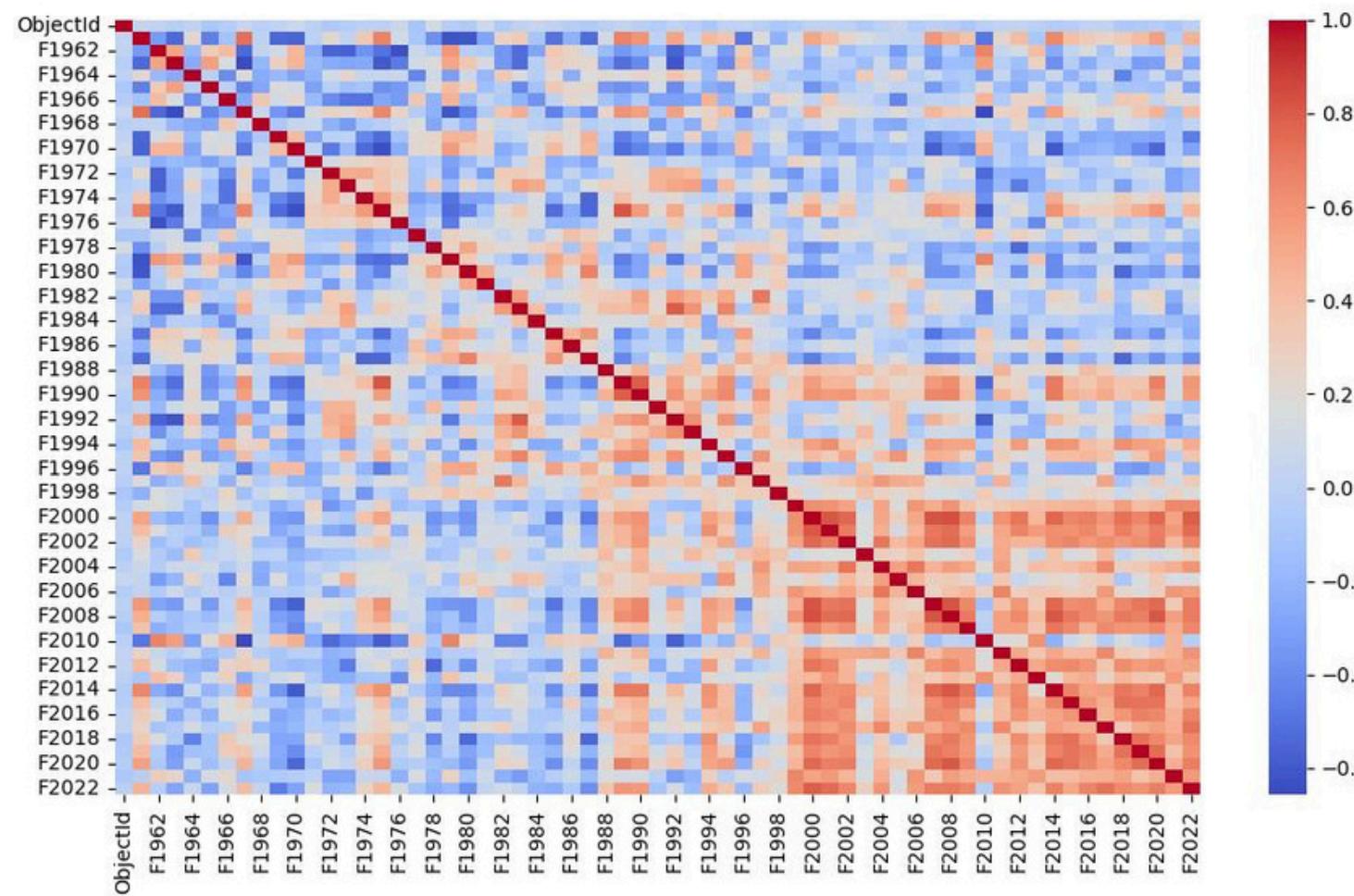
To predict future climate trends by analyzing historical and future climate data in the CMIP6 dataset.

Impact of Natural and Human-induced Factors on Climate:

Compare the effects of these factors on climate to assess how they may contribute to future climate change.



EXPLORATORY DATA ANALYSIS

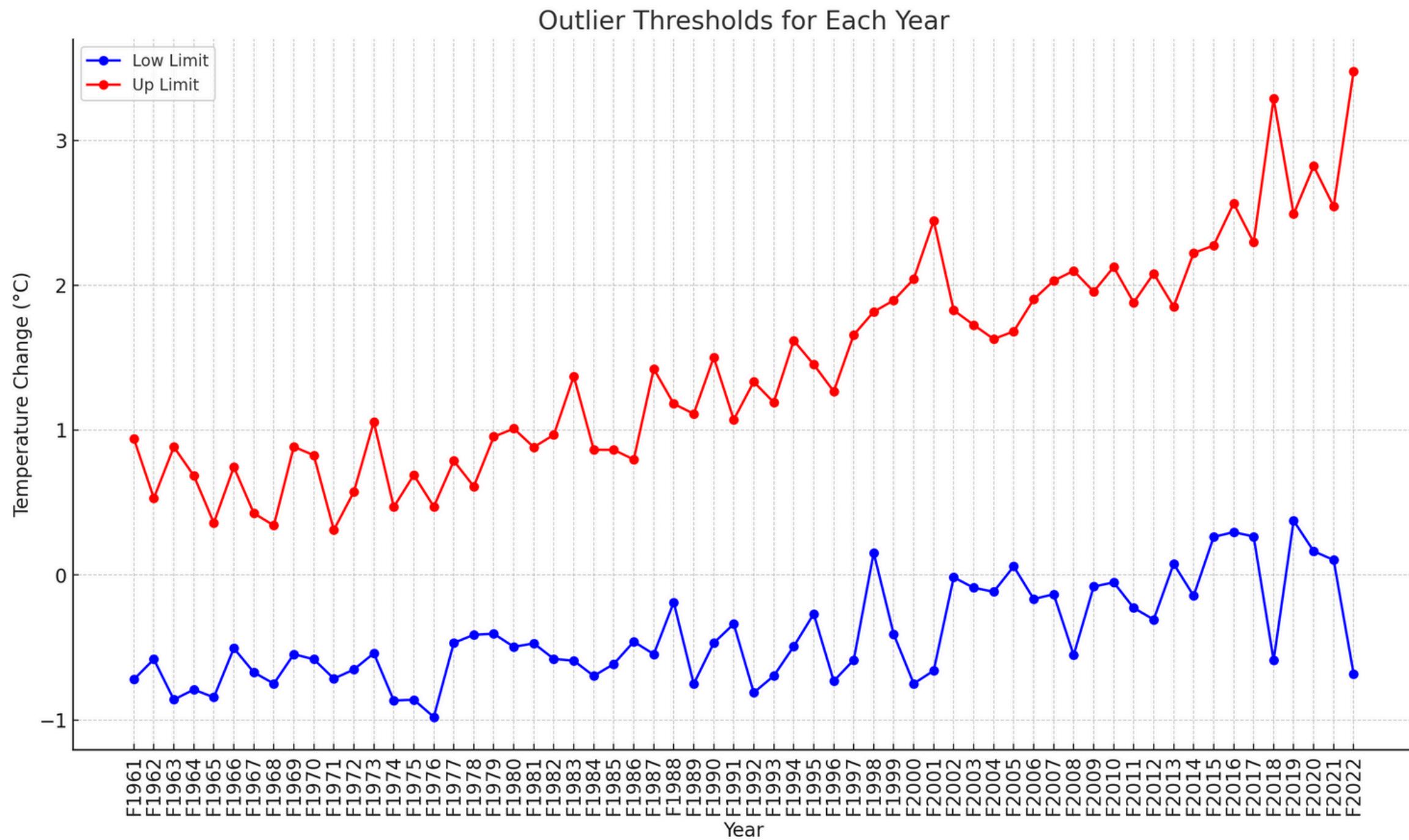


- Our dataset includes **surface temperature changes** over the years for various countries.

- Our dataset includes **average surface temperature changes** over the years.



FEATURE ENGINEERING

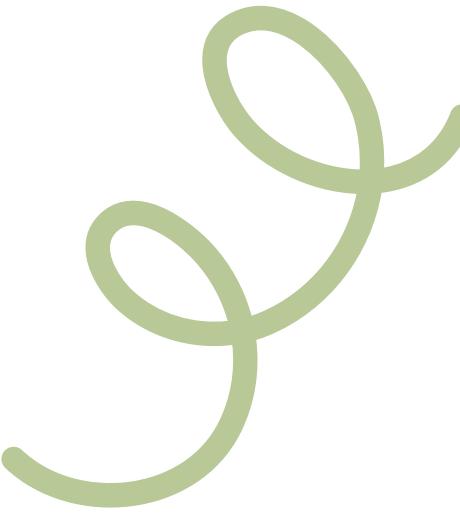


- Outliers were handled appropriately as they could negatively impact model performance.
- Missing values were filled appropriately in the data set.

Lower and Upper Limits of Temperature Changes

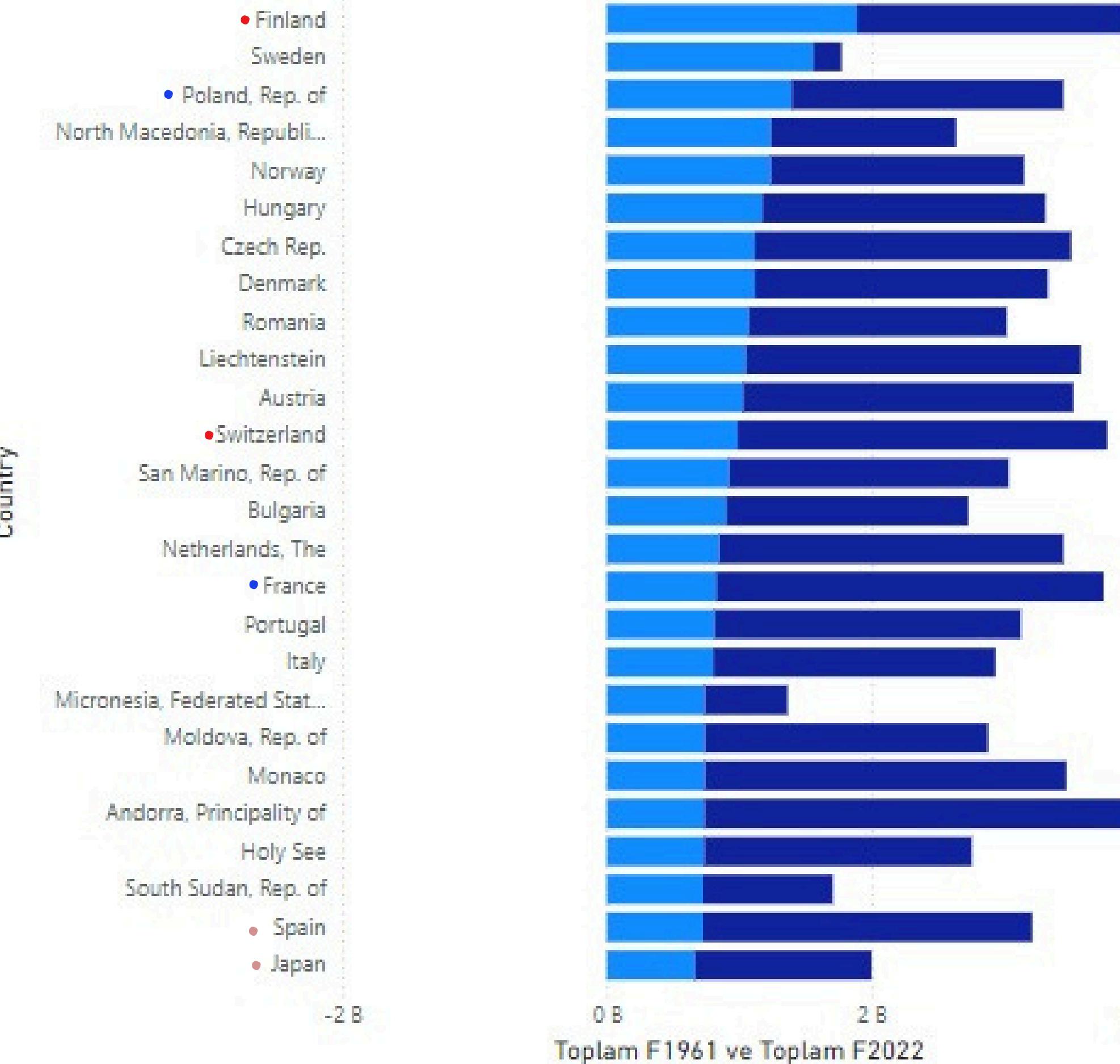


Power BI

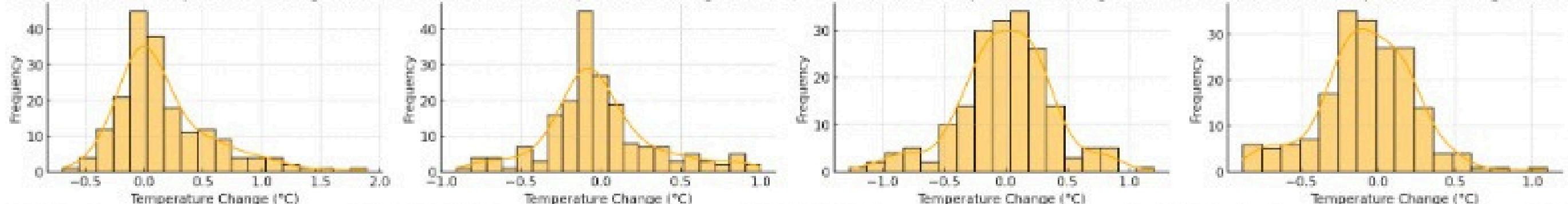


Country ölçütüne göre Toplam F1961 ve Toplam F2022

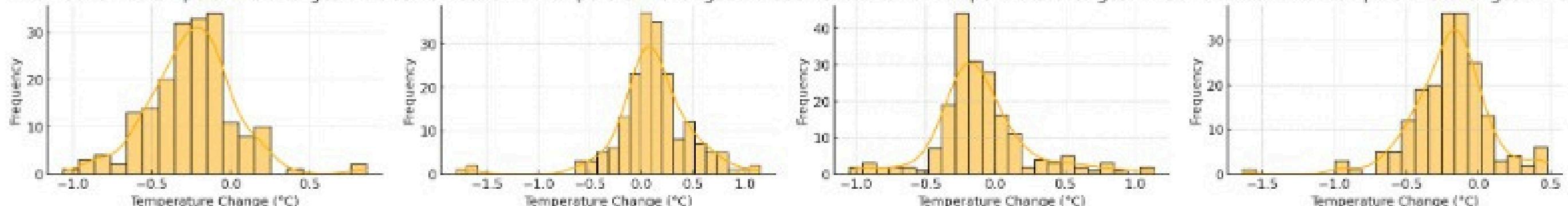
● Toplam F1961 ● Toplam F2022



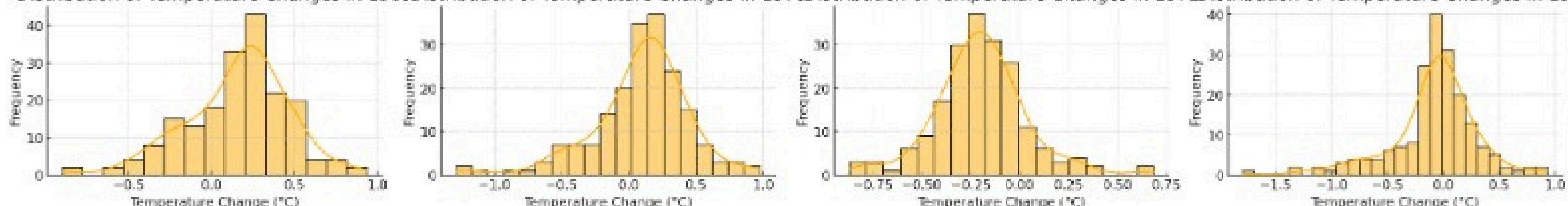
Distribution of Temperature Changes in 1961 Distribution of Temperature Changes in 1962 Distribution of Temperature Changes in 1963 Distribution of Temperature Changes in 1964



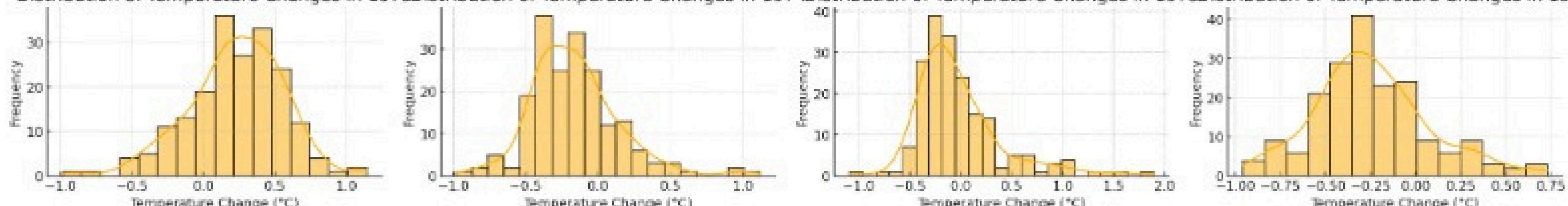
Distribution of Temperature Changes in 1965 Distribution of Temperature Changes in 1966 Distribution of Temperature Changes in 1967 Distribution of Temperature Changes in 1968



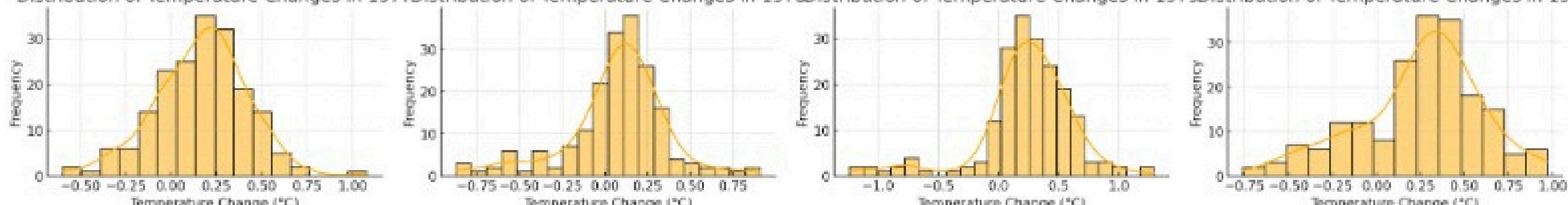
Distribution of Temperature Changes in 1969 Distribution of Temperature Changes in 1970 Distribution of Temperature Changes in 1971 Distribution of Temperature Changes in 1972



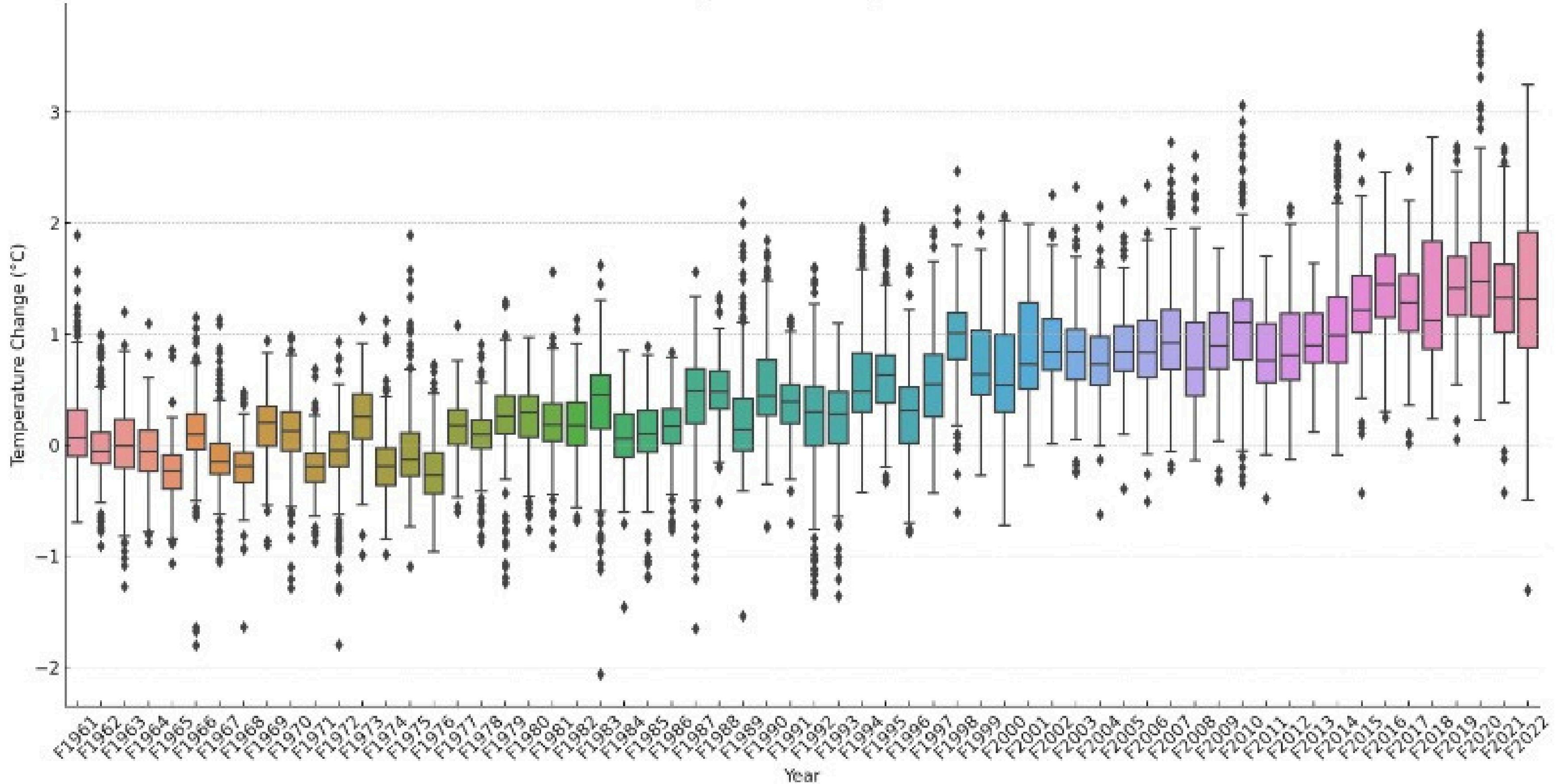
Distribution of Temperature Changes in 1973 Distribution of Temperature Changes in 1974 Distribution of Temperature Changes in 1975 Distribution of Temperature Changes in 1976



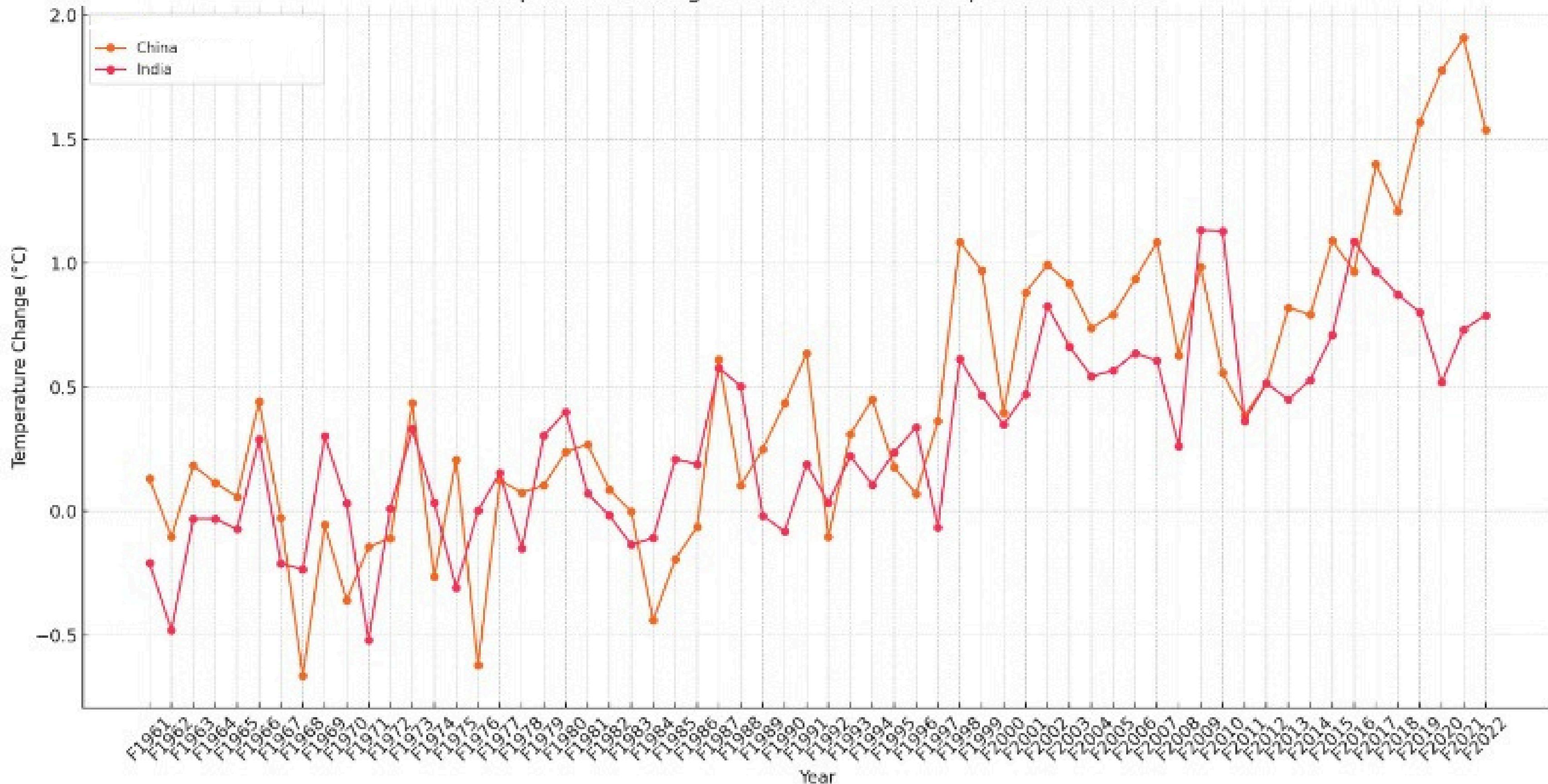
Distribution of Temperature Changes in 1977 Distribution of Temperature Changes in 1978 Distribution of Temperature Changes in 1979 Distribution of Temperature Changes in 1980



