Data Visualization Report

(DASC-5305-002)

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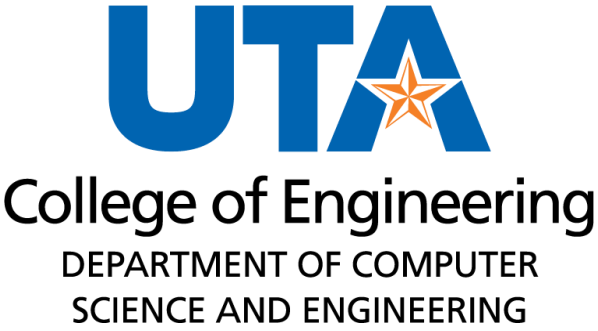

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Introduction

This report examines data on terrorist attacks in the Middle East and North Africa **(MENA) region** (i.e. region-10.2.csv). The dataset offers in-depth insights into different types of attacks, the groups targeted, and the organizations behind them over a defined timeframe. Grasping these patterns is essential for policymakers, security agencies, and researchers like data scientists to observe patterns and evaluate future threats and formulate effective countermeasures.

Objective

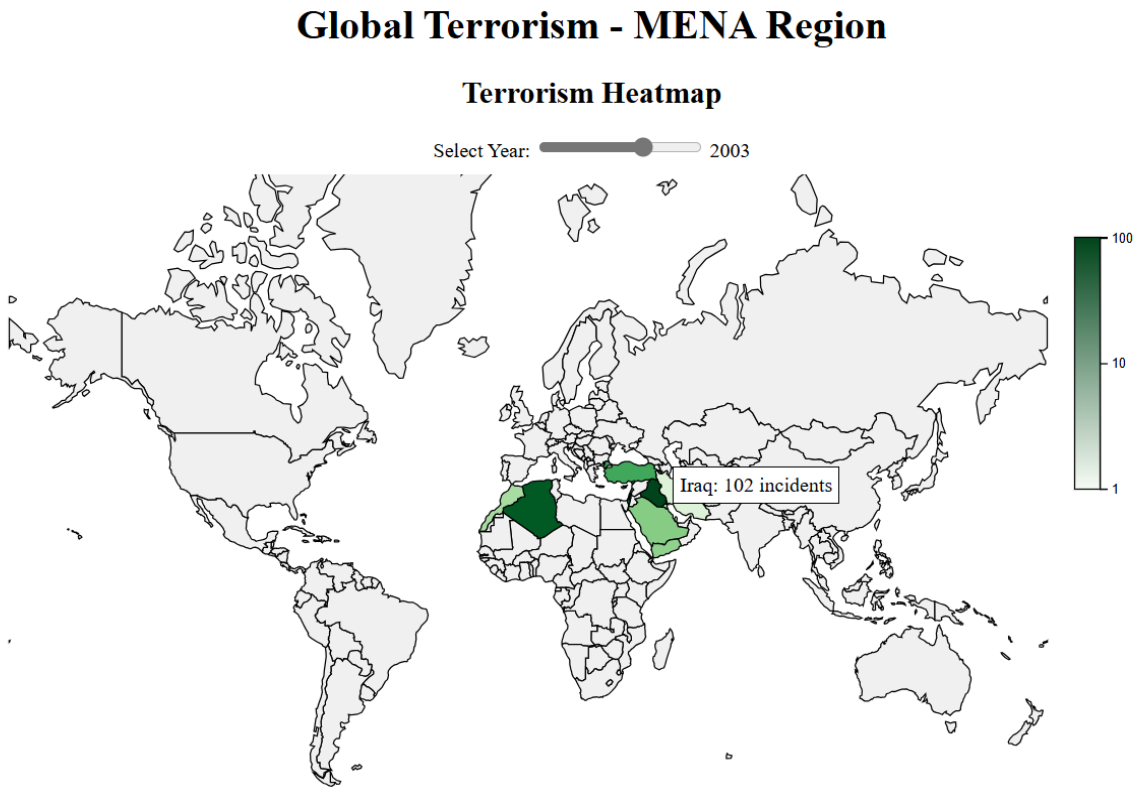
The key objectives of this analysis are:

- Identify areas of high risk through mapping terrorist attack occurrence throughout the MENA region.
- Analyze the most active terror organizations and how they trend over different years.
- Look into the occurrence and evolution of different types of attacks over the years.
- Analyze the relationship between the types of targets and the effects of attacks.
- Provide interactive visualizations to enable us to find patterns and correlations effectively.

