Weather Forecaster-Urban Heat Mitigation

K. Doondi
II BCA-2,
KBN College,
Vijayawada

D. Geeta Gayathri
II BCA-2,
KBN College,
Vijayawada

Naved Abbas
II BCA-2,
KBN College,
Vijayawada

Abstract:
This application, titled "Weather Forecaster," empowers users to effortlessly access detailed weather forecasts and visualize key weather data for any location. It leverages the OpenWeatherMap API and Python libraries to deliver an interactive and informative experience. Users can readily retrieve temperature, humidity, wind speed, rainfall, sunrise/sunset times, and a visual heat map for a chosen city.

Keywords: Weather forecast, OpenWeatherMap API, Python, Tkinter, visualization, heat map, user-friendly

Introduction:
Accurate and readily available weather information is crucial for individuals across various disciplines, from personal planning and outdoor activities to agricultural planning and disaster preparedness. However, relying solely on traditional methods like news reports or weather websites can be cumbersome and offer limited data visualization capabilities.

Problem Proposed: This project tackles the challenge of providing users with a convenient and interactive platform for accessing comprehensive weather forecasts and visualizing relevant data. Traditional methods often lack comprehensiveness, user-friendliness, or the ability to present data visually.

Proposed Solution:
"Weather Forecaster" addresses these limitations by offering:

- **Centralized access:** Easily retrieve forecasts for any location.
- **Comprehensive data:** View temperature, humidity, wind speed, rainfall, and sunrise/sunset times.
- **Interactive visualization:** Gain insights through a heat map.
- **User-friendly interface:** Interact with the application effortlessly.

Technologies Used:

- **Python:** The versatile programming language provides the foundation for building the application.
- **Tkinter:** This Python library constructs the user-friendly graphical user interface (GUI).
- **OpenWeatherMap API:** This API supplies the crucial weather data for the application.
- **Matplotlib:** This library creates informative visualizations of the retrieved data.
- **Pytz:** This Python library handles time zones, ensuring accurate time displays in various locations.

System Requirements:

- **Operating system:** Windows, macOS, or Linux
- **Python:** Version 3.x or later (check using python --version in your terminal)
- **Required libraries:**
  - requests
  - matplotlib
  - folium
  - geopy
  - pytz
  - tkinter (often included in Python installations)
- **OpenWeatherMap API key:** Obtain one from https://openweathermap.org/api

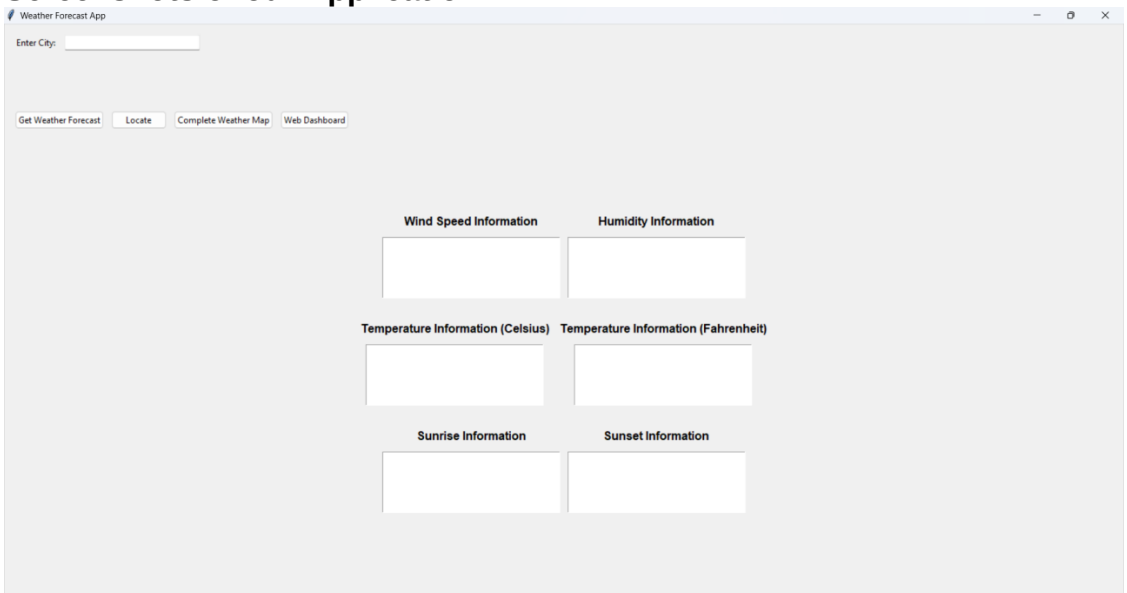
Modules:

