Team Members & Roles

- Arya Deshmukh - Data Collection and Preprocessing
- Ajay Vinayak Y - Model Development and Implementation
- Eswaran S - Data Analysis and Visualization
- Janisa Ria - Code Integration and Testing
- Ketaki Shinde - Project Coordination and Model Evaluation
- Shreesha VB - Report Writing and Documentation

Problem Statement

The rapid melting of polar ice due to climate change poses significant risks to global ecosystems, coastal communities, and economic systems. Predicting the precise timing of ice melt and freeze events is critical for understanding future environmental trends and their potential impacts on sea levels, biodiversity, and weather patterns. This project focuses on developing a machine learning model to forecast polar ice melting and freezing patterns, aiming to enhance the accuracy of early predictions by using a hybrid model integrating SARIMA, LSTM, and Random Forest algorithms.

Objective

The goal is to predict future patterns of polar ice melt onset and freeze onset, identifying specific dates of early melt, late melt, early freeze, and late freeze. The project will also analyze the countries and regions most affected by these changes, providing actionable insights for governments, environmental organizations, and policymakers.

Polar Ice Melting Predictor

Forecasting polar ice melt and freeze patterns to predict climate impacts.

Solution

Hybrid Model: Utilize a combination of SARIMA, LSTM, and Random Forest algorithms to accurately predict the onset of polar ice melt and freeze patterns.

Data-Driven Insights: Analyze historical climate data (1979-2022) to forecast future ice behavior and identify regions most impacted by these changes.

Impact Assessment: Provide actionable insights for policymakers to mitigate the effects of rising sea levels and disrupted ecosystems.

Wow factors

- **Hybrid Model Innovation**: Combining time-series (SARIMA), deep learning (LSTM), and ensemble methods (Random Forest) for highly accurate and robust predictions of polar ice melt and freeze events.
- **Long-Term Climate Forecasting**: Predicting specific melt and freeze onset days for future years, going beyond traditional seasonal forecasts.
- **Global Impact Mapping**: Offering visual insights into the countries and regions most affected, supporting informed decision-making for climate adaptation and mitigation efforts.

Let’s Jump into the Demo!

Learnings during the Datathon

Data Preprocessing Importance: The challenge of cleaning, handling missing values, and aligning multi-source datasets reinforced the need for thorough data preprocessing.

Model Optimization: Balancing the trade-offs between different models (SARIMA, LSTM, Random Forest) helped us understand how to enhance model accuracy and performance.

Feature Engineering: Identifying the most relevant climate indicators and creating new features played a key role in improving prediction quality.

Collaboration and Teamwork: Effective communication and clear division of roles were crucial in managing tasks and ensuring smooth progress during the datathon.

Time Management: We learned how to prioritize tasks and efficiently manage time in a fast-paced datathon environment.

Impact of Visualizations: Crafting clear, insightful visualizations to present data-driven results helped demonstrate the practical implications of our findings to the judges.