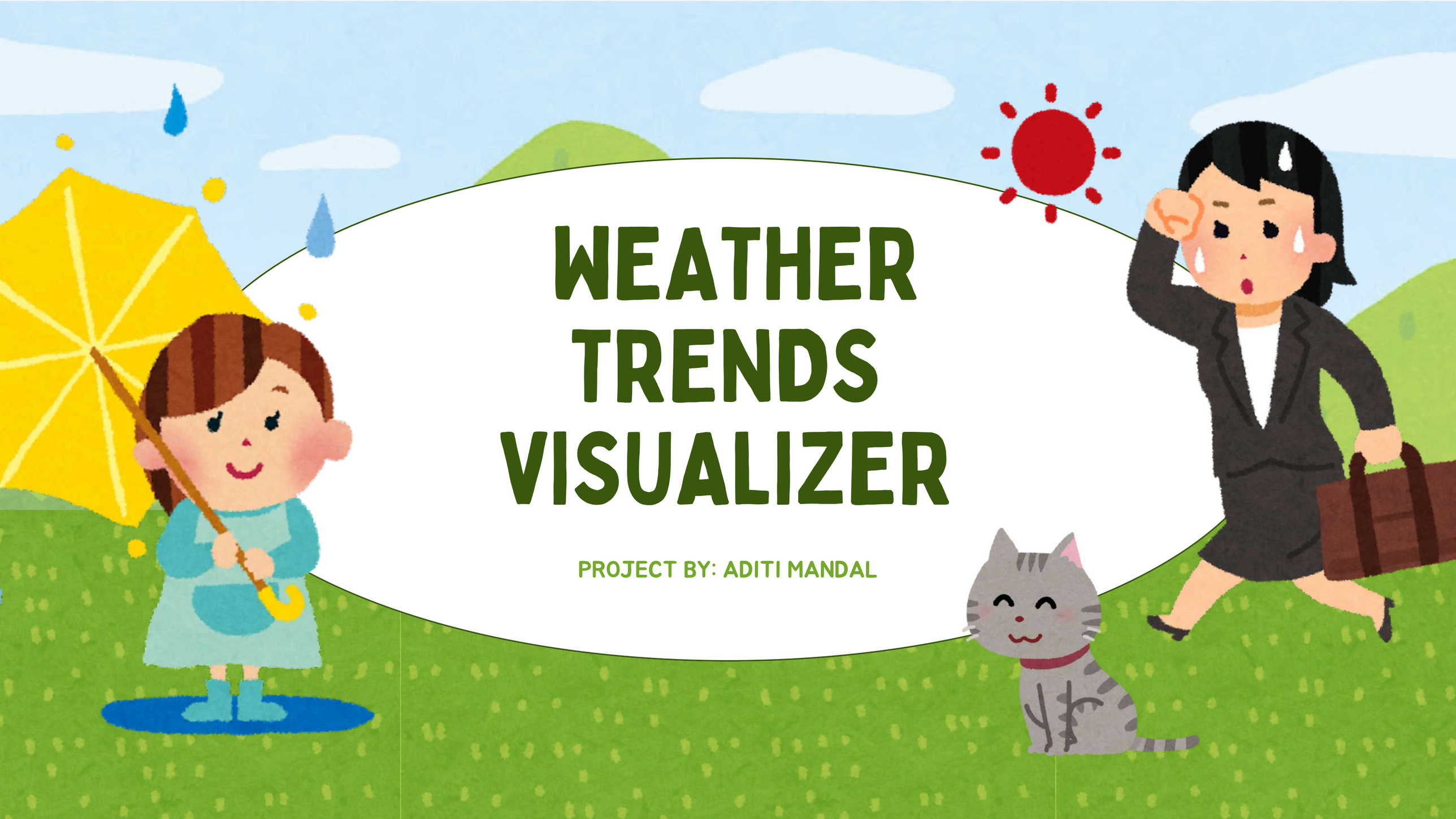
WEATHER
TRENDS
VISUALIZER
PROJECT BY: ADITI MANDAL

INTRODUCTION

Why Analyze Weather Data?

- Weather significantly impacts agriculture, energy, transportation, and daily life.
- Understanding patterns is crucial for planning and preparedness.
- Raw data is difficult to interpret; visualization is key to unlocking insights.
- Project Goal: To build a tool that automates the visualization of Indian weather trends.

THE SOLUTION

What Did We Build?

- A flexible Python application that:
  - Accepts real weather data CSV files.
  - Generates its own realistic sample data for demonstration.
  - Automatically cleans and processes the data.
  - Creates beautiful, insightful visualizations with a single click.
- Key Feature: User-friendly menu-driven interface.

TECHNOLOGY STACK

- Python: The core programming language.
- Pandas: For powerful data manipulation and analysis.
- Matplotlib & Seaborn: For creating static, animated, and statistical visualizations.
- NumPy: For numerical computations and generating sample data.

HOW IT WORKS (STEP 1)

Step 1: Data Input

- The user is presented with a simple menu.
- Option 1: Provide a path to their own CSV file with weather data.
- Option 2: Let the program generate comprehensive sample data for major Indian cities (Mumbai, Delhi, Chennai, Kolkata, Bangalore).
- The code handles file errors gracefully with helpful messages.

HOW IT WORKS (STEP 2)

Step 2: Data Processing

- The program loads the data into a Pandas DataFrame.
- It performs essential cleaning:
  - Converts date strings to datetime objects.
  - Sorts the data chronologically.
- It checks for required data columns to ensure analysis is possible.

```
def create_monthly_analysis(df):
    """This function is no longer applicable as we removed Date column"""
    print("Monthly analysis skipped as Date column was removed")

if __name__ == "__main__":
    main()
```

```
Enter your choice (1 or 2):

Indian Weather Trends Visualizer
================================
Options:
1. Use existing CSV file
2. Generate sample data
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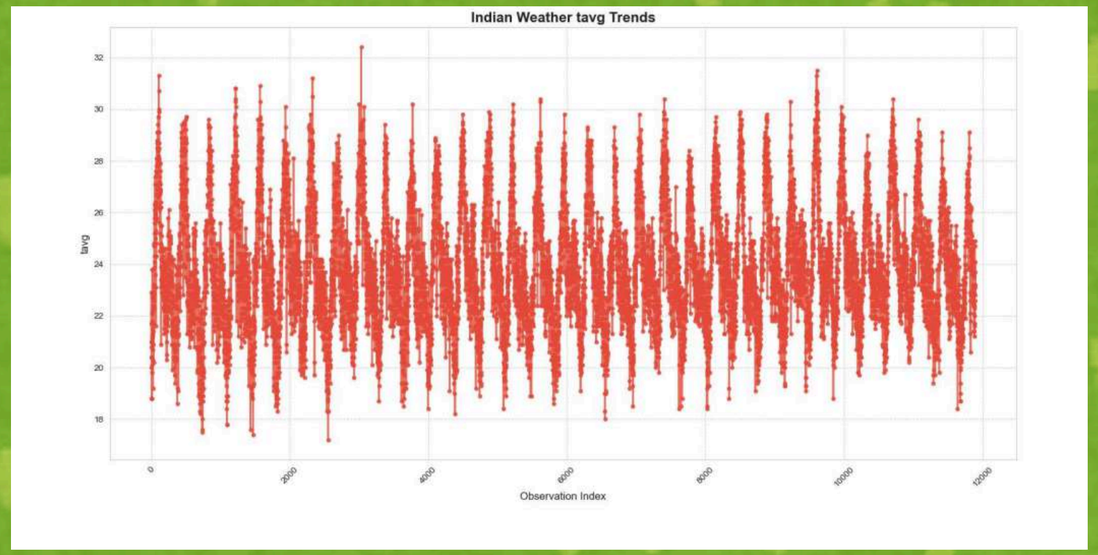
```
Indian Weather Trends Visualizer
================================
Options:
1. Use existing CSV file
2. Generate sample data
Enter your choice (1 or 2): 1

