Actual Weather Forecast Web Scrapping base on Location Input with CustomTkinter GUI

College Dropouts Team

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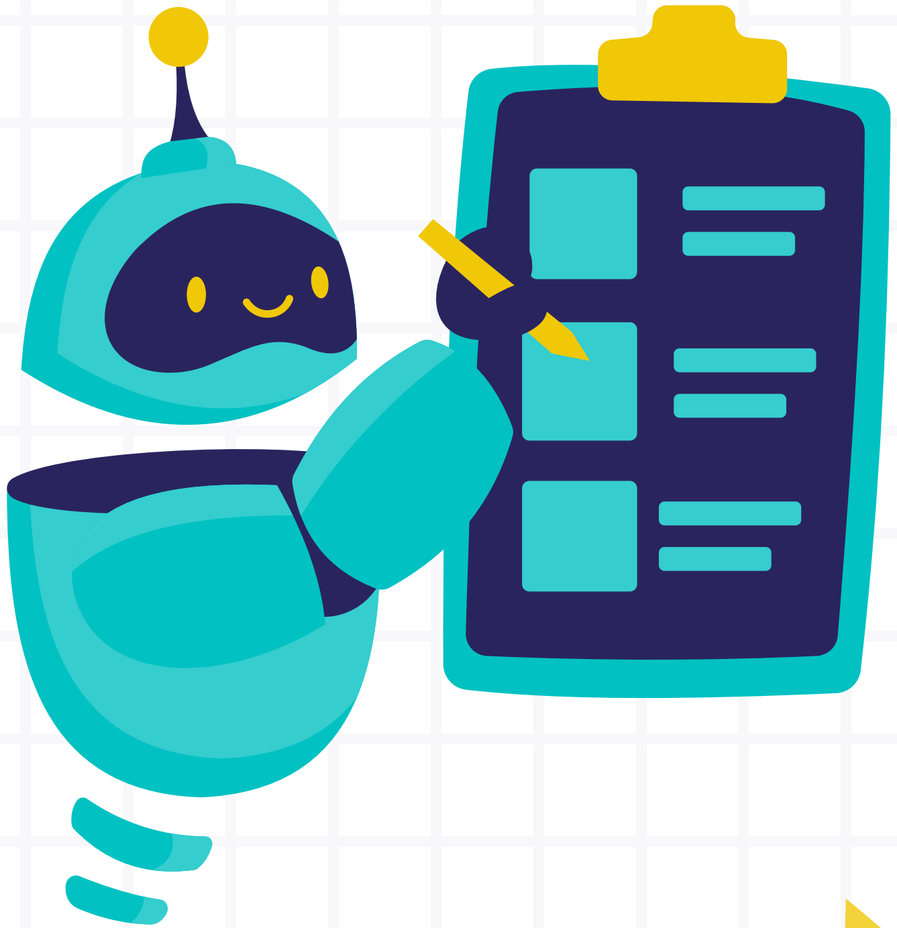
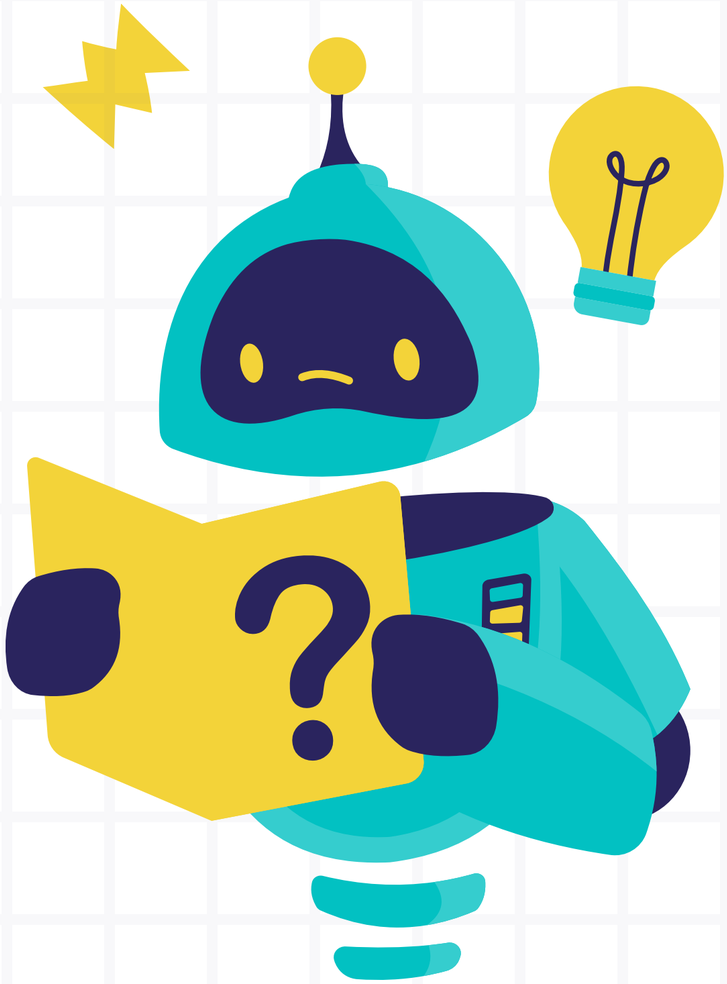