Box Plot of Temperature Changes Over the Years

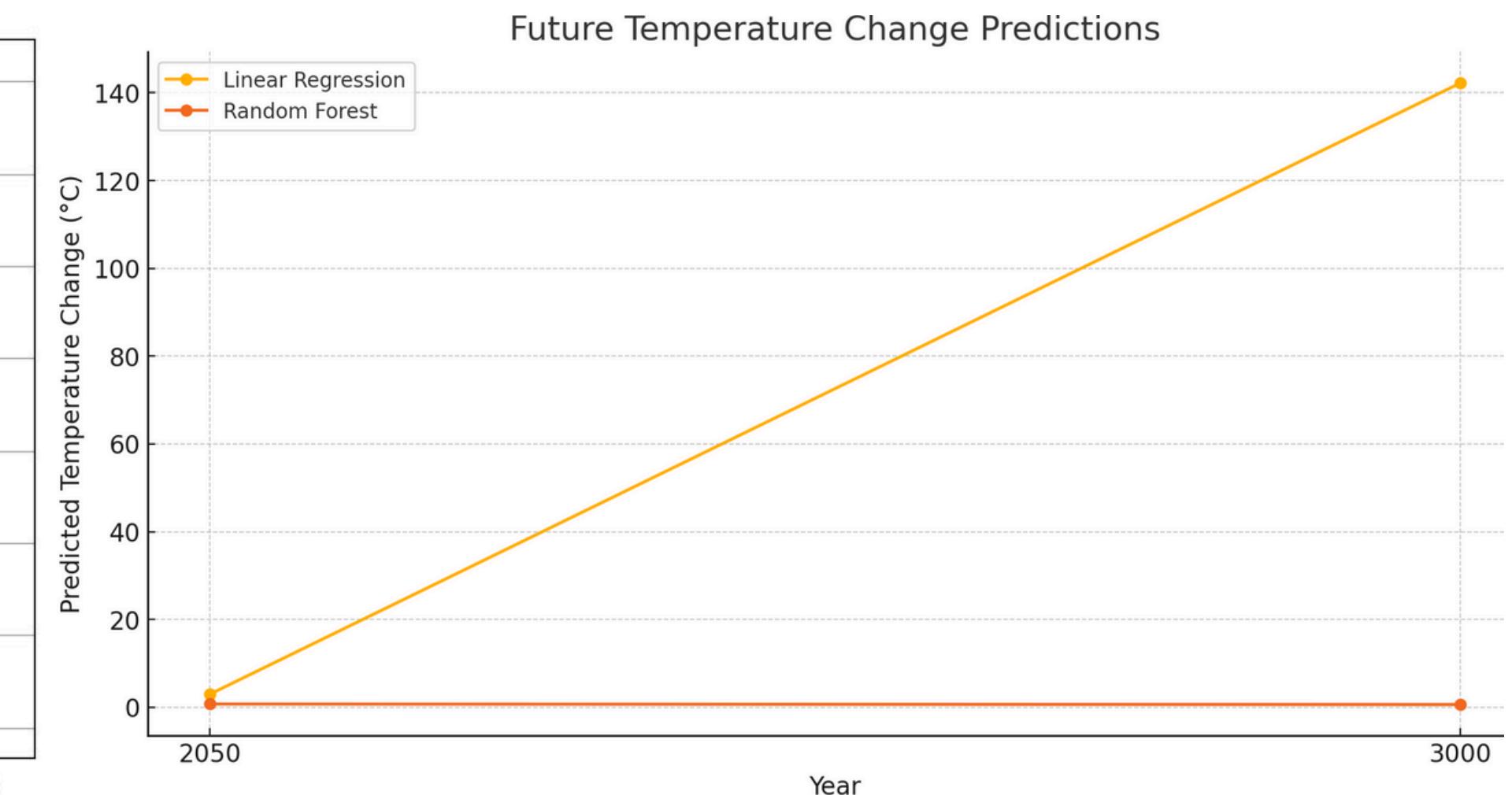
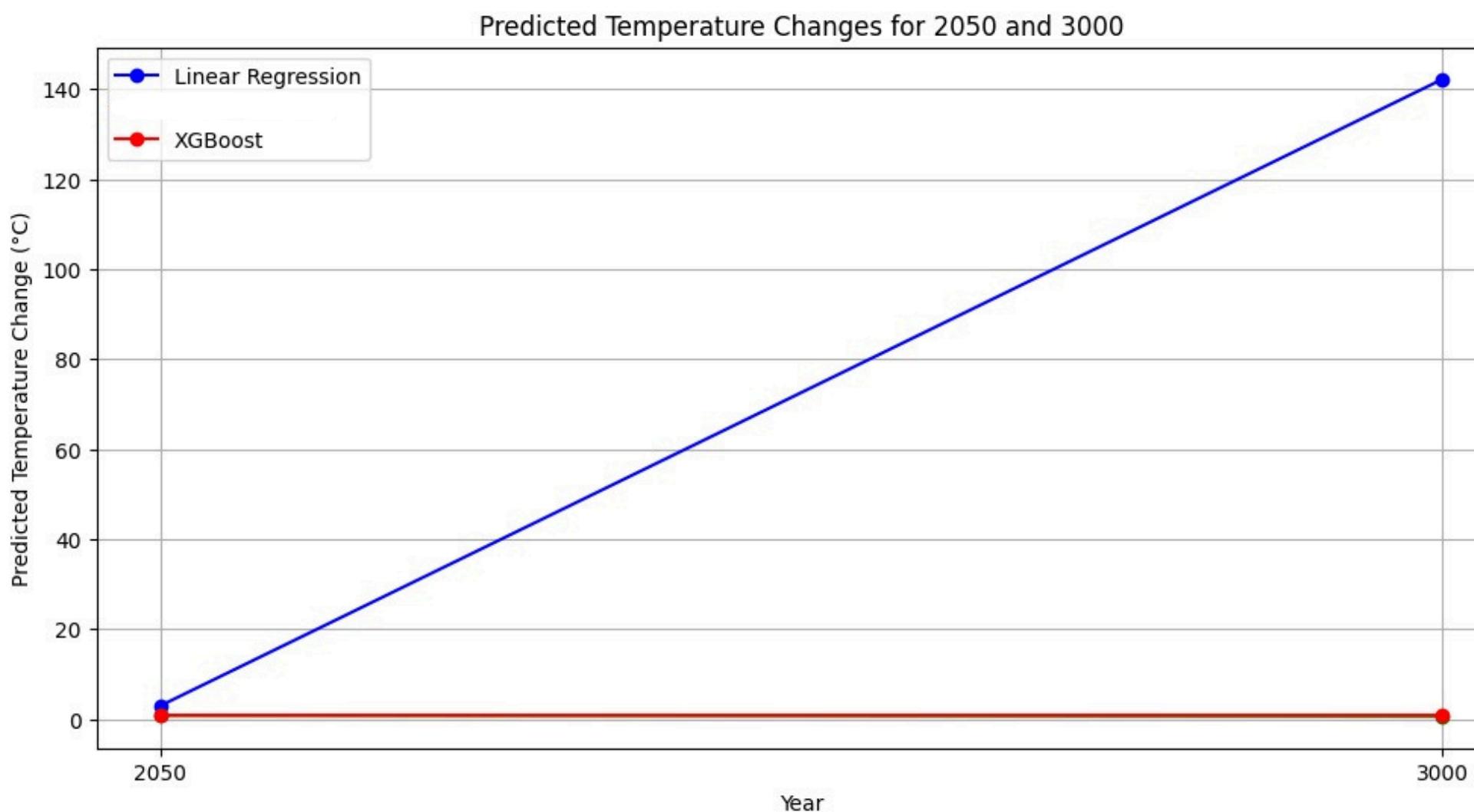


