**Detailed Report**

1. How does your visual inform a decision or action that furthers one or more of the key competition SDGs ([zero hunger](https://www.un.org/sustainabledevelopment/hunger/), [clean water and sanitation](https://www.un.org/sustainabledevelopment/water-and-sanitation/), [climate action](https://www.un.org/sustainabledevelopment/climate-change/))?

Our solution facilitates the interactive use of all the data collected, analyzed, and generated, and serves as a dynamic platform for users to interact with the data and gain insights from the visualizations and predictive models that explore climate patterns and future projections, thereby facilitating an understanding of the real-world impacts of global warming and climate change.

1. How did you create your submission? Include the tools you used (e.g., Python, Excel, specific python packages), how you processed the data, and (if applicable) how you managed your codebase. If you have a public repository with code, you can share a link here.

The core of our solution is a set of predictive models, powered by Meta AI's Prophet framework, designed to predict average monthly temperatures for U.S. cities. To achieve this, the data underwent a series of processes including data preprocessing, exploratory data analysis, feature engineering, model building, and model evaluation. These processes were performed using Python as the primary programming language within a Jupyter Notebook environment, utilizing libraries and frameworks such as Scikit-learn, NumPy, Pandas, Seaborn, Matplotlib, and others.

In addition, a comprehensive analysis of the data was performed to extract in-depth knowledge and insights, including the use of multiple plots, geographic maps, and descriptive statistics. The culmination of these efforts was the integration of all the results obtained into the World Temperature Viewer, a Streamlit application that provides users with a quick and easy way to understand the historical state of global temperatures and explore potential future scenarios.

The software allows users to compare temperature trends from 1970 to 2013, as well as forecast U.S. temperatures using high-performance models with a Mean Absolute Error (MAE) of 1.7 and Mean Squared Error (MSE) of 7.3. Links to the GitHub repository of the code, the Streamlit application deployed on the Streamlit Cloud, and the dataset used in the study conducted are provided below:

Code Repository:

World Temperature Viewer:

Dataset:

1. What motivated you to choose this topic?

In today’s world, it is imperative for every individual, community, and organization to firmly believe that each scientific and technological advancement should be intrinsically linked to sustainable development and environmental stewardship. Over time, this has become my primary field of research and development. I have had the opportunity to work on eco-forecasting of renewable energies at the Schneider Electric Hackathon. Furthermore, I have published a draft of our research on Advancing Sustainable Agriculture in Cuba in the TechRxiv preprint. While the development of science and technology is indeed remarkable, sustainable science and technology development is even more commendable. This approach ensures that we care for our vast green home, the Earth, which is the only place where humankind truly belongs. This belief forms the core of my motivation for my solution in climate action for the Pale Blue Dot Challenge.

1. How did you learn about the broader context of your chosen issue (e.g., historical, social, political)? This could include drawing on the lived experiences of team members, reading articles and literature, conducting interviews with community members, etc. Did what you learned change your approach?
2. What are the ethics and/or equity issues you considered? What are some possible strategies or approaches for addressing them?
3. Would your team like to share the URL of an interactive visualization?