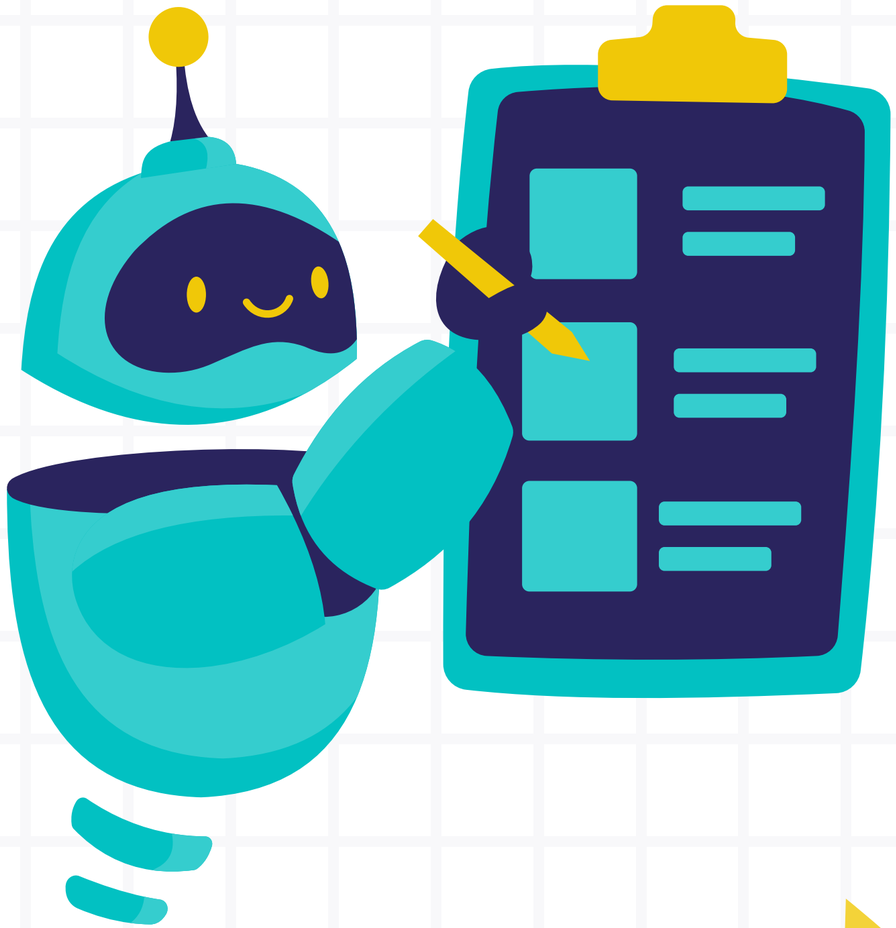


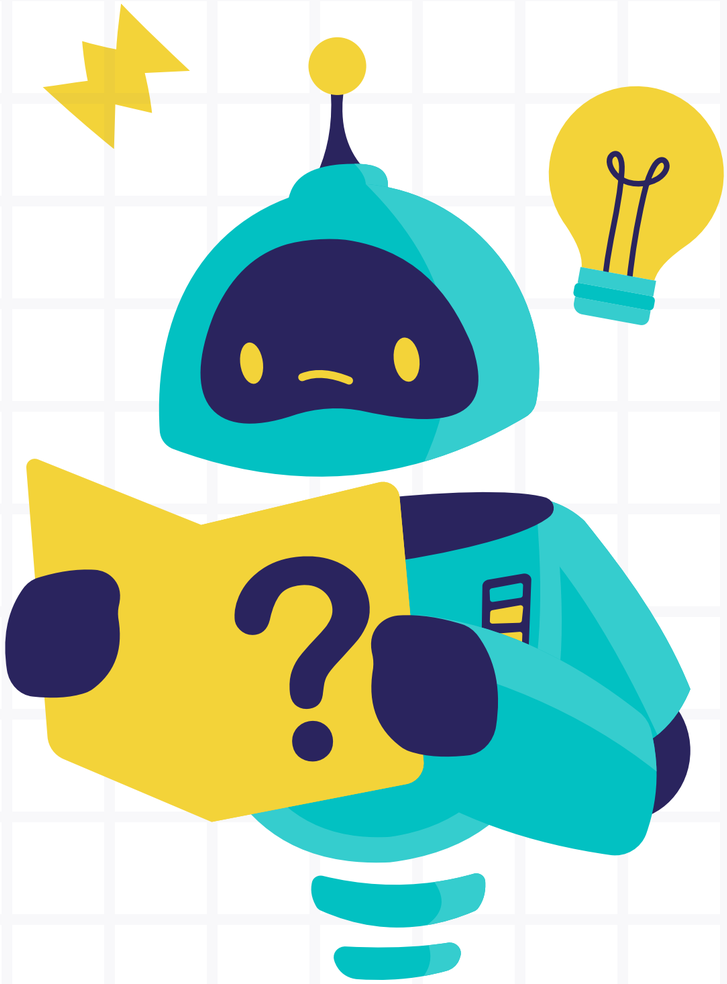
Brief Description

Our project builds a tool to scrape real-time weather data from weather.com, including current conditions, hourly, and daily forecasts. It features an interactive graphical interface and allows users to export data to CSV files for accurate weather updates and effective planning.

Library that we use

- BeautifulSoup (for Web Scraping).
- Geopy (for Geolocation).
- Pandas (for Data Handling).
- Tkinter (for GUI).
- CustomTkinter (for Enhanced GUI).
- TkinterMapView (for Maps Integration).
- Datetime (for date and time).
- Regular Expressions (re module).
- pyinstaller (convert the code to .exe)





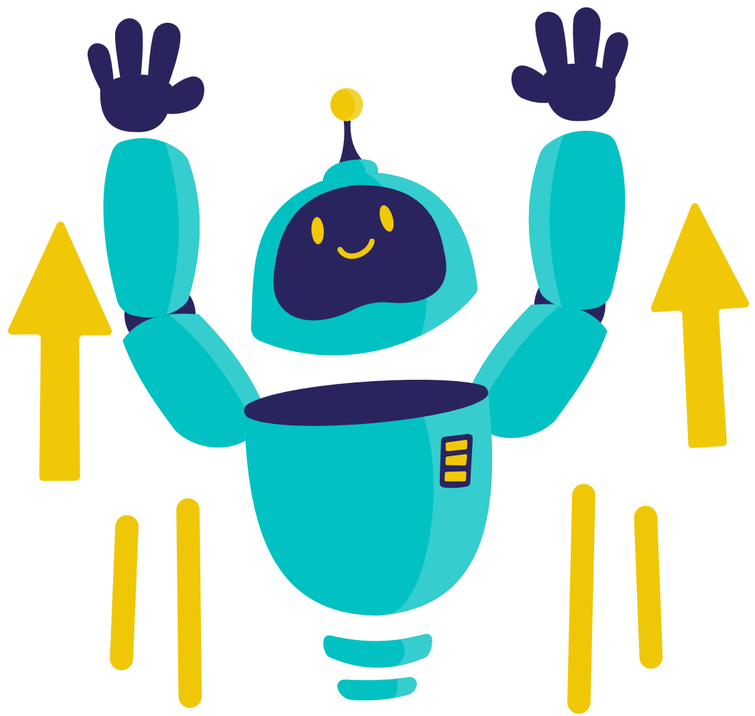
Result Achieved

Our program converts locations to coordinates with Geopy, scrapes weather data from weather.com using BeautifulSoup, and converts temperatures to Celsius. It organizes data into Pandas DataFrames, displays it in a Tkinter/CustomTkinter GUI with real-time map integration, and allows CSV exports. The program is also available as an .exe file, so users can run it without installing Python.

Implementation

get_lat_long(location_name):

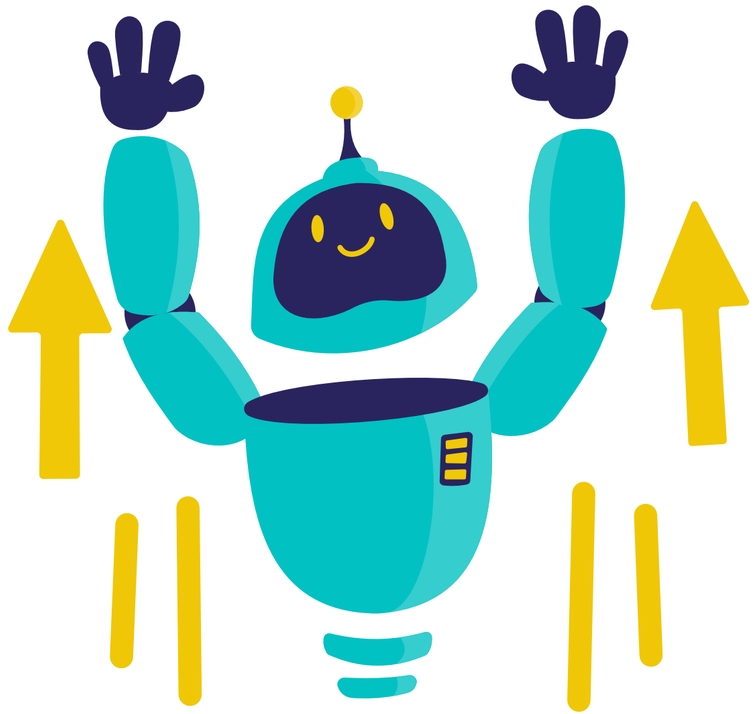
- Description: This function gets the latitude and longitude of a given location name.
- Fields: Uses the Nominatim geocoder from the geopy library.
- Methods: geolocator.geocode(location_name): Returns a location object with latitude and longitude.
- Parameters: location_name (str) – the name of the location to geocode.
- Returns: Tuple (latitude, longitude) or (None, None) if location not found.



