Global Terrorism Analysis

User Manual

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Introduction

The Global Terrorism Analysis system aims to provide users an interactive system to better understand trends in global terrorism.

Our project visualizes the Global Terrorism Database from various perspectives and allows the user to explore the data by customizing our visualizations to meet their needs. Terrorism is an increasing concern despite recent progress along other development goals. The Global Terrorism Database provides a rich resource of information about how terrorism has changed over time and differs by region or country. Our project seeks to make the insights from the data discoverable to all.

This project is part of the United Nations' ICT4SD (Information and Communications Technology for Sustainable Development) program in the OICT department.

Official GitHub repository:

https://github.com/violaciao/Global-Terrorism-Analysis

Getting Started

Dependencies

- Python 3.3+

Mandatory dependencies

- Numpy
- Pandas
- Matplotlib
- Seaborn
- Scipy
- Basemap
- Folium
- Jupyter Notebook
- Ipywidgets
- Json

Installing

Skip this part if you have all the dependencies listed above installed.

View the Notebook

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Our project is found here and is part of the UN's ICT4SD platform. You can view a static version using GitHub's nbviewer here. However, in order to customize and rerun the visualizations, you will need Jupyter Notebook and all the related packages installed on your computer.

Using Command-Line

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We recommend using command-line to perform these tasks. Mac users can access command-line using the Terminal software. Windows users may install and use a terminal emulator such as Git Bash or use the Command Prompt software, which comes installed on most Windows machines. We recommend using Git Bash.

Install Python

You will need to have Python installed before you can use Jupyter Notebook. We recommend using Anaconda, an open-source distribution of Python that conveniently includes Jupyter Notebook and most of the packages you'll need.

Check if you already have Anaconda

If you think you may already have Anaconda on your computer, you can easily check using command-line:

```
conda --version
```

This command will verify which version of Anaconda you have. The creators of this project used Anaconda 4.2.9.

Download Anaconda

If you don't have Anaconda, go here to download it. Please select the 3.5 version. https://www.continuum.io/downloads

Installing Required Packages

Anaconda comes with most packages required for our project. Matplotlib, Numpy, Pandas, Scipy, and Ipywidgets are part of the Anaconda installer.

Update Ipywidgets

Some recent changes have been made to ipywidgets. To update ipywidgets, use the commands:

```
conda update ipywidgets
```

and

```
jupyter nbextension enable --py --sys-prefix widgetsnbextension
```

Install standard packages

Use the following commands in command-line to install Seaborn and Folium:

```
pip install Seaborn
```

```
pip install Folium
```

Alternatively, use Anaconda navigator to install Seaborn and Folium:

1. Open Anaconda Navigator
2. Choose Environments
3. Select the kernel you wish to view (most likely, the root kernel)
4. Select “not installed” on the far left
5. Search for Seaborn or Folium
6. Select the package, and select “Apply.”

Install Basemap

The official guide to installing Basemap is here. There are three options for how to download Basemap:

Option 1: If you have a windows computer and Python 3.3 or earlier, you can directly use the installers provided here.

Option 2: If you have a windows computer, but you have Python 3.4 or beyond, you can use the "unofficial" installers here.

a) Search for "basemap." The file names contain "32" or "64" depending on whether it's appropriate for a 32-bit or 64-bit version of Windows. The file names also have a number representing the version of Python, so a filename containing "cp35" is compatible with Python 3.5.

b) Download the appropriate file for your system. Now use the following command:

```
Pip install
'Downloads\basemap-1.0.8-cp35-none-win_amd64.whl'
```

The expression in quotation marks should be the full path where the download is saved.

c) You should get a message saying "successfully installed basemap."

Option 3: You can download the source code and follow the instructions in the video tutorial.

Without Required Packages

Our program is not designed to run on a computer that does not have Python 3, numpy, pandas, scipy, iwidgets, folium, and seaborn. These requirements are fundamental for all of our visualizations.

Without Basemap, the density plot will not render, but the other visualizations will be unaffected.

Installing Jupyter Notebook

Jupyter Notebook is automatically installed along with Anaconda. Full instructions for using Jupyter Notebook can be found here. You can access jupyter notebook by typing in command line:

```
jupyter notebook
```

You can also open Jupyter notebook with Anaconda Navigator.

Data Downloading

Global Terrorism Dataset

The database we are using is Global Terrorism Database. This database was compiled by University of Maryland Researchers.