Visualization: Global Terrorism Trends in MENA region

1.1 Global Terrorism Heatmap (D3.js)

The heatmap shows the number of terrorist attacks by country in a choropleth map. The color is darker where there were more incidents, so it's easy to spot where there were multiple attacks. There's a year ***slider*** that helps us observe how things evolve over time, and tooltips provide precise information on hovering over a country. Trends like highest recorded incidents in *Iraq* and increase and decrease in other countries in the same region over the years, really stand out in this visualization.

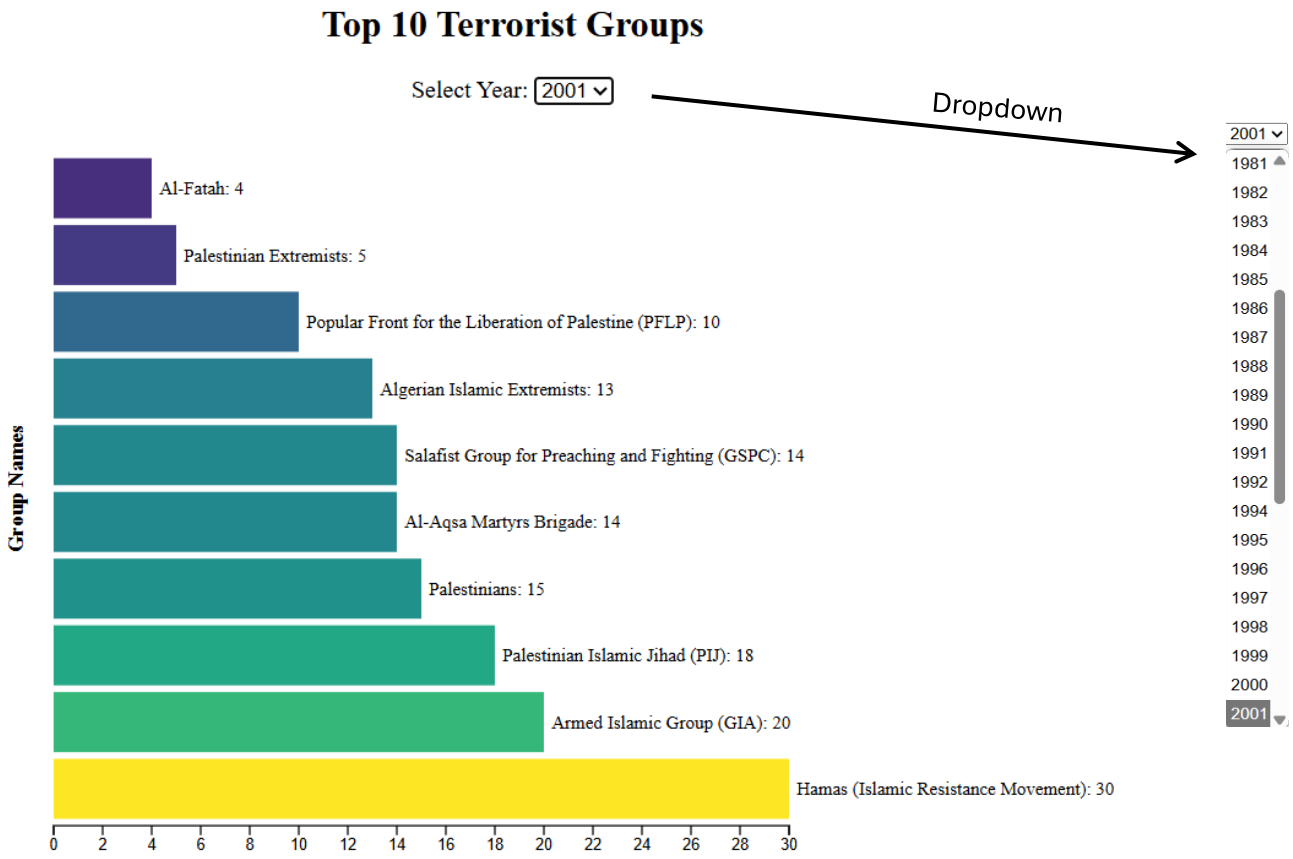


Here we can see Iraq has darkest color displaying the highest number incidents (102 incidents) recorded in the year 2003.

1.2 Top 10 Terrorist Groups Bar Chart (D3.js)

This animated bar chart visually demonstrates the top 10 terrorist groups by number of incidents. The ***dropdown*** enables sorting data by year, indicating how different groups increased or decreased in significance over time.