Implementation

extract_numeric_temperature(temperature_string)

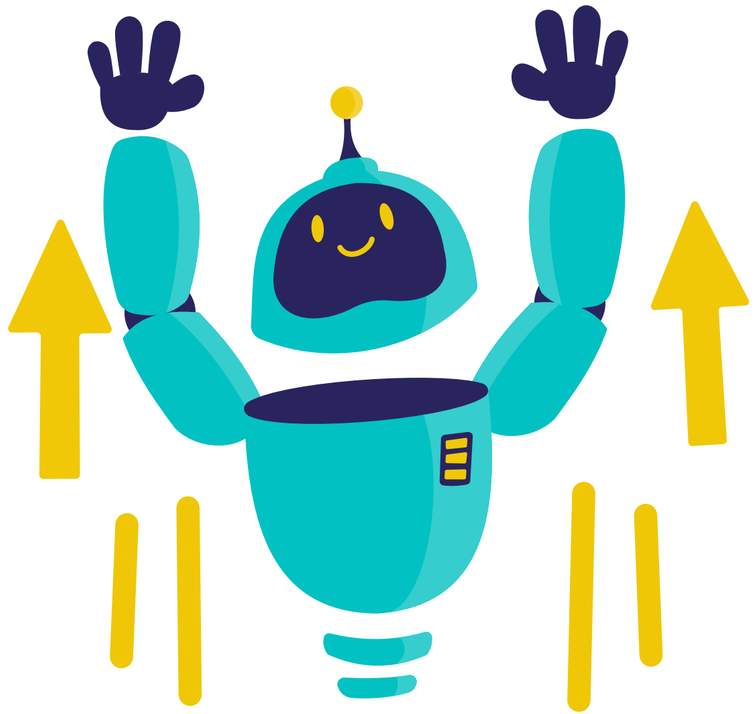
- Description: Extracts numeric temperature value from a string.
- Fields: None.
- Methods: String manipulation and list comprehension to filter digits and period.
- Parameters: temperature_string (str) – the temperature string.
- Returns: Numeric temperature as an integer (or None if not found).



Implementation

convert_fahrenheit_to_celsius (fahrenheit)

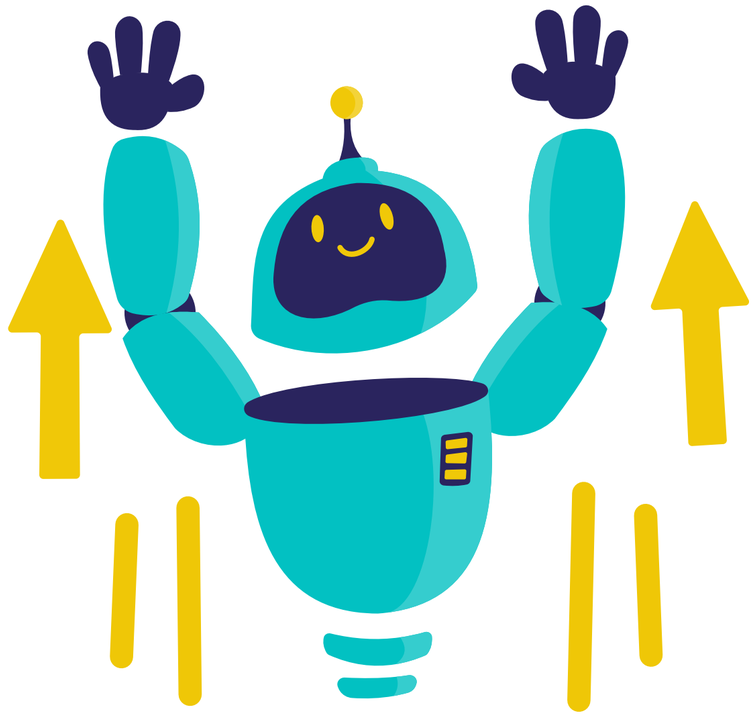
- Description: Converts a temperature from Fahrenheit to Celsius.
- Fields: None.
- Methods: Uses the formula Celsius (Fahrenheit−32)×59\text{Celsius} = \frac{(Fahrenheit – 32) \times 5}{9}Celsius=9(Fahrenheit−32)×5.
- Parameters: fahrenheit (int/float) – temperature in Fahrenheit.
- Returns: Temperature in Celsius as an integer (or None if input is None).



Implementation

get_today_place_forecast(soup):

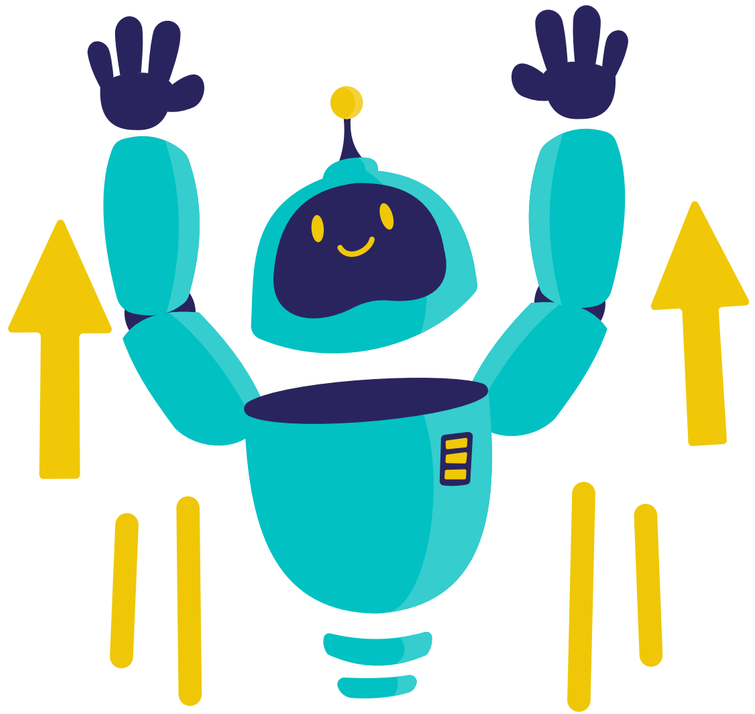
- Description: Extracts the current day's forecast from the HTML soup.
- Fields: Uses BeautifulSoup to parse HTML content. today_forecast: the div containing today's weather forecast.
- Methods: soup.find and soup.find_all: Extract specific HTML elements. pd.DataFrame: Constructs a DataFrame to store the forecast data.
- Parameters: soup (BeautifulSoup object) – parsed HTML content.
- Returns: Tuple (header_element, df_today_forecast) – the header string and a DataFrame of today's forecast.



