



# CLIMATE CHANGE

**ANALYZING TRENDS AND DEVELOPING SUSTAINABLE SOLUTIONS**

**Presented by Team Beyond the Data**

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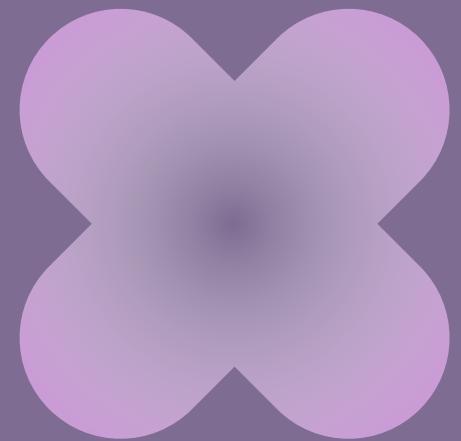
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# INTRODUCTION

TOPIC ➤

Climate Change: Analyzing Trends & Developing Sustainable Solutions





# OVERVIEW

- Analyze climate data to identify trends in global temperature,  $\text{CO}_2$  emissions, and environmental impact, using machine learning models for future predictions.
- Developed sustainable solutions based on data-driven insights and deploy an interactive model for visualizing trends and recommendations using streamlit



# PROJECT GOALS

## Goal 1

Collecting the data , Pre-Processing and Analyzing

## Goal 2

EDA and Visualization of Data

## Goal 3

Model Training and Implementation

## Goal 4

Model Deployment Using Streamlit



# BACKGROUND

Climate change is a serious global problem caused by rising temperatures, increasing CO<sub>2</sub> emissions, and environmental damage. It leads to extreme weather, melting ice caps, and rising sea levels. Using data analysis and machine learning, we can study past climate patterns, predict future changes, and find effective solutions. This project aims to use data-driven insights to understand climate trends and suggest sustainable ways to reduce its impact.





# METHODOLOGY

- Software:
  - Python environment with required libraries (Pandas, NumPy, Matplotlib, Seaborn, Streamlit, Scikit-learn)
  - Jupyter
- Data Sources:
  - Climate Change Dataset (2020-2024) from Kaggle
- Deployment:
  - Streamlit for deployment



# PROCESS

## DATA CLEANING

- Handling missing values (e.g., replacing 'Unknown' with NaN, forward filling missing values)
- Data transformation and feature engineering



# EXPLORATORY DATA ANALYSIS (EDA)

- Visualization techniques used:
- Pair plots for correlation analysis
- Line charts for temperature trends
- Bar charts for CO<sub>2</sub> emissions



# MODEL IMPLEMENTATION

**Algorithm Used:** Random Forest Regressor

- Handles missing data effectively
- Reduces overfitting
- Works well with non-linear relationships

```
# Select target and features
target_col = "your_target_column" # Replace with actual target column
feature_cols = [col for col in df.columns if col != target_col] # Replace with actual
# feature selection logic
```

```
X = df[feature_cols]
y = df[target_col]
```

```
# Convert all data to numeric (ensure float values)
X = X.apply(pd.to_numeric, errors='coerce').fillna(0)
```

```
# Split dataset
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
```

```
# Train Random Forest Model
model = RandomForestRegressor(n_estimators=100, random_state=42)
model.fit(X_train, y_train)
```

```
# Make predictions
y_pred = model.predict(X_test)
```



# MODEL EVALUATION

Performance metrics:

- Mean Absolute Error (MAE)
- R-squared ( $R^2$ ) score

```
# Show evaluation metrics
mae = mean_absolute_error(y_test, y_pred)
r2 = r2_score(y_test, y_pred)

print(f"Mean Absolute Error (MAE): {mae:.2f}")
print(f"R2 Score: {r2:.2f}")
```



# DEPLOYMENT USING STREAMLIT

- Features of the Streamlit Web App:
  - Upload climate dataset (CSV format)
  - Train and evaluate a model in real-time
  - Provide predictions based on user input
  - Visualize actual vs. predicted values
-



# CONCLUSION

This project analyzed climate change trends using data and machine learning. It helped identify patterns in temperature rise, CO<sub>2</sub> emissions, and other environmental factors. The predictive model gave insights into future climate changes, and the interactive dashboard made it easy to explore data.

To reduce climate change effects, we suggest using renewable energy, cutting down emissions, and adopting sustainable practices. This project shows how data-driven solutions can help tackle climate issues and highlights the importance of ongoing monitoring and action.



# RESOURCES

Streamlit : [Climate Change](#)

GitHub : [Climate Change](#)



# THANK YOU!