Comparisons are continuous from year to year because of animated transitions, and a color scale distinguishes between groups based on attack severity. ***Hover*** effects provide additional information about each group's activity. The graph illustrates trends such as the dominance of specific groups over specific time periods and the emergence of new groups over time.



We can see for the selected year 2001 *Hamas* is the top group with the greatest number of incident counts followed by GIA, PIJ and so on.

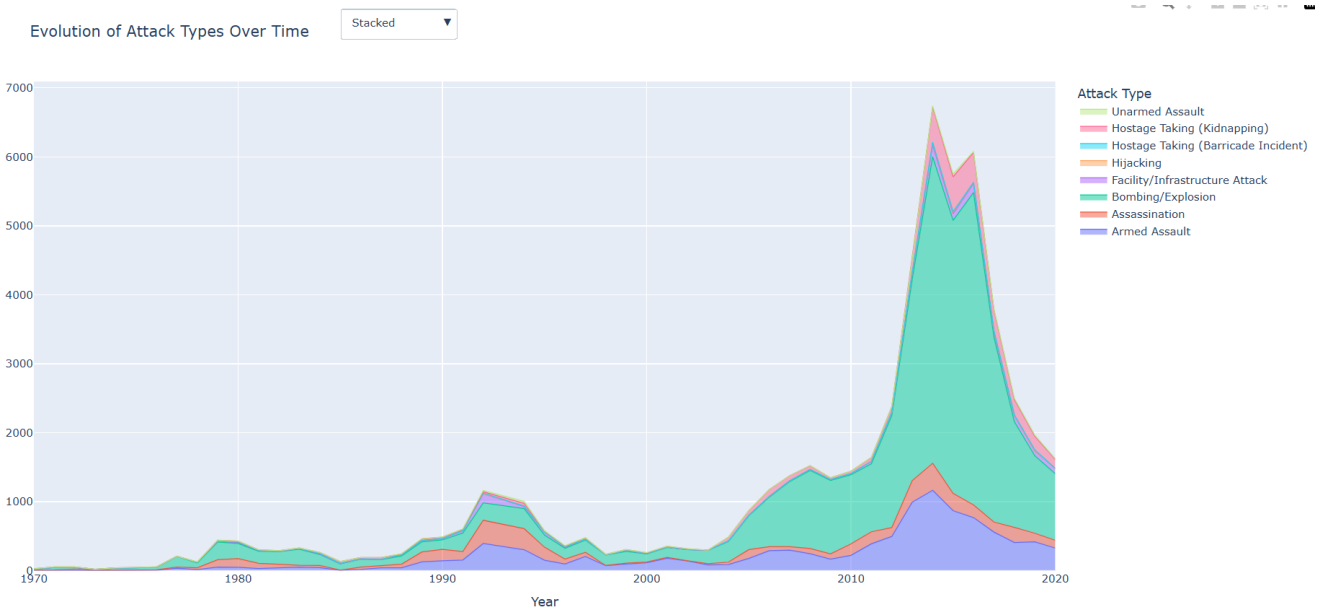
Instructions to Run code (Using VS Code)

- Index.html: To run this, right click and select “Open with Live server”
- D3_plot.js: Run/execute not required (but both the files needs to be in same folder)

