# Climate Change Analysis

# EXECUTIVE SUMMARY

# Overview - The Quick Pitch

Climate change is a critical issue in our current environment.   Weather patterns changes impact our daily livers, form food production to increase risk of floods, wildfires and many more changes that affect us all globally. Our goal is to create a visual interactive data focused analysis that shows changes in weather patterns.

# The Problem

# How are we tracking the current climate changes? What is the data saying about global climate change from 1960 to the present? This project used initialized study data to understand weather patterns through different visualizations. Some setbacks were The National Centers of Environmental Information use data from different stations worldwide with metrics like temperature max/min, snow depth, precipitation, and many more. They also provide data with details of stations. In addition, With the data being so huge, we build a loop to download one year at a time using python requests, perform the necessary aggregations/lookup, and store only the required data into the required metric files

# The Solution

With the massive data, we download one year at a time using python requests, perform the necessary aggregations/lookup, and store only the required data into the required metric files. We also decided to focus our trends and climate changes one globals region the US. The Initialized data was built using daily temperature collations from different station codes and State codes. A lookup table was then created to view the values using the data collected from these two different pinpoints.

# Highlights

### **Machine Learning:** Using Gradient Boosting for Regression, we split our input features into the year, month, and day. We could predict past and future dates by taking a specific state and metric using analyzed code. This updated code was Used to take the inputs and generate the prediction using the required model.

Graphical user interface

Description automatically generated

* **Database query:** sample view of the data loaded to SQLite DB using SQL AlchemyA screenshot of a computer

  Description automatically generated with medium confidence
* **Visualization:** We created several graphs and heatmaps to show thetrends of the data collected. Below is a sample visual of a heatmap maximum temperer form 1960-2010. Also, a trend chart of the average rain over the past 120 years.

Map

Description automatically generated

Graphical user interface, application

Description automatically generated

# Keys to Success

We accomplished our goal of demonstrating the increase of tempters from 1960-current. The data that we used gave us the ability to create a data driven interactive website that provides users the ability to:

* Visualized extreme weather patterns using the dashboards we created in Tableau, i.e heatmap, rain/snow fall charts.
* Through machines learning Used polished historical data to created predictable and accurate future and past temperatures
* Webpage, we used the flask app to build website, which we designed using JavaScript’s

References page.

Data Source

* URL: <https://www.ncei.noaa.gov/pub/data/ghcn/daily/by_year>

Code used:

<https://github.com/MoenJohn/capstone_climate_project/blob/main/data_setup/data_pull_and_cleanup.ipynb>

<https://github.com/MoenJohn/capstone_climate_project/blob/main/database/database_sqlite.ipynb>

Dashboard 1: <https://public.tableau.com/views/FinalProject7_16613026204870/Dashboard1?:language=en-US&:display_count=n&:origin=viz_share_link>

Dashboard 2: <https://public.tableau.com/views/FinalProject7_2/Dashboard2?:language=en-US&:display_count=n&:origin=viz_share_link>

### Machine Learning

<https://github.com/MoenJohn/capstone_climate_project/blob/main/model/gbr/GradientBoostingRegressorAnalysis.ipynb>

<https://github.com/MoenJohn/capstone_climate_project/blob/main/web_app/gbrModelHelper.py>

Website:

<https://html5up.net/solid-state>