Cluster Bomb: Uncovering Patterns in Terrorist Group Beliefs and Attacks

COM-480 Data Visualization: Course Project - Milestone 2

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1 Introduction

Our work will revolve around the extensively studied and impressively rich **Global Terrorism Database** (GTD). The GTD includes data on over 200,000 international terrorist attacks since 1970 and has information on over 100 features for each terrorist attack. We direct our analysis at the differences between terrorist groups with different ideologies. A prototype of the website can be viewed **here**. Please note that most of the visualizations aren't functional yet. We replace missing visualizations with hand-drawn sketches.

In this report, we will go over each section that we aim to present on our final website. For each section, we will present the visualizations that we are building and highlight which parts of the course materials will be used for these sections.

2 Structure of the website

Our main research question for this project is: *What are the differences between the characteristics of terrorist groups with different ideologies?* To answer this question, we want to gain an understanding of the differences between terrorist groups, including their respective span of attacks, strategies employed, ideologies, goals and targets.

The results will be presented on our website in three parts. First, we present a general overview of terrorist attacks and highlight several trends over time. Second, we discuss the different ideologies that are considered in the data and make a comparative analysis. Last, we focus on how terrorist groups differ between ideologies. In the following sections of this report, we will discuss the three parts in more detail. We highlight the different plots that will be shown in each section, and discuss which course material we will use.

Part 1: A general analysis of terrorism over time

In the first part of the website, we will present the viewer with a general overview of trends in terrorism. In this part we will have at least one plot. We will mainly use the material from the lecture on maps (28th of april), which discusses different types of maps, projections and GeoJSON.

- *Interactive map of terrorist attacks over time:* Our main visualization in this part is an interactive map of terrorist attacks around the world, made using the **Kepler.gl** tool. This map contains arcs connecting the country of origin of each terrorist group to the location of their attