Global Land and Ocean Average Temperatures Analysis

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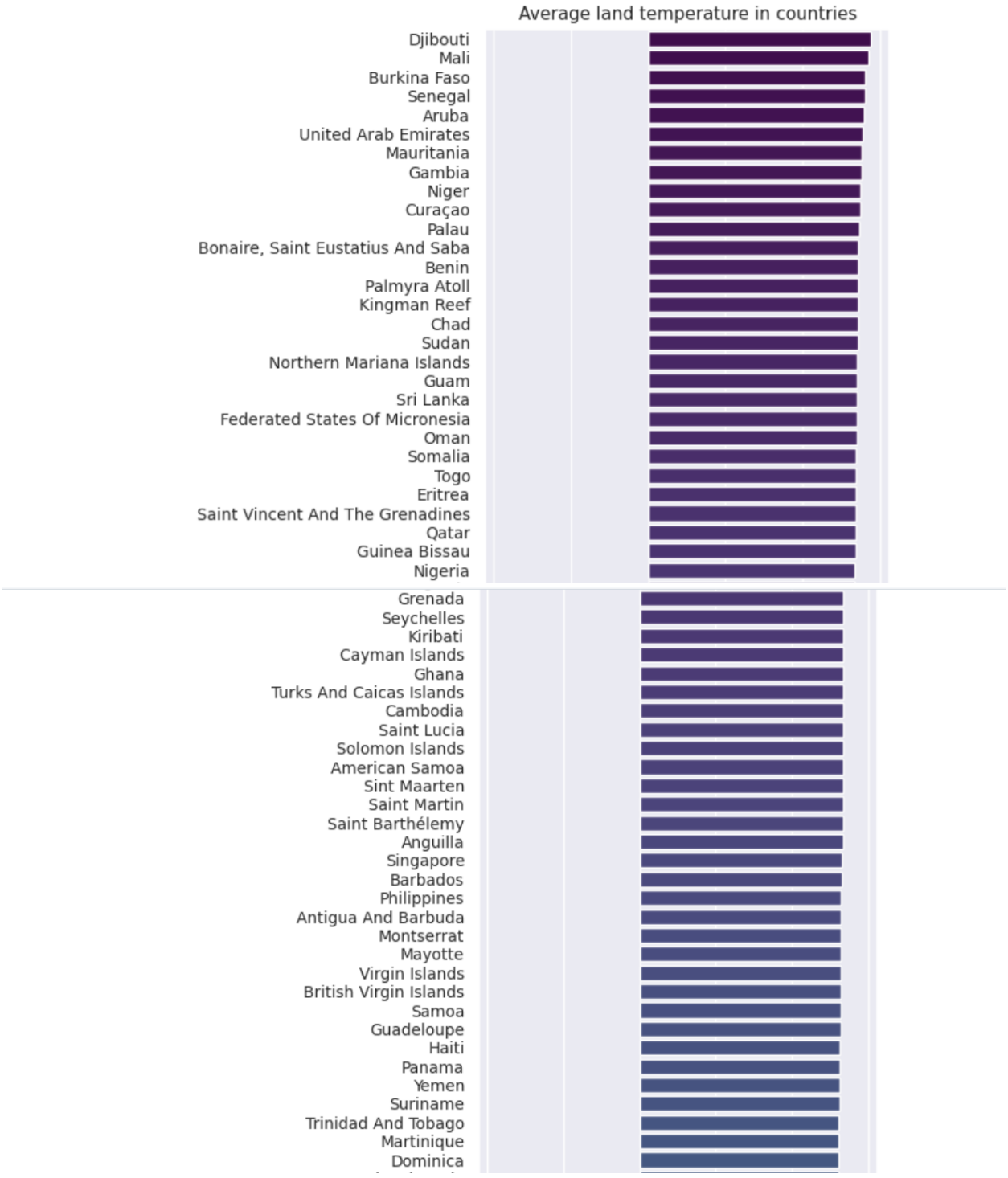
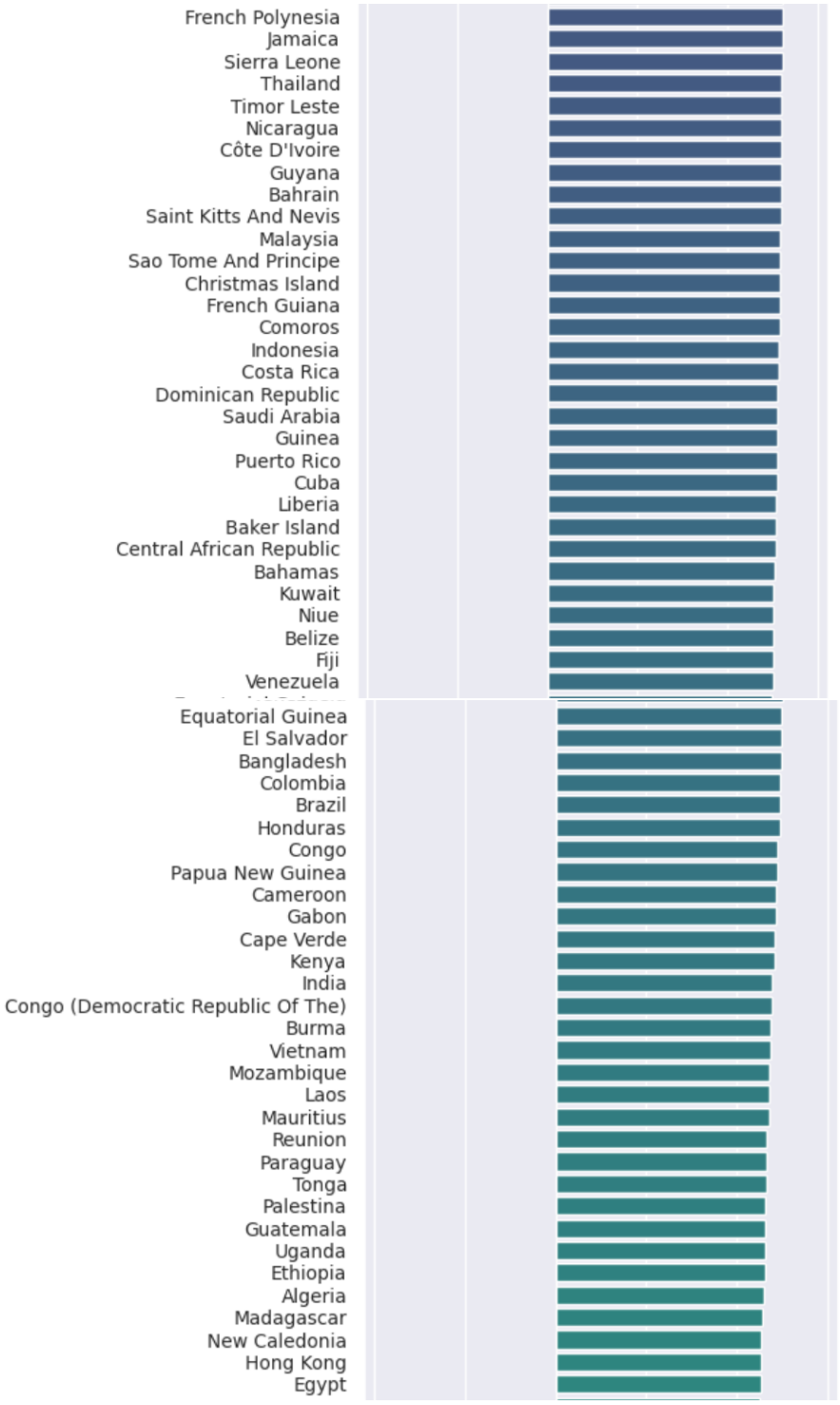
Problem Statement