Implementation

todays_weather(soup)

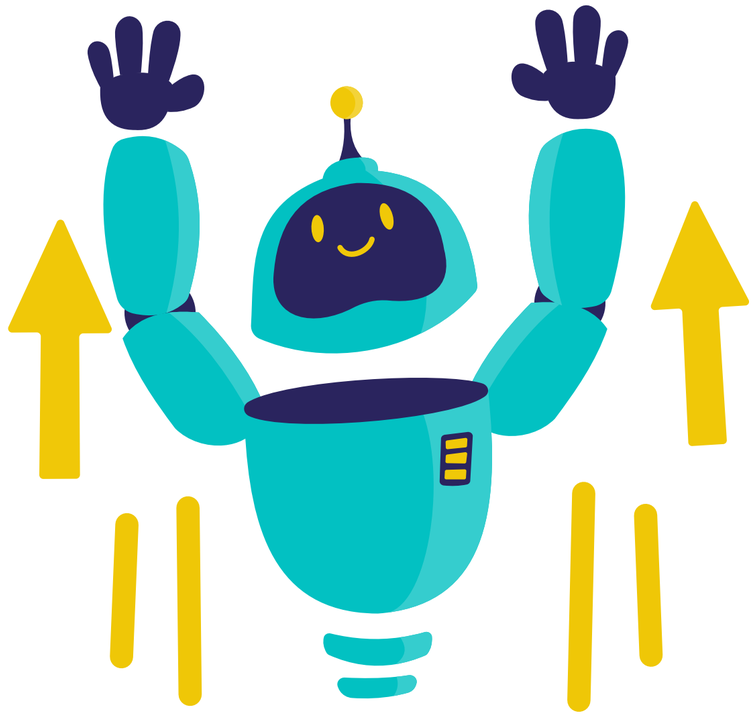
- Description: Extracts today's detailed weather information.
- Fields: Uses BeautifulSoup to parse HTML content. weather_today: the div containing today's weather details.
- Methods: soup.find and soup.find_all: Extract specific HTML elements. pd.DataFrame: Constructs a DataFrame to store weather data.
- Parameters: soup (BeautifulSoup object) – parsed HTML content.
- Returns: Tuple (header_element, df_weather_today) – the header string and a DataFrame of weather details.



Implementation

hourly_forecast(soup)

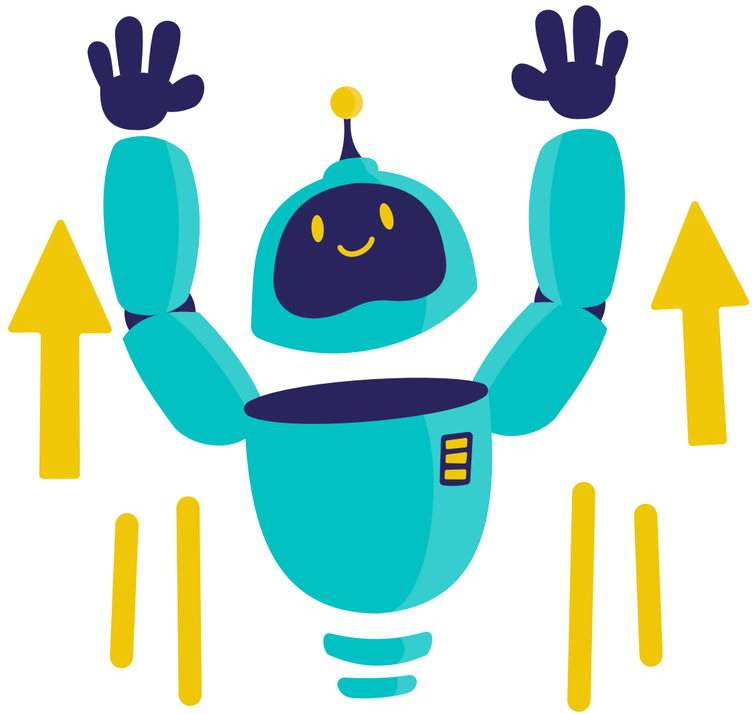
- Description: Extracts hourly weather forecast.
- Fields: Uses BeautifulSoup to parse HTML content. hourly_forecast: the div containing hourly forecast.
- Methods: soup.find and soup.find_all: Extract specific HTML elements. pd.DataFrame: Constructs a DataFrame to store the hourly forecast data.
- Parameters: soup (BeautifulSoup object) – parsed HTML content.
- Returns: Tuple (header_element, df_hourly_forecast) – the header string and a DataFrame of the hourly forecast.



Implementation

daily_forecast(soup)

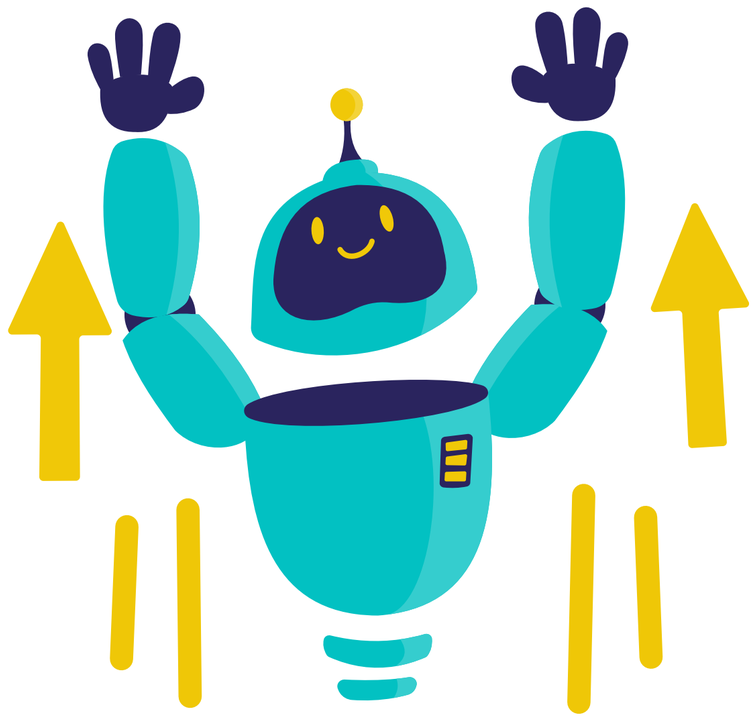
- Description: Extracts daily weather forecast.
- Fields: Uses BeautifulSoup to parse HTML content. daily_forecast: the div containing daily forecast.
- Methods: soup.find and soup.find_all: Extract specific HTML elements. pd.DataFrame: Constructs a DataFrame to store the daily forecast data.
- Parameters: soup (BeautifulSoup object) – parsed HTML content.
- Returns: Tuple (header_element, df_daily_forecast) – the header string and a DataFrame of the daily forecast.