> **NB:** GTD lacks the data in the year 1993. Exceptions and error catches been handled in our system.
>
> To start with the original dataset, do the following:
> **Option 1**
>
> - If you wish to view our notebook, and you don't need to run our unit-tests, you can simply use the data on the git repository. When you clone the repository, you will also receive the relevant portion of the data called 'gtd_wholedata_selected.csv.'
>
> **Option 2**
>
> - To use our prepared dataset, refer to the following Google drive:
>
> https://drive.google.com/open?id=0B7yioh-vZyU7U2xscHFKdnpubVk
>
> - Do not change the filename and save it in the same directory as the "data" module. The functions will now be able to find your file.

Geographical Dataset

The world.geo.json file is used for plotting Choropleth Map and extracting the whole list of country names.

- The original json file was found here:

  https://raw.githubusercontent.com/johan/world.geo.json/master/countries.geo.json

- This json file includes:
  - Coordinates of 180 countries to plot boundaries
  - Country names and abbreviations
- The “data” module also contains the functions that convert this dataset. If you download our entire repository, the functions will be able to find the file already. If you reorganize the files in the repository, be sure to change the file path in the load_json_file function to represent where you have saved the json file in your system.

Interface

Users will be using Jupyter Notebook to experience all the interactive visualizations with our GTD data. We've modified this jupyter notebook extensively to promote a positive user experience. For data scientists who already have common tools such as Anaconda, Jupyter, and the required packages, starting the interface may be the only step required:

- Use Git to either clone or download the following Global Terrorism Analysis project's repository to local directory
    - https://github.com/violaciao/Global-Terrorism-Analysis
- Run the Global Terrorism Analysis - ICT4SD.ipynb with terminal
- In the menu bar, select:
    - "Kernel" -> "Restart & Run All"
- Begin your Global Terrorism Analysis journey
- Please feel free to click on the header picture to go to the GitHub repository under UN_OICT website.

- Whenever a user wishes to start fresh with a default notebook, the user can use the kernel options on the toolbar to restart it and run all cells again.

Interactive Visualizations

Statistical Overview - Line Plot

Line Plot (in “Country Scale Overview” section) provides users with a straightforward way to show the overall trend of terror attacks from 1970 to 2015.

- Pick a country or the “whole world” to see the line graph overtime for that country and a paragraph highlighting some of the most important facts.
- A detailed statistical analysis based on your selected country (or the whole world) can be

Geographic Timeline Variation - Choropleth Map

- Pick an indication (Casualties / Kills / Wounds)
- Scroll the slider bar to choose a year
- Visualize the Geo-heat Map, a.k.a. Choropleth Map, to get a better understanding of the terror attacks patterns from a geographical view, and compare the terror attack damage levels among all countries in the world in the chosen year.

NB: No data available in 1993. This exception has been handled.

Geographic Attack Density - Geo2D

- Pick any time interval you like
- Pick a background mapping style

During the time slot chosen by the user, the more dense and the larger the number of red plot within certain area, the more frequently this region or country was attacked by terrorists.

Regional Heatmap Over Time - Heatmap

- Pick a region from the dropdown box;
- Pick a indication (Casualties / Kills / Wounds);
- Pick a color pallette you like.

Users can:

- Vertically compare the countries terror attack trends listed on the y-axis in the chosen region's heatmap;
- Horizontally observe countries' attack patterns over the 45 years' time period.

The heatmap indicator is presented right under the map, and the darker the color, the more severe damages were caused by the terror attacks in the corresponding country.


Global Terrorism Analysis

Occurrence Scatter Over Time - Bubble Chart

- Pick a year as the end of the five year range to view
- The bubble chart features have the following meanings:
  i. Bubble: Each bubble represents a country
  ii. Bubble size: All time terrorism event occurrences within the country
  iii. X-axis: Casualties (wounded or killed) within the five year period
  iv. Y-axis: Terrorism events within the five year period
  v. Bubble color: Country region

Attack Type Ranking Overview - Dot Plot

The dot plot shows the “top 20” countries who rank the highest for the chosen attack type and the chosen years.

- Pick a metric, either casualties or occurrences. Casualties includes killed or wounded, and occurrences refers to terrorism events.
- Pick an attack type. These refer to the methods by which the terrorists sought to inflict harm.

- Pick a time interval. The first year is inclusive and the second year is exclusive.

Please feel free to give us your feedback. We would love to hear any ideas and feedbacks on our analysis.

Citation

National Consortium for the Study of Terrorism and Responses to Terrorism (START). (2016). Global Terrorism Database ‘gtd_wholedata_selected.csv.’

Retrieved from https://www.start.umd.edu/gtd