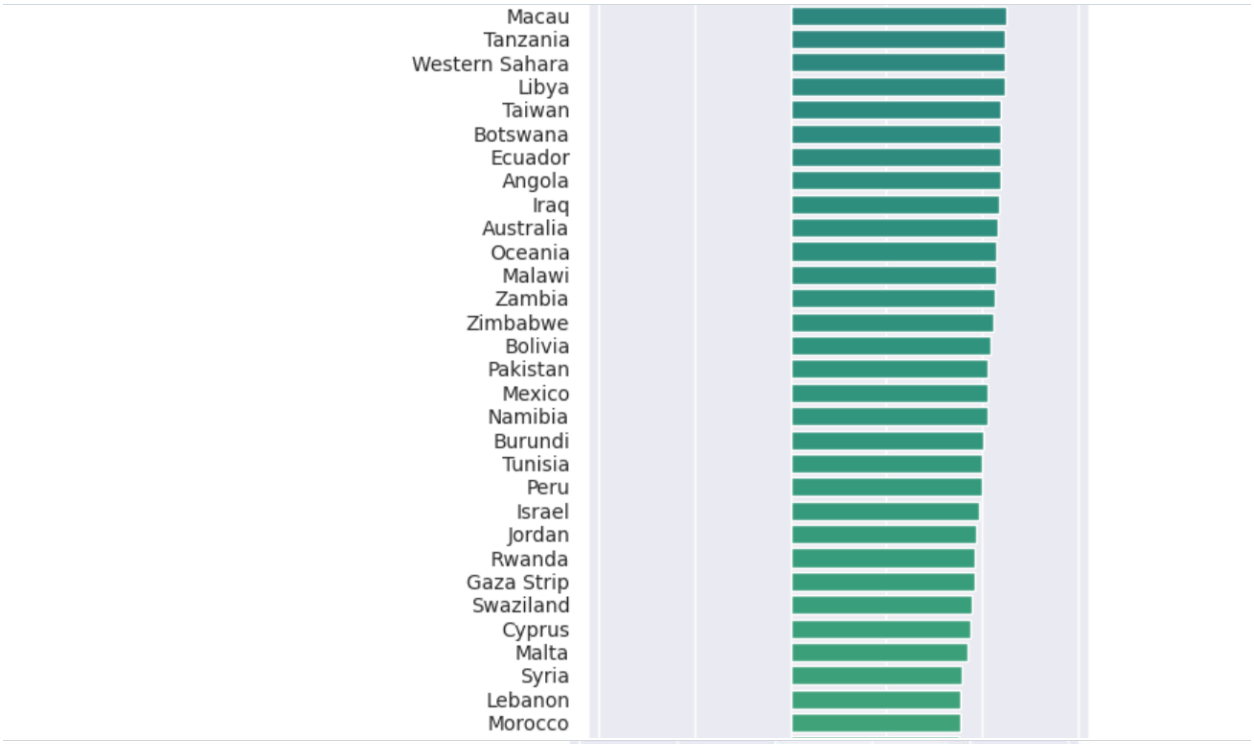
- **Objective:** To analyze the historical global land and ocean average temperatures and predict future temperature trends.
- **Data Sources:** GlobalTemperatures.csv, GlobalLandTemperaturesByCountry.csv

Data Wrangling

- **Data Cleaning:** Removed null values and handled missing data.
- **Data Transformation:** Extracted year from date for temporal analysis.
- **Data Selection:** Focused on key columns for analysis, including date, average temperature, and uncertainty metrics.