Temperature Changes Over the Years for Specific Countries

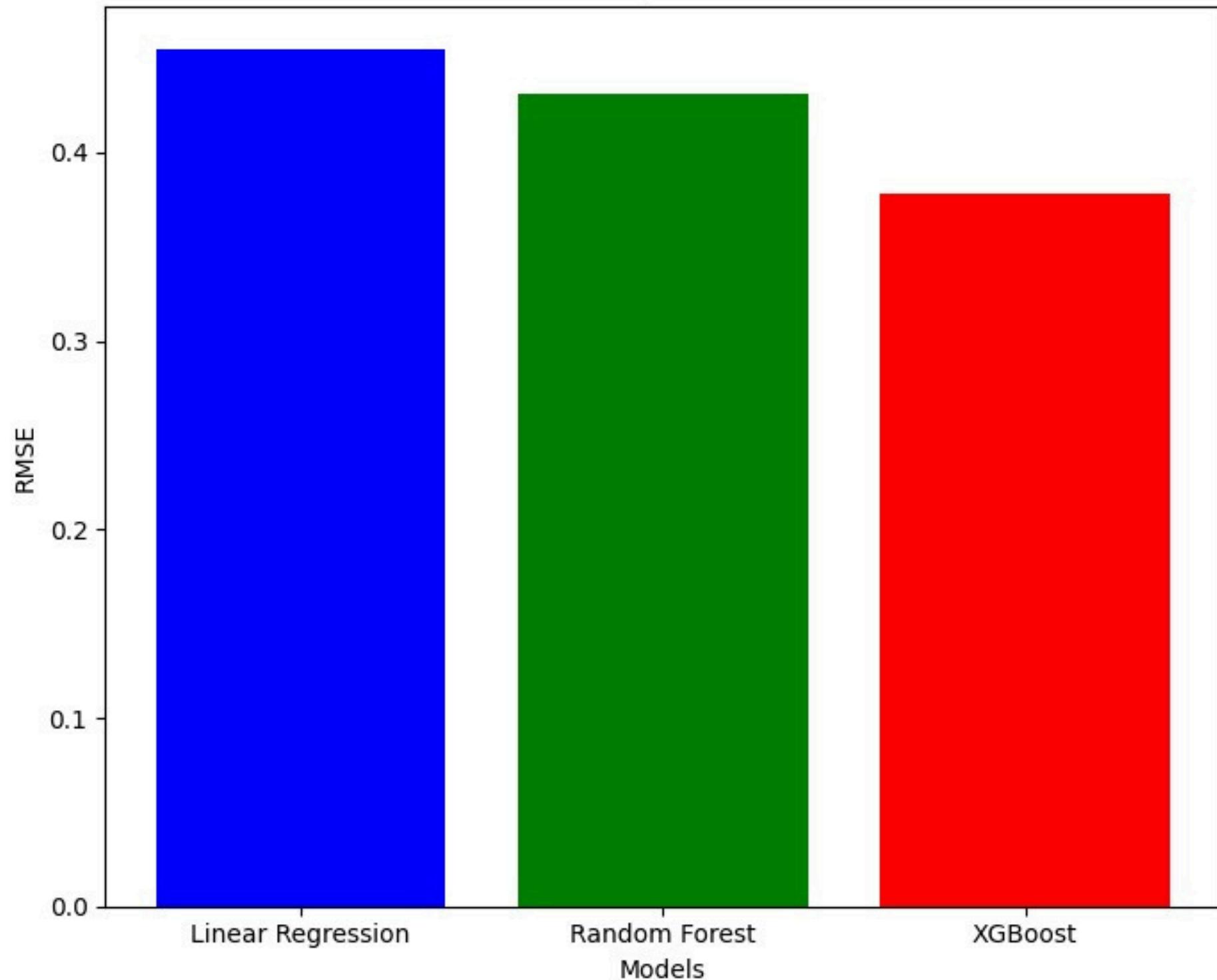




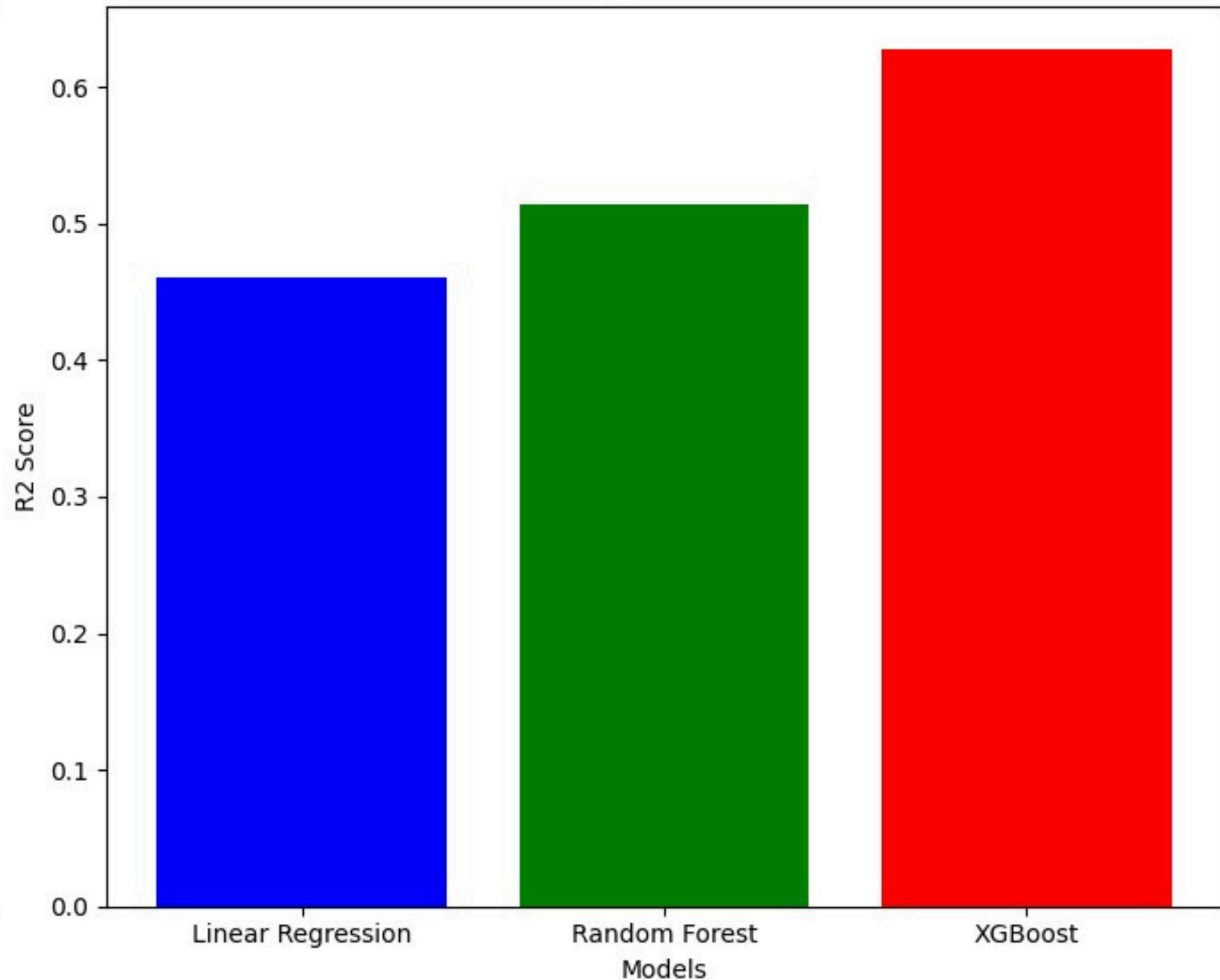
MODELLING

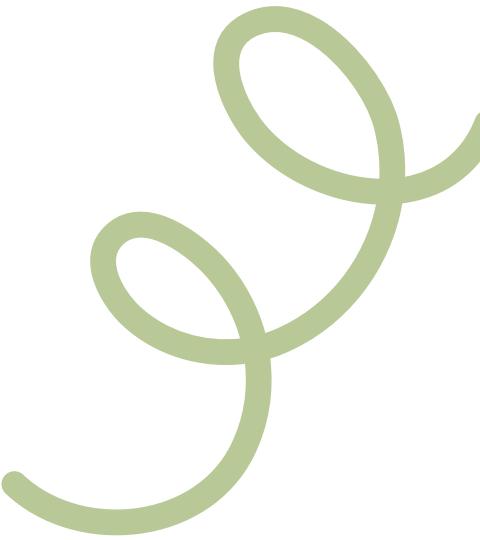


Model Comparison - RMSE



Model Comparison - R2 Score





RESULTS

Linear Regression RMSE: 0.45440643369549716

Linear Regression R2 Score: 0.4603108561567787

Random Forest RMSE: 0.431872648976222

Random Forest R2 Score: 0.512509519136908

XGBoost RMSE: 0.3777339363333687

XGBoost R2 Score: 0.6270704925846482

Linear Regression model estimate for 2050: 2.9792 °C

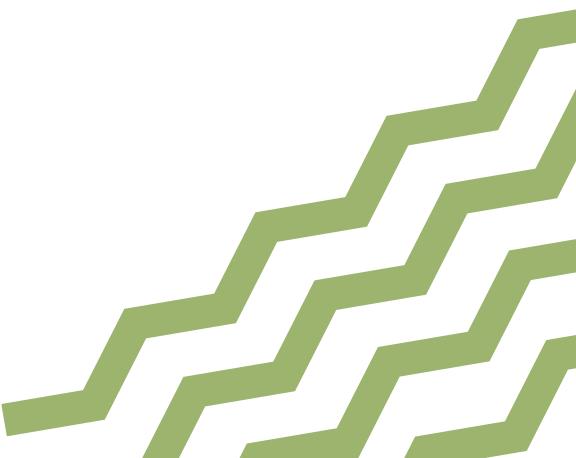
Random Forest model estimate for 2050: 0.7157 °C

XGBoost model forecast for 2050: 1.0249 °C

Linear Regression model estimate for the year 3000: 142.2470 °C

Random Forest model estimate for the year 3000: 0.5450 °C

XGBoost model prediction for the year 3000: 1.0249 °C

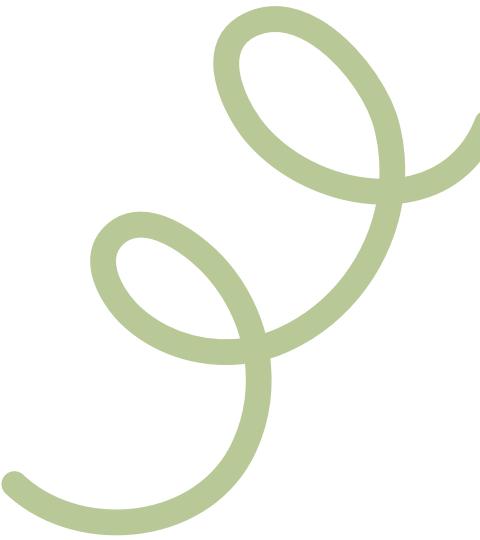




BUSINESS SUGGESTIONS



- By reviewing current climate policies, stronger measures can be taken to reduce the effects of global warming.
 - Investments in renewable energy sources can be increased.