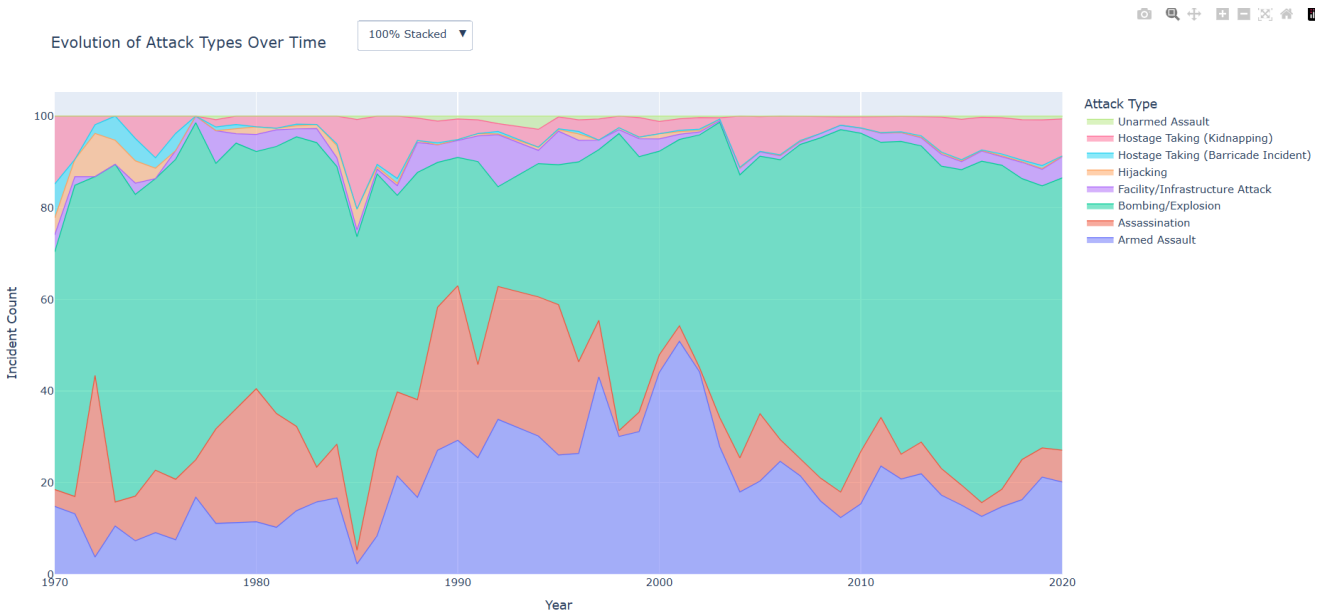
2. Attack Types Over Time (Plotly)

Stacked area chart illustrates the rate of various kinds of attacks throughout years. A choice to navigate between stacked, grouped, and 100% stacked modes allows us to consider trends from varying perspectives. Hovering feature illustrates detailed statistics of each attack kind in a year.

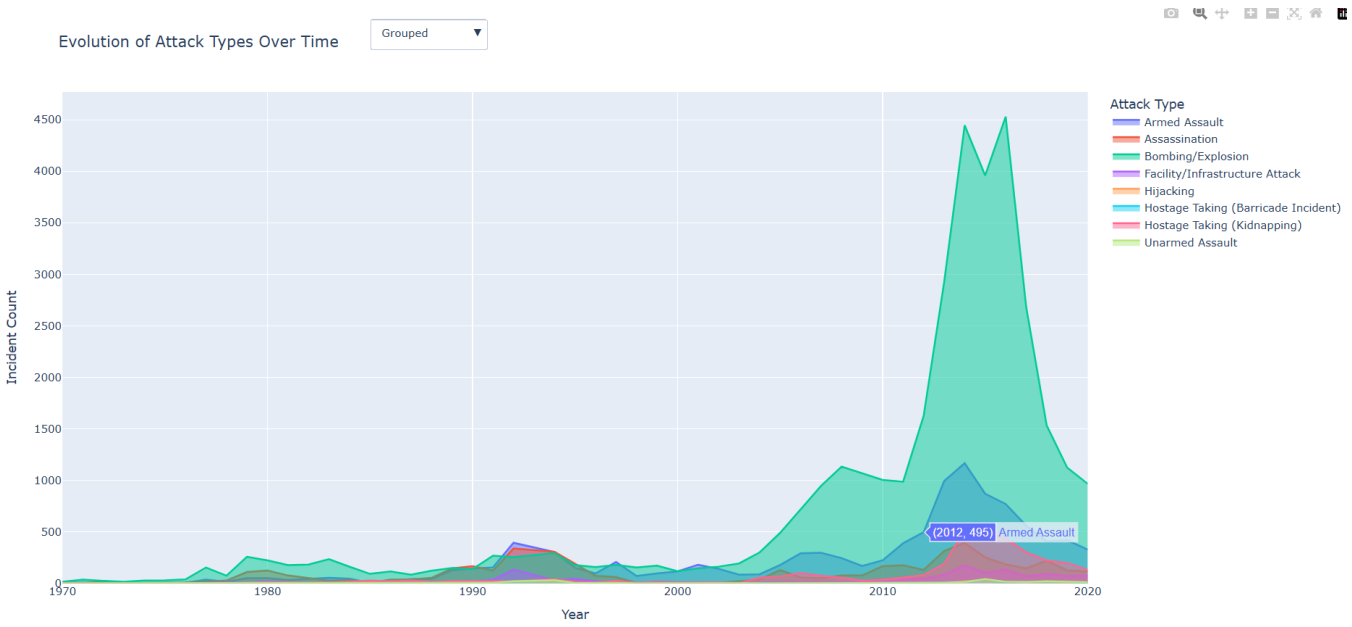
2.1 Stacked View:



2.2 100% Stacked View:



2.3 Grouped View:



If we hover over a particular group, its respective year and count of incidents is visible.