Average land temperature in countries
Djibouti
Mali
Burkina Faso
Senegal
Aruba
United Arab Emirates
Mauritania
Gambia
Niger
Curaçao
Palau
Bonaire, Saint Eustatius And Saba
Benin
Palmyra Atoll
Kingman Reef
Chad
Sudan
Northern Mariana Islands
Guam
Sri Lanka
Federated States Of Micronesia
Oman
Somalia
Togo
Eritrea
Saint Vincent And The Grenadines
Qatar
Guinea Bissau
Nigeria
Grenada
Seychelles
Kiribati
Cayman Islands
Ghana
Turks And Caicas Islands
Cambodia
Saint Lucia
Solomon Islands
American Samoa
Sint Maarten
Saint Martin
Saint Barthélemy
Anguilla
Singapore
Barbados
Philippines
Antigua And Barbuda
Montserrat
Mayotte
Virgin Islands
British Virgin Islands
Samoa
Guadeloupe
Haiti
Panama
Yemen
Suriname
Trinidad And Tobago
Martinique
Dominica


French Polynesia
Jamaica
Sierra Leone
Thailand
Timor Leste
Nicaragua
Côte D'Ivoire
Guyana
Bahrain
Saint Kitts And Nevis
Malaysia
Sao Tome And Principe
Christmas Island
French Guiana
Comoros
Indonesia
Costa Rica
Dominican Republic
Saudi Arabia
Guinea
Puerto Rico
Cuba
Liberia
Baker Island
Central African Republic
Bahamas
Kuwait
Niue
Belize
Fiji
Venezuela
Equatorial Guinea
El Salvador
Bangladesh
Colombia
Brazil
Honduras
Congo
Papua New Guinea
Cameroon
Gabon
Cape Verde
Kenya
India
Congo (Democratic Republic Of The)
Burma
Vietnam
Mozambique
Laos
Mauritius
Reunion
Paraguay
Tonga
Palestina
Guatemala
Uganda
Ethiopia
Algeria
Madagascar
New Caledonia
Hong Kong
Egypt


Macau
Tanzania
Western Sahara
Libya
Taiwan
Botswana
Ecuador
Angola
Iraq
Australia
Oceania
Malawi
Zambia
Zimbabwe
Bolivia
Pakistan
Mexico
Namibia
Burundi
Tunisia
Peru
Israel
Jordan
Rwanda
Gaza Strip
Swaziland
Cyprus
Malta
Syria
Lebanon
Morocco