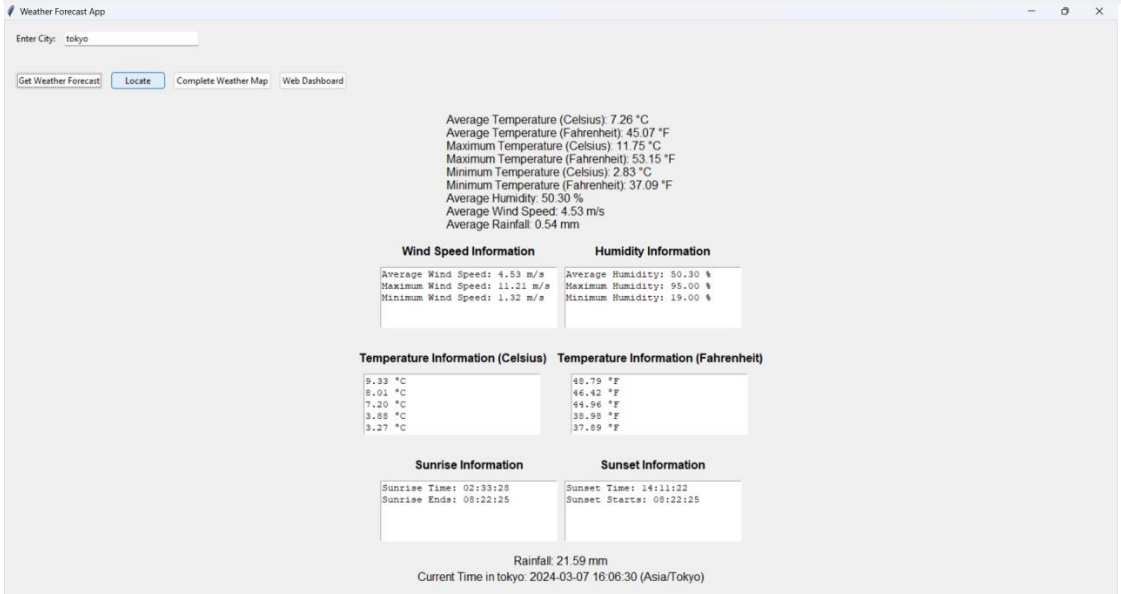
1. **Data Acquisition Module:**
   - Manages API interaction to fetch weather data for the specified location.
   - Error handling for potential API issues.
2. **Data Processing Module:**
   - Transforms and prepares the retrieved data for visualization.
   - Calculates averages and other statistics.
3. **Visualization Module:**
   - Employs Matplotlib to create informative plots and heat maps.
   - Presents temperature, humidity, wind speed, and rainfall data visually.
4. **GUI Module:**
   - Uses Tkinter to construct a user-friendly interface.
   - Consists of entry fields, buttons, and display areas.

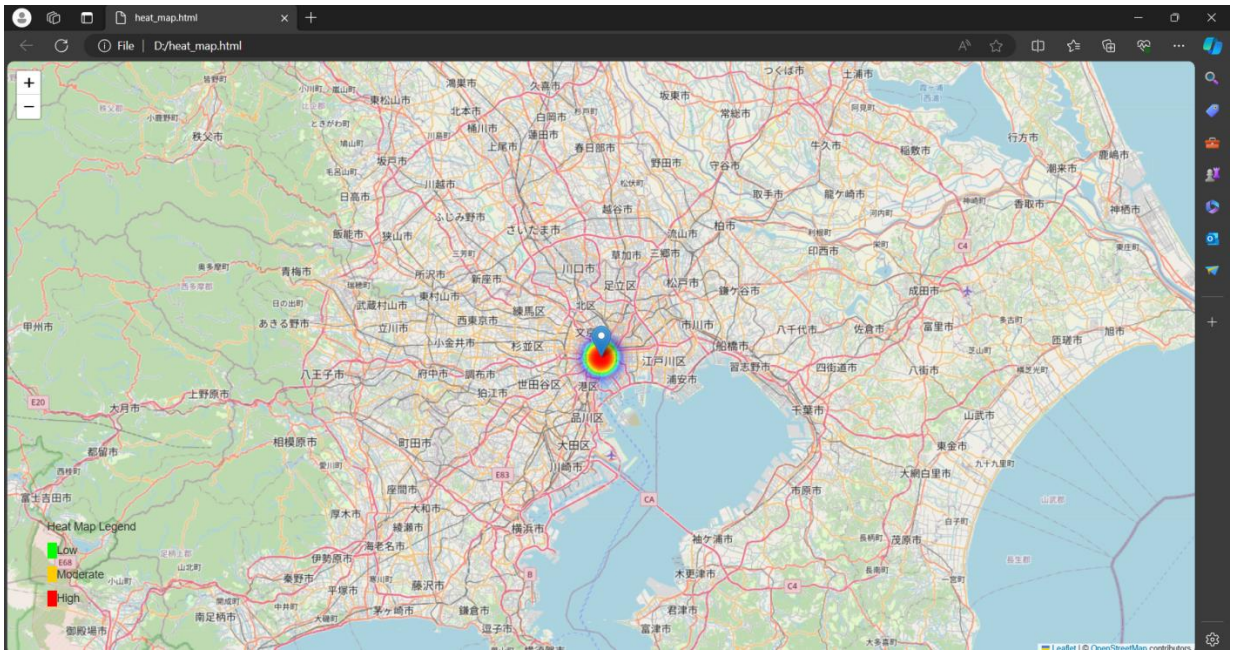
Conclusion:

"Weather Forecaster" effectively addresses the need for a user-centric, comprehensive, and visually appealing weather information platform. Its strengths lie in its ease of use, rich data presentation, and flexibility for diverse use cases. By leveraging the OpenWeatherMap API and various Python libraries, this application empowers users with tailored weather insights within their fingertips.

Screenshots of our Application



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Heat Map Legend
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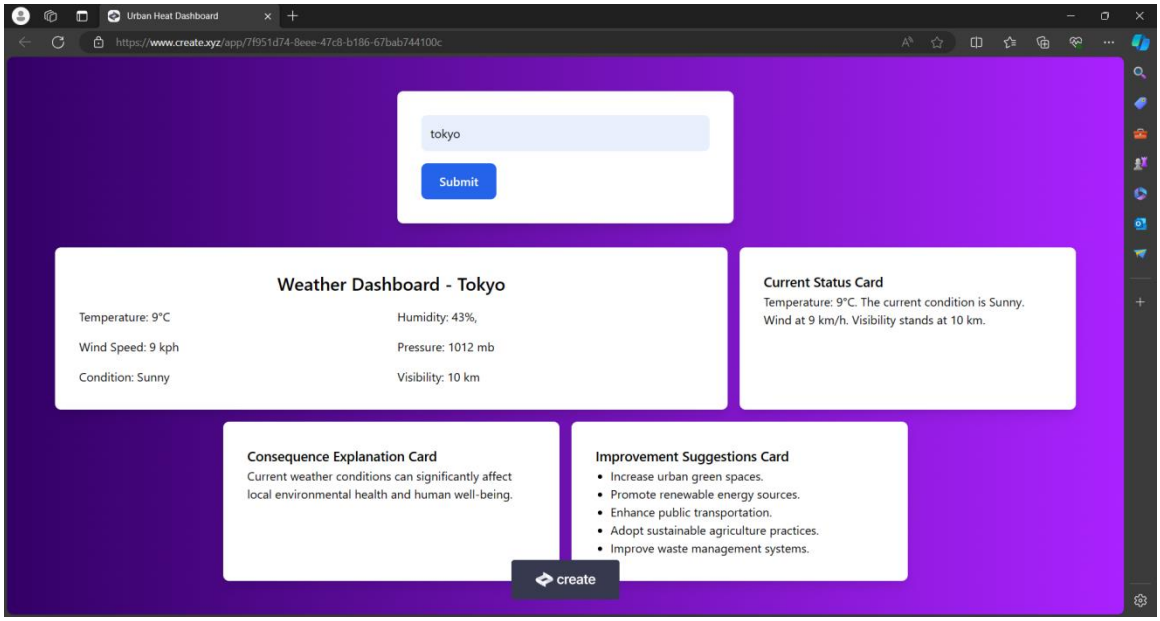
Urban Heat Dashboard
https://www.create.xyz/app/7f951d74-8eee-47c8-b186-67bab744100c
tokyo
Submit
Weather Dashboard - Tokyo
Temperature: 9°C
Humidity: 43%,
Wind Speed: 9 kph
Pressure: 1012 mb
Condition: Sunny
Visibility: 10 km
Current Status Card
Temperature: 9°C. The current condition is Sunny.
Wind at 9 km/h. Visibility stands at 10 km.
Consequence Explanation Card
Current weather conditions can significantly affect local environmental health and human well-being.
Improvement Suggestions Card
Increase urban green spaces.
Promote renewable energy sources.
Enhance public transportation.
Adopt sustainable agriculture practices.
Improve waste management systems.
create