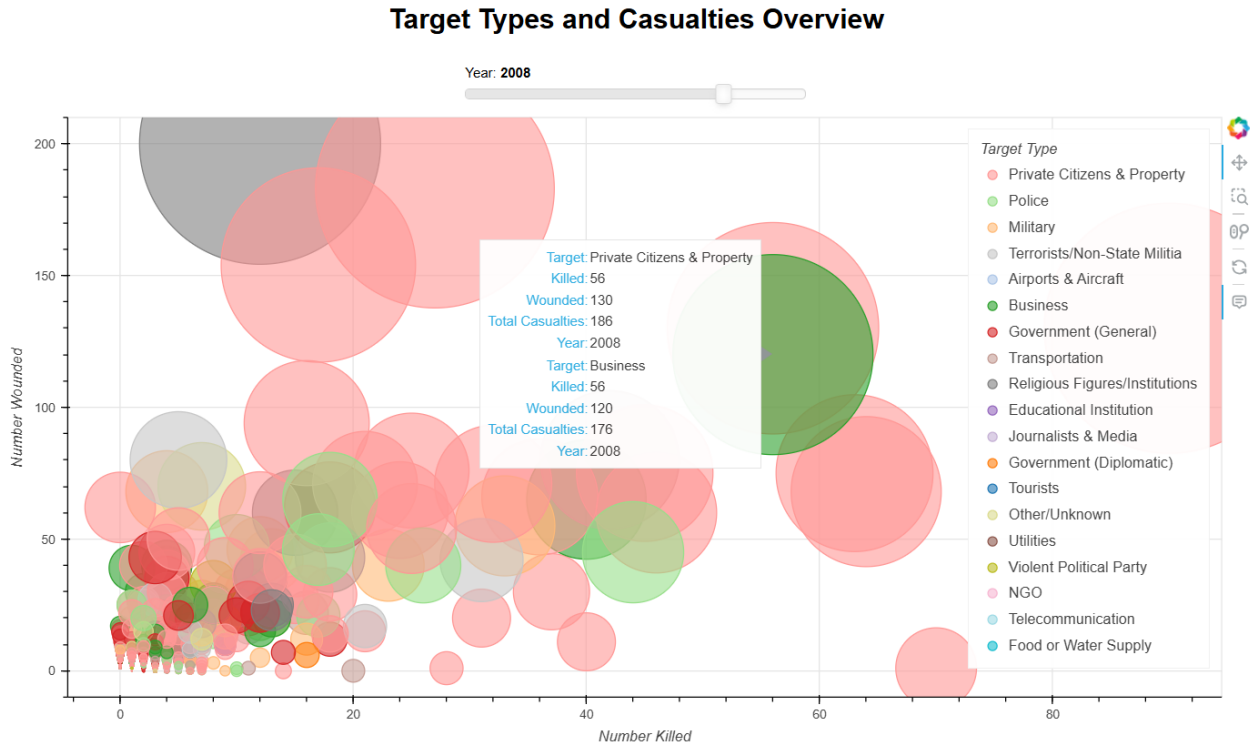
As observed from this visualization that Hijacking and unarmed attack have a less frequency, whereas other types vary in frequency based on geopolitical events.

Instructions to Run code (Using VS Code)

plotly_plot.py: Click on the “Run Python File” and it will redirect to web browser to show visualization.

3. Target Types and Casualties (Bokeh)

The ***scatter plot*** shows the relationship between the number of casualties and types of targets. Points are shaded by target category, with their size indicating total casualties (wounded + killed). The hover option provides individual details on each data point, and a range slider provides the option to filter by year. It also highlights the varying severity of assaults on different target groups.



The visualization indicates the types of targets with the greatest casualties, with Private citizens and Business locations being among the highest casualty types for the year 2008.

Instructions to Run code (Using VS Code):

bokeh_plot.py: Click on the “Run Python File” and it will redirect to web browser to show visualization.

Conclusion

We got to see interactive exploration of global terrorism trends by identifying high-risk regions, attack patterns, and group activities. The visualizations enhanced data comprehension and provided valuable insights.