**PNA Isochrone Map Generator Tool**

**Overview**

The **PNA Isochrone Map Generator** is a web-based application designed to visualize pharmacy data using interactive maps. The tool allows users to:

1. Upload pharmacy data (in CSV format) and geographic boundary data (in GeoJSON format).
2. Generate an interactive map displaying pharmacy locations, with isochrone layers representing travel times to the pharmacies.
3. Customize the maps based on the mode of travel (walking, cycling, driving, driving-traffic) and travel times (5-30 minutes).

This tool is built using Python, with a focus on simplicity and flexibility, and it integrates geospatial visualizations using the [**Folium** library](https://python-visualization.github.io/folium/latest/getting_started.html) and [**Mapbox API** for isochrones](https://docs.mapbox.com/api/navigation/isochrone/).

**Key Features**

* **Pharmacy Data Visualization**: Displays pharmacy locations on a map with customizable markers that show key details like name, address, opening hours, and organization type.
* **Isochrone Map**: Generates isochrone layers based on travel time and mode, enabling users to see areas accessible within specific time ranges.
* **Interactive Maps**: The maps allow for zooming, panning, and clicking on markers to reveal more detailed information.
* **Multiple Travel Modes**: Includes walking, cycling, driving, and driving with traffic options for isochrone calculations.
* **Custom Color Assignment**: Assigns colors to pharmacies based on local authority (LA) or other categories for better visualization.

**Python Libraries Used**

The tool leverages the following Python libraries:

* **Streamlit** (streamlit): A lightweight framework for creating interactive web applications.
* **Pandas** (pandas): For data manipulation and processing of pharmacy data.
* **GeoPandas** (geopandas): Extends Pandas to handle geospatial data.
* **Folium** (folium): For generating interactive Leaflet maps.
* **Streamlit Folium** (streamlit\_folium): Allows embedding of Folium maps in Streamlit applications.
* **Requests** (requests): Used to fetch isochrone data from the Mapbox API.

**Installation**

**1. Create a Python Virtual Environment**

It is recommended to create a virtual environment to isolate the dependencies required by this tool. Please see the attached documentation on ‘How to create a virtual python environment’.

For more details on Python and Anaconda, please see the following links; [venv — Creation of virtual environments — Python 3.13.0 documentation](https://docs.python.org/3/library/venv.html) and [Managing environments — Anaconda documentation](https://docs.anaconda.com/navigator/tutorials/manage-environments/).

**2. Install Required Libraries**

To install all necessary libraries, please use the requirements.txt which contained all python libraries used in creating the tool. To install the dependencies, use the following command:

pip install -r requirements.txt

**3. Add Mapbox Credentials**

The tool relies on the Mapbox Isochrone API for generating isochrones. To use this functionality, you need to:

1. Sign up for a [Mapbox](https://www.mapbox.com/mapbox-studio) account and get an API access token.
2. Store your access token in a credentials.py file in the root directory by replacing 'YOUR\_MAPBOX\_ACCESS\_TOKEN' with you access credential.

# credentials.py

access\_token = 'YOUR\_MAPBOX\_ACCESS\_TOKEN'

**Running the Application**

To start the Streamlit app, run the following command:

streamlit run PNA \_Map\_Generator.py

The application will launch in your web browser, where you can upload your pharmacy data and boundary files.

**User Instructions**

**1. Upload Files**

* **Pharmacy CSV File**: This should contain information about the pharmacies, including names, addresses, postcodes, and opening hours. The pharmacy data used for this tool was pulled from the [NHS Business Services Authority Open Data portal – Consolidated Pharmaceutical List 2024-2025 Quarter 1](https://opendata.nhsbsa.net/dataset/consolidated-pharmaceutical-list/resource/60da93f7-3100-4ce1-995f-f2dcfb766949)
* **GeoJSON File**: This should contain the boundary information of the area where the pharmacies are located.

**2. Configure Map Settings**

* **Select Day**: Choose whether you want to visualize pharmacy activity on a Weekday, Weekend\_Saturday, or Weekend\_Sunday.
* **Select Travel Mode**: Choose from walking, cycling, driving, or driving-traffic.
* **Select Travel Time**: Set the maximum travel time (in minutes) for which you want to generate isochrones.

**3. Generate Maps**

* Click "Create Isochrone Map" to generate the map with the selected settings. The map will be displayed in the main window.

**4. Reset Functionality**

* Use the **Reset** button in the sidebar to clear the current state and upload new data.

**Example Use Case**

A public health department may use the **PNA Isochrone Map Generator** to analyse accessibility to pharmacies in their jurisdiction. By uploading pharmacy data and geographic boundaries, they can visualize:

* Which pharmacies are open on different days.
* The areas of coverage based on travel times using different modes of transportation.

**Additional Notes**

* **Customization**: The tool's layout and visual styles (e.g., marker colors and popups) can be easily customized in the source code.
* **Performance**: For large datasets or complex geojson files, the map generation process might take longer. Optimizing the data size and complexity can improve performance.
* **Other File Dependencies**: The tool also depends on a csv file named ‘ukpostcodes.csv’ stored in the data folder. The file contains the coordinates for postcodes in the UK, it is used to link coordinates[Longitude, Latitude] to pharmacy postcode.

This tool provides a straightforward way to visualize pharmacy access in a geographic context, with options to adjust travel time and mode. The interactivity of the maps allows for dynamic exploration of accessibility across different regions.