Implementation

get_weather(latitude, longitude)

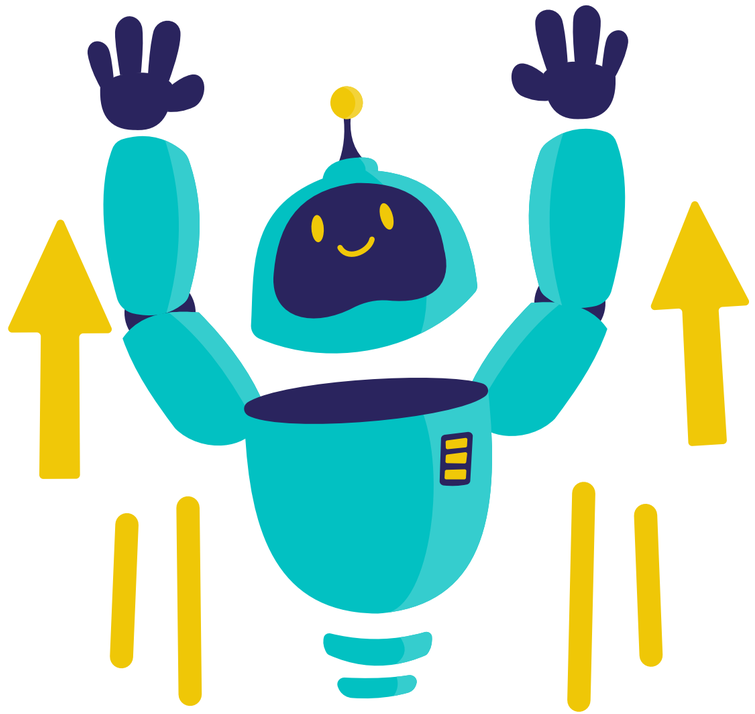
- Description: Fetches weather data for a specific latitude and longitude.
- Fields: Uses requests to fetch data from a URL. Uses BeautifulSoup to parse HTML content. Various data extraction fields (e.g., temperature_today, condition_span).
- Methods: requests.get(url): Fetches the web page.
- BeautifulSoup(response.text, "html.parser"): Parses the HTML.
- Calls to helper functions (get_today_place_forecast, todays_weather, hourly_forecast, daily_forecast).
- Parameters: latitude (float) – latitude of the location, longitude (float) – longitude of the location.
- Returns: String with concatenated weather details.



Implementation

export_to_csv()

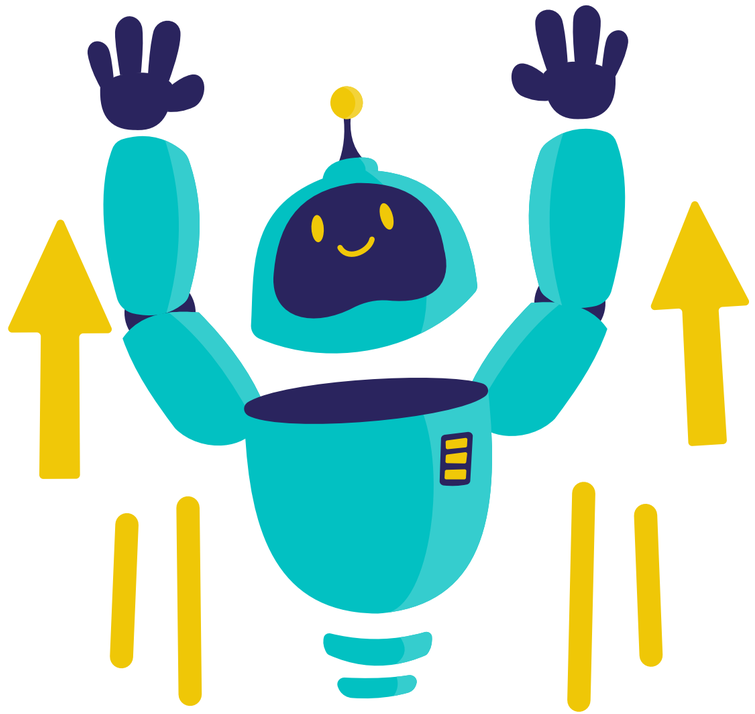
- Description: Exports weather data to CSV files.
- Fields: Uses data_to_save to get data.
- Methods: Iterates over data_to_save to save each DataFrame as a CSV file. df.to_csv(filename): Saves the DataFrame.
- Parameters: None.
- Returns: None (prints confirmation message for each file saved).



Implementation

dropdown_func(event)

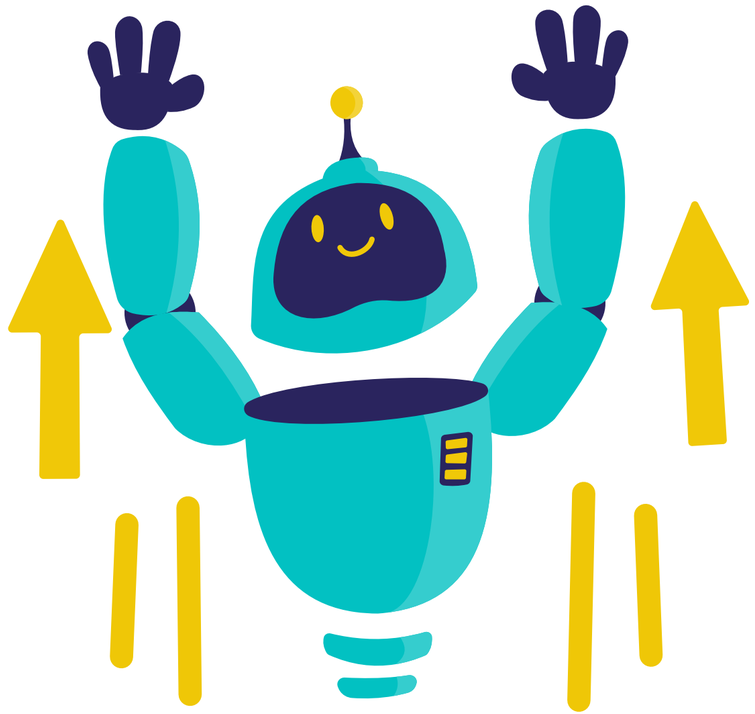
- Description: Handles changes in the dropdown selection for forecasts.
- Fields: Uses global variables to update the UI based on selection.
- Methods: combobox.get(): Gets the selected value from the dropdown. Updates UI labels with forecast data.
- Parameters: event (event object) – the event triggering the function.
- Returns: None.



Implementation

show()

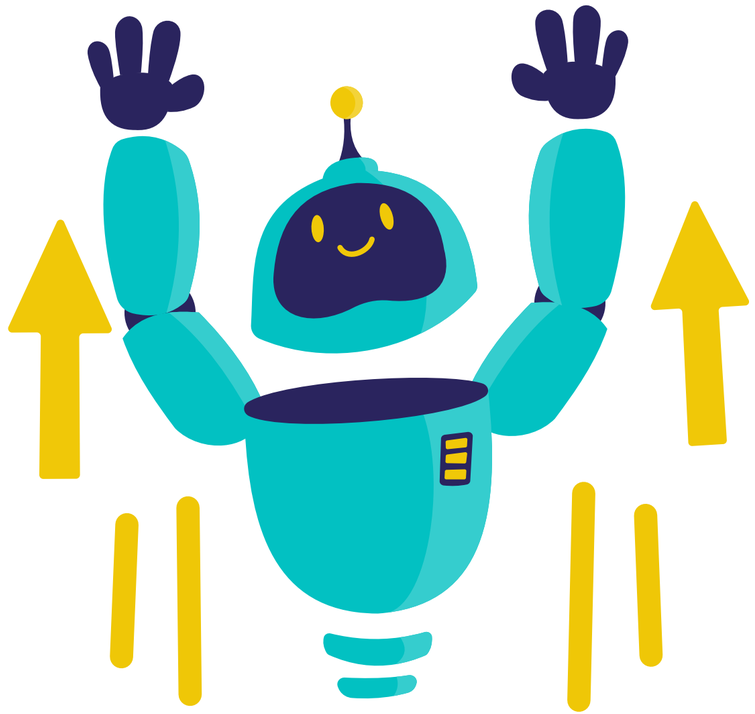
- Description: Displays the weather data on the GUI.
- Fields: Uses various global variables to display data.
- Methods: CTkLabel: Creates labels for displaying data..grid(): Places the labels in the grid layout.
- Parameters: None.
- Returns: None.