 - Cleaner technologies can be used in industrial processes and transportation to reduce greenhouse gas emissions.
 - By supporting long-term climate forecasts and research, we can better prepare for future scenarios.
- 



Climate Change Impact Prediction



1. Dataset Preview

	ObjectId	Country	ISO2	ISO3	Indicator
0	1	Afghanistan, Islamic Rep. of	AF	AFG	Temperature change with respect to a baseline climate
1	2	Albania	AL	ALB	Temperature change with respect to a baseline climate
2	3	Algeria	DZ	DZA	Temperature change with respect to a baseline climate
3	4	American Samoa	AS	ASM	Temperature change with respect to a baseline climate
4	5	Andorra, Principality of	AD	AND	Temperature change with respect to a baseline climate

2. Basic Statistics

	ObjectId	F1961	F1962	F1963	F1964	F1965	F1966	F1967	F1968	F1969	F1970
count	225	188	189	188	188	188	192	191	191	190	189
mean	113	0.1631	-0.0135	-0.006	-0.0701	-0.247	0.1055	-0.1108	-0.1991	0.1579	0.0925
std	65.0961	0.4051	0.3418	0.3873	0.3093	0.2707	0.3784	0.3395	0.2701	0.3085	0.3521
min	1	-0.694	-0.908	-1.27	-0.877	-1.064	-1.801	-1.048	-1.634	-0.9	-1.288
25%	57	-0.097	-0.164	-0.2055	-0.2365	-0.3925	-0.0358	-0.2595	-0.34	-0.009	-0.053



Streamlit



THANK YOU
FOR
LISTENING!