Iran
South Africa
Uruguay
Nepal
Turkmenistan
Greece
Portugal
Argentina
Afghanistan
San Marino
Lesotho
Spain
Italy
Albania
Uzbekistan
Japan
South Korea
Bhutan
Turkey
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Jersey
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Bulgaria
Bosnia And Herzegovina
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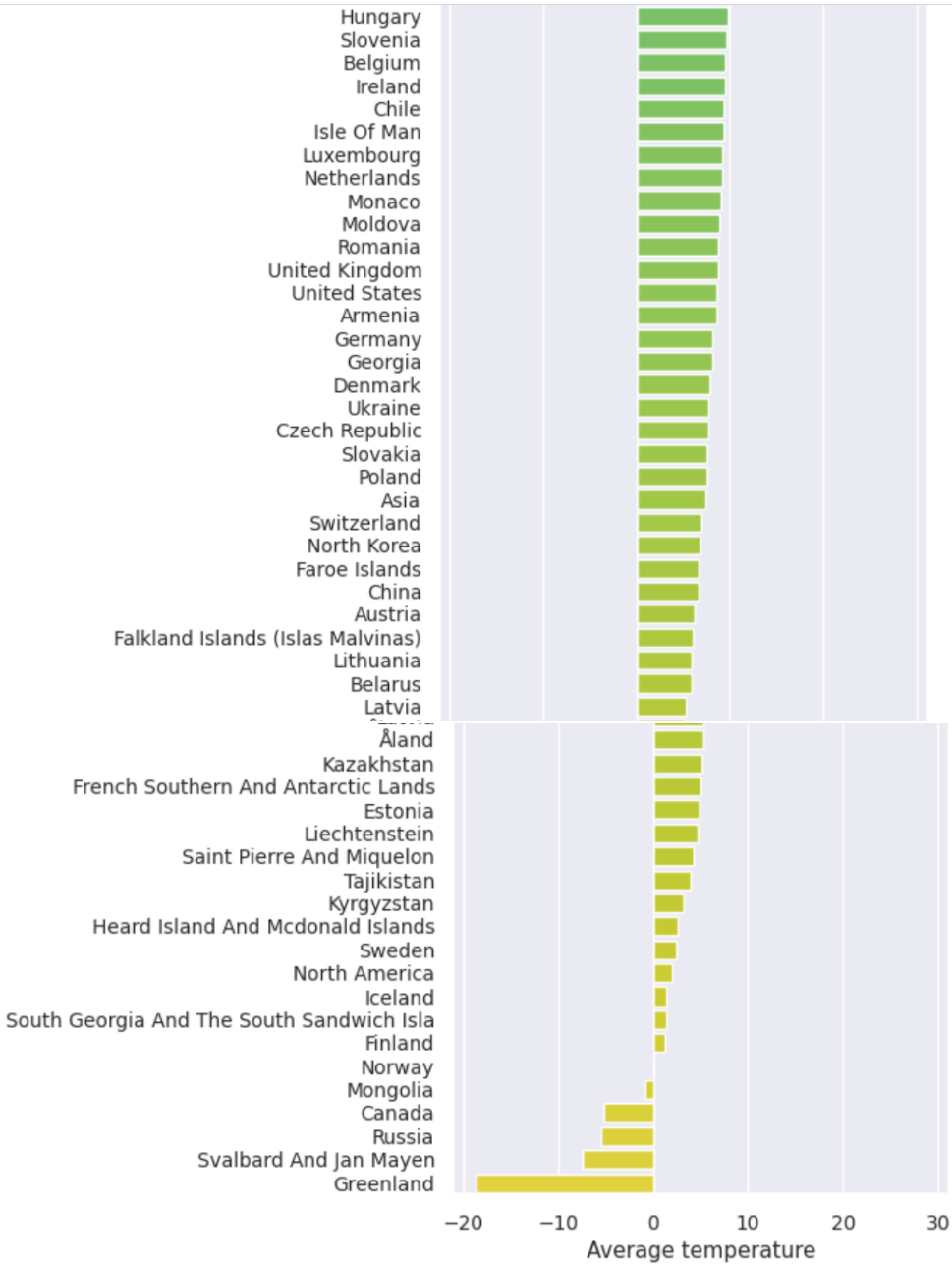
Macedonia
New Zealand
Montenegro
Serbia



Exploratory Data Analysis

1. **Average Land Temperature by Country:**
   A choropleth map visualizing average land temperatures across various countries.

2. **Global Average Temperature Over Time:**
   A line plot showing the trend of global land and ocean average temperatures over the years, including uncertainty intervals.

3. **Temperature Trends by Continent:**
   Line plots demonstrating temperature trends for selected countries over the years.

In-depth Analysis

1. **Data Preprocessing:**
    - Loaded and preprocessed data.
    - Performed linear regression on the dataset.
2. **Scatter Plot of Data Points:**
    - Visual representation of the data points.
3. **Model Training and Evaluation:**
    - Trained a linear regression model.
    - Evaluated model performance using Mean Squared Error.
4. **Regression Line Plot:**
    - Plotting regression line on the test data.
5. **Future Temperature Predictions:**
    - Predicted average temperature for future years using the trained model.

Conclusion

- **Findings:**
    - The average global temperature shows a clear upward trend, indicative of global warming.
    - The linear regression model predicts a continuous increase in global temperatures through 2125.
- **Future Implications:**
    - The predicted rise in temperatures highlights the urgency for climate change mitigation efforts.
    - Policymakers and environmental organizations need to consider these trends in their strategic planning.
- **Model Performance:**
    - The mean squared error of the model indicates moderate accuracy, but further refinement and inclusion of more variables could improve predictions.