Implementation

get_location()

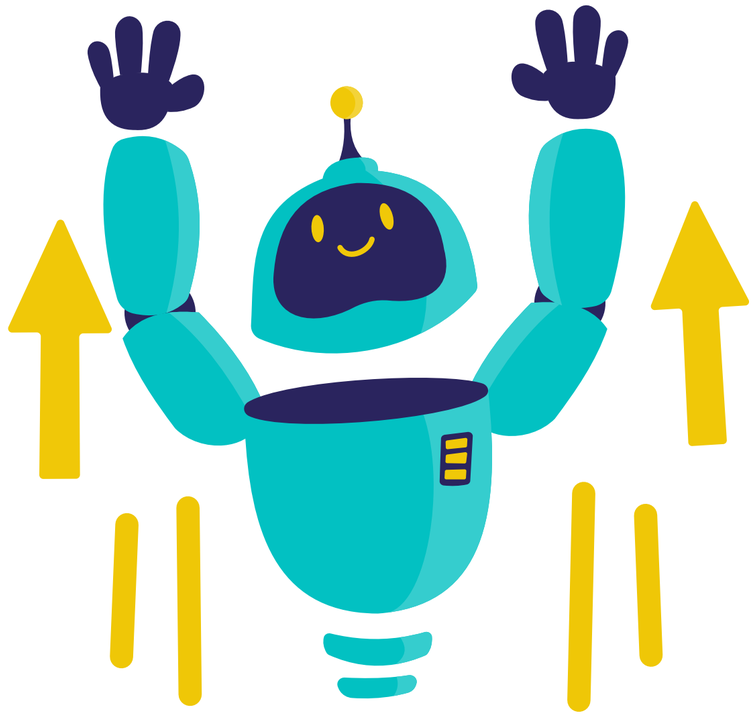
- Description: Retrieves location, fetches weather data, and updates the GUI.
- Fields: Uses global variables for location, latitude, longitude, etc.
- Methods: location_entry.get(): Gets the location from the input field.
- Calls get_lat_long, maps, get_weather, and show. Uses requests and BeautifulSoup to parse the HTML content.
- Parameters: None.
- Returns: None.



Implementation

maps(latitude, longitude)

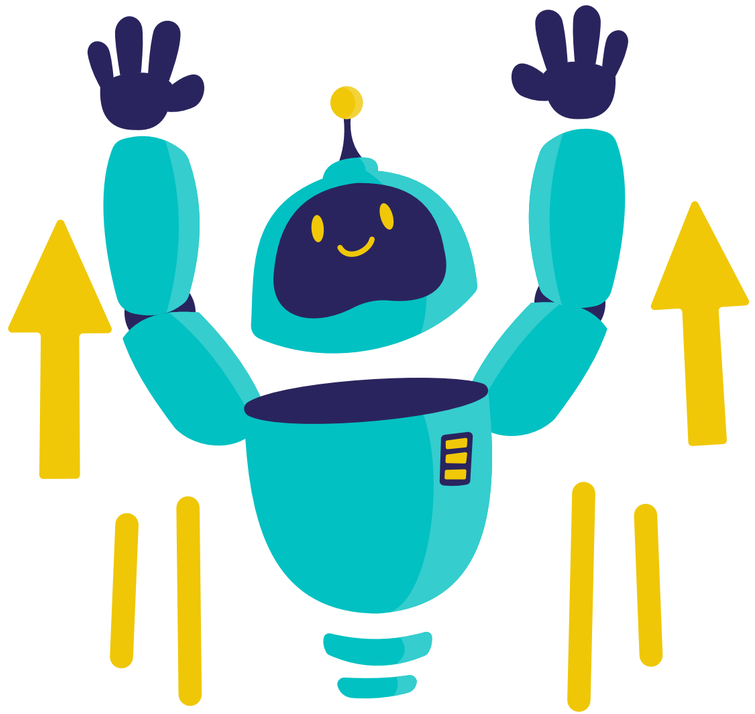
- Description: Displays a map for the given latitude and longitude.
- Fields: Uses TkinterMapView to display the map.
- Methods: TkinterMapView(): Initializes the map view.
- gmap.set_tile_server(): Sets the tile server URL. gmap.set_position(): Sets the position of the map marker.
- Parameters: latitude (float) – latitude of the location, longitude (float) – longitude of the location.
- Returns: None.



Implementation

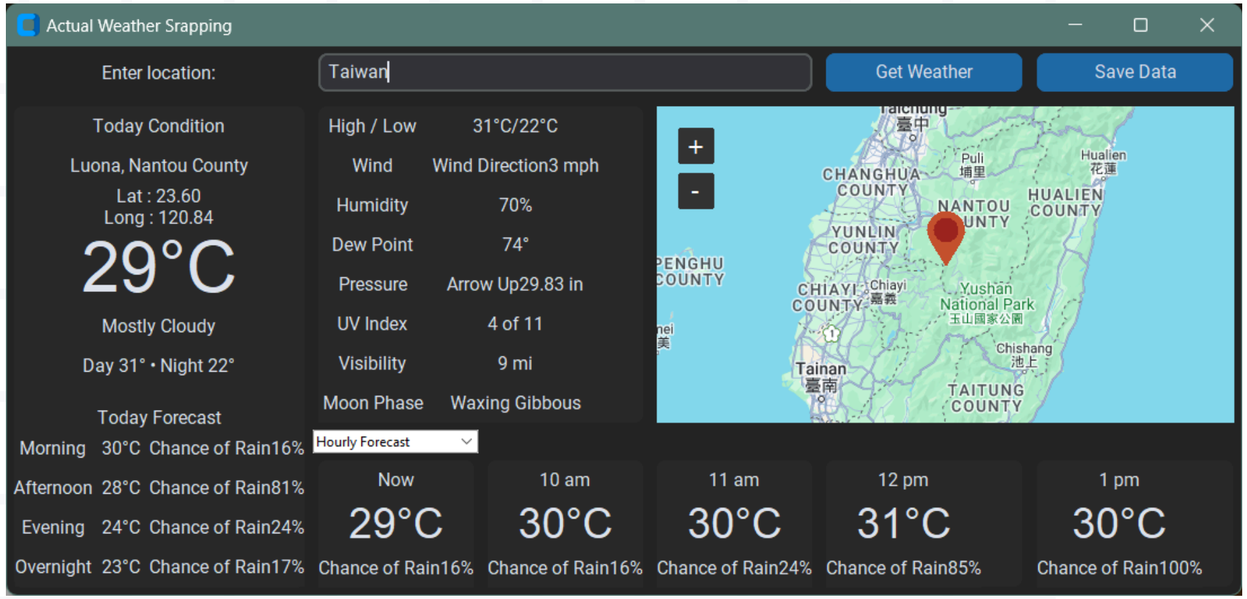
main()

- Description: Sets up the main GUI layout and event loop.
- Fields: Uses tkinter and customtkinter to create the GUI.
- Methods: Initializes the main Tkinter window and widgets. Sets up layout using .grid(). Binds event handlers (get_location, export_to_csv, dropdown_func). Starts the Tkinter main event loop with root.mainloop().
- Parameters: None.
- Returns: None.