Please enter the path to your weather CSV file:
```

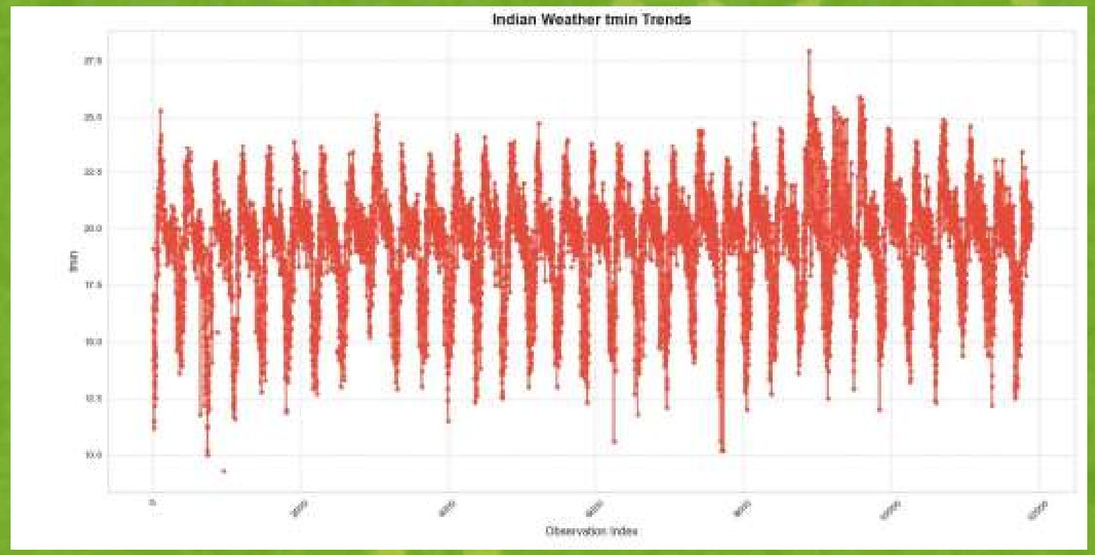
HOW IT WORKS (STEP 3)

Step 3: Visualization & Analysis

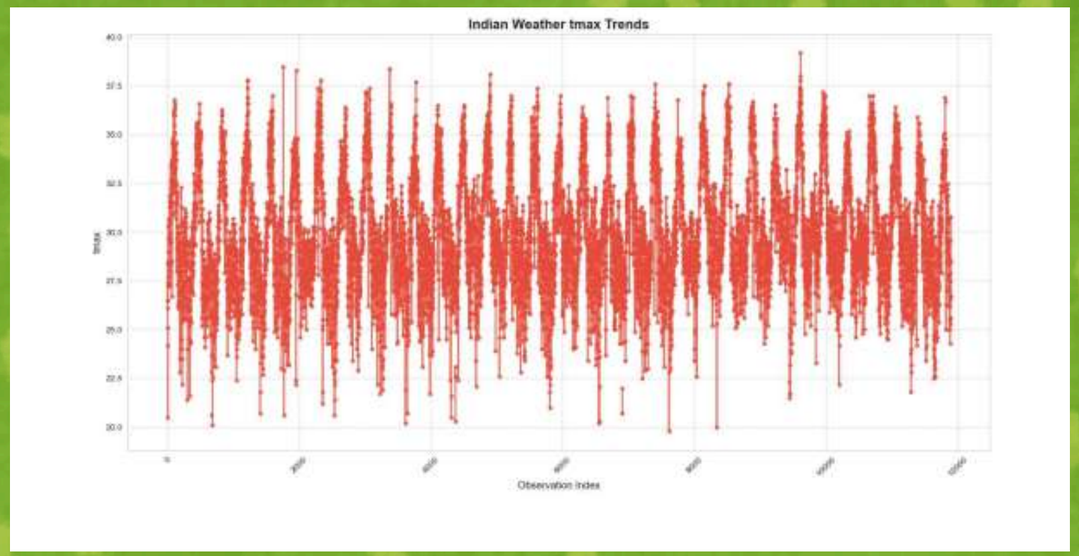
- The core function of the application.
- Generates multiple high-resolution PNG charts:
  - Multi-City Trend Lines: Compares temperature trends across cities on one chart.
  - Individual City Charts: Detailed view for each city.
  - Statistical Summary: Prints average, max, and min values for each city.
- (If date is available) Monthly Analysis: Bar charts comparing average monthly temperatures across cities.



tavg Trend



tminTrend



tmax Trend

KEY FEATURES & BENEFITS

- Flexibility: Works with both real and synthetic data.
- Automation: Generates a full analysis report with visuals automatically.
- Clarity: Creates publication-quality, easy-to-understand charts.
- Robustness: Includes error handling for invalid user input.
- Extensible: Code can be easily modified to add new charts or analysis.

CONCLUSION

The Indian Weather Trends Visualizer successfully demonstrates how Python transforms raw climate data into clear, actionable visual insights. This project provides a robust, flexible foundation for analyzing weather patterns across major cities, serving as a powerful tool for education and exploratory data analysis. Its modular design allows for easy future expansion into forecasting and interactive dashboards.

THANK YOU !