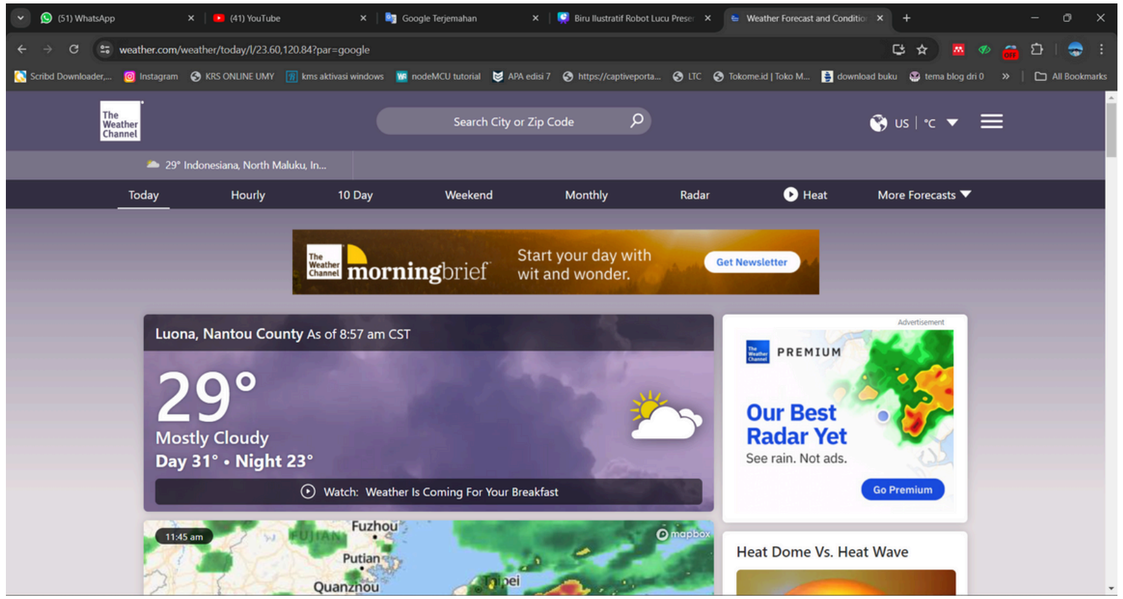


Result (input = Taiwan)

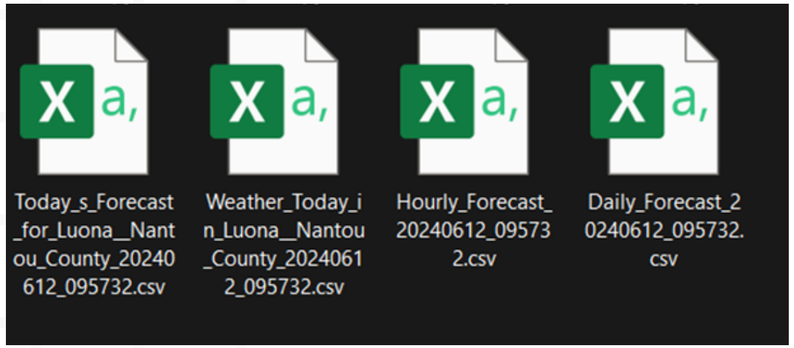
Our Project



Website

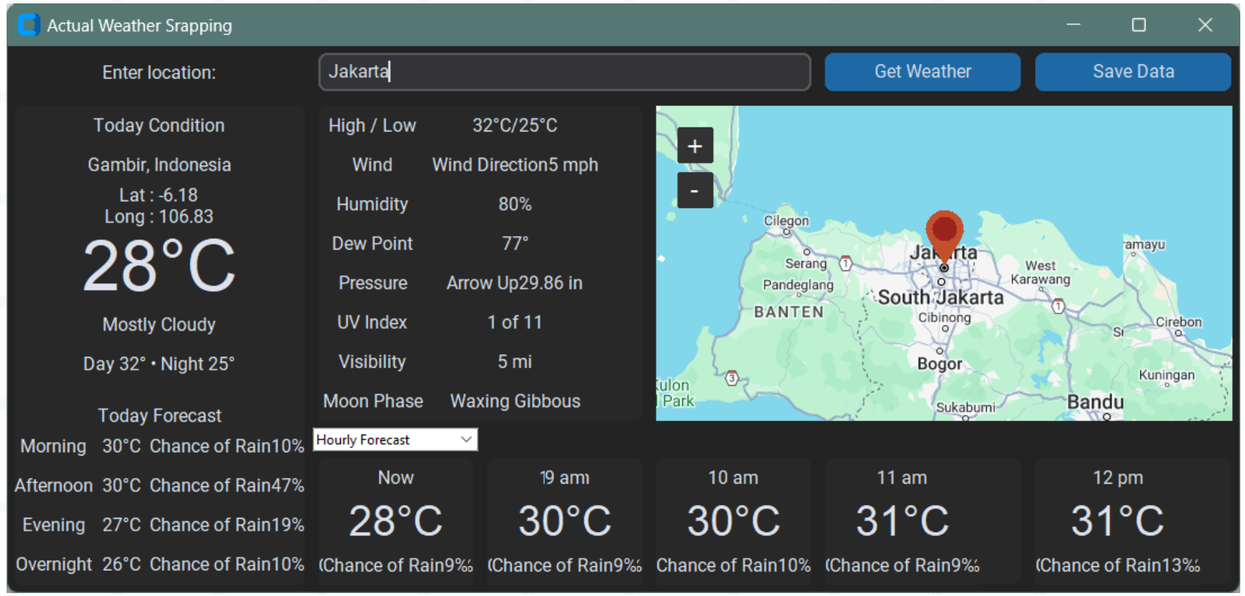


Saved data

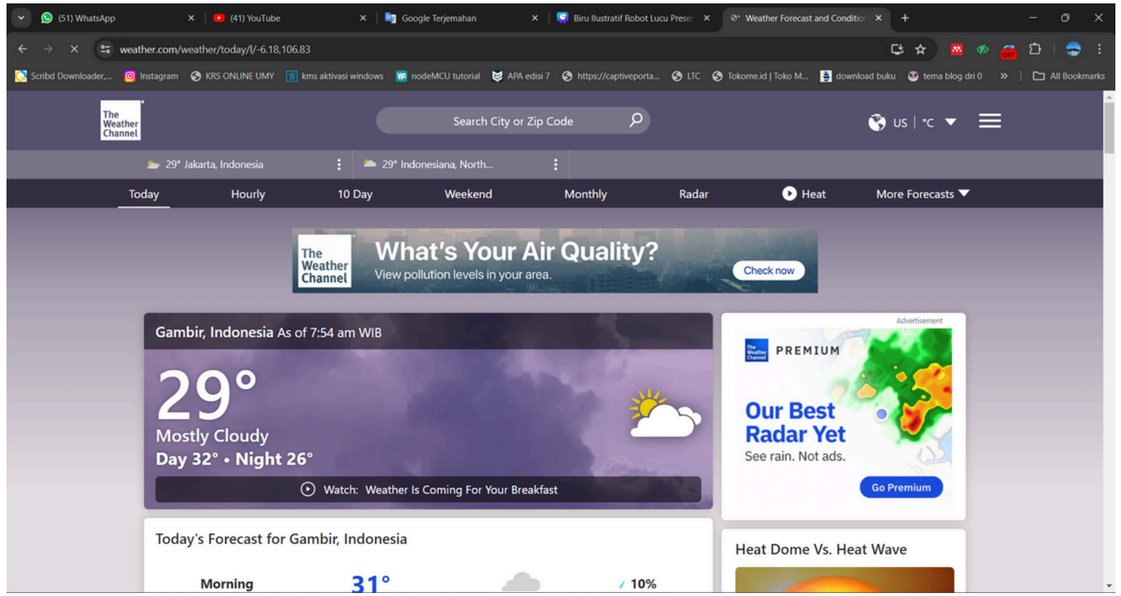


Result (input = Jakarta)

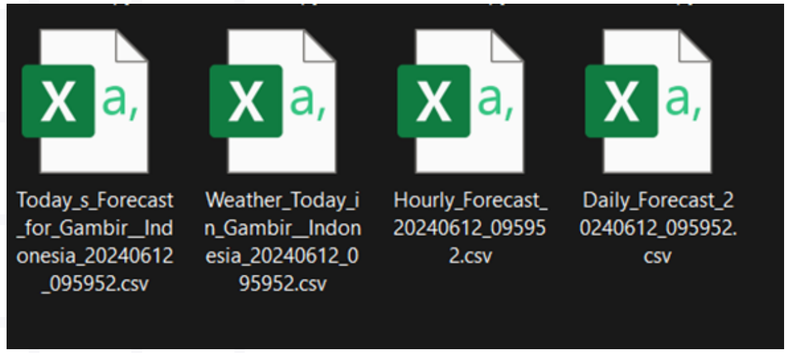
Our Project



Website



Saved data



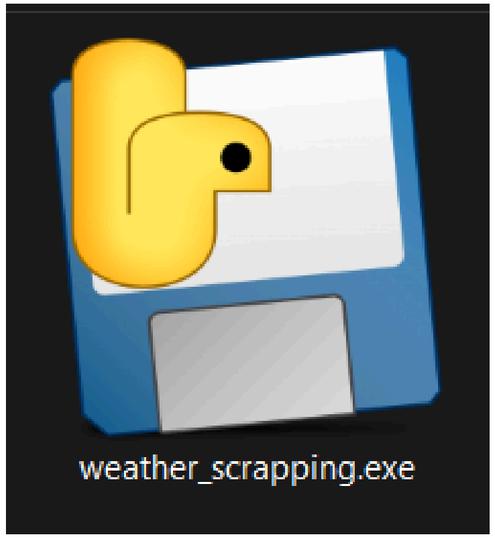
Converted to .exe file

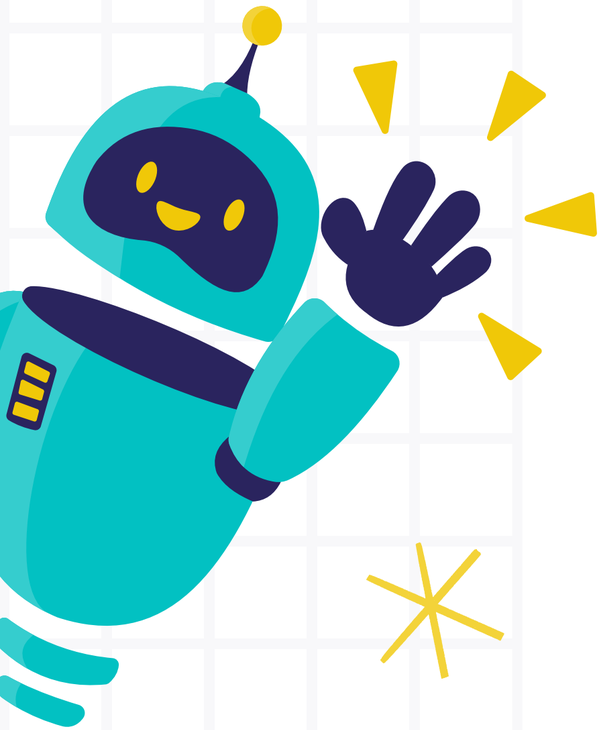
Prompt

Anaconda Prompt

```
(acpogram) C:\D file\ad comp\final>pyinstaller weather_scrapping.py --onefile -w
665 INFO: PyInstaller: 6.8.0, contrib hooks: 2024.7
665 INFO: Python: 3.12.3 (conda)
690 INFO: Platform: Windows-11-10.0.22631-SP0
690 INFO: Python environment: C:\Users\user\anaconda3\envs\acpogram
691 INFO: wrote C:\D file\ad comp\final\weather_scrapping.spec
698 INFO: Module search paths (PYTHONPATH):
['C:\\Users\\user\\anaconda3\\envs\\acpogram\\Scripts\\pyinstaller.exe',
 'C:\\Users\\user\\anaconda3\\envs\\acpogram\\python312.zip',
 'C:\\Users\\user\\anaconda3\\envs\\acpogram\\DLLs',
 'C:\\Users\\user\\anaconda3\\envs\\acpogram\\Lib',
 'C:\\Users\\user\\anaconda3\\envs\\acpogram',
 'C:\\Users\\user\\AppData\\Roaming\\Python\\Python312\\site-packages',
 'C:\\Users\\user\\AppData\\Roaming\\Python\\Python312\\site-packages\\win32',
 'C:\\Users\\user\\AppData\\Roaming\\Python\\Python312\\site-packages\\win32\\lib',
 'C:\\Users\\user\\AppData\\Roaming\\Python\\Python312\\site-packages\\Pythonwin',
 'C:\\Users\\user\\anaconda3\\envs\\acpogram\\Lib\\site-packages',
 'C:\\Users\\user\\anaconda3\\envs\\acpogram\\Lib\\site-packages\\win32',
 'C:\\Users\\user\\anaconda3\\envs\\acpogram\\Lib\\site-packages\\win32\\lib',
 'C:\\Users\\user\\anaconda3\\envs\\acpogram\\Lib\\site-packages\\Pythonwin',
 'C:\\D file\\ad comp\\final']
1310 INFO: checking Analysis
1310 INFO: Building Analysis because Analysis-00.toc is non existent
1311 INFO: Running Analysis Analysis-00.toc
1311 INFO: Target bytecode optimization level: 0
1311 INFO: Initializing module dependency graph...
1311 INFO: Caching module graph hooks...
1325 INFO: Analyzing base_library.zip ...
3967 INFO: Loading module hook 'hook-encodings.py' from 'C:\\Users\\user\\anaconda3\\envs\\acpogram\\Lib\\site-packages\
```

Output





Conclusion

This program effectively combines web scraping, data processing, and a user-friendly interface to deliver comprehensive weather information for any specified location. This functionality is useful for users needing real-time weather updates and forecasts for planning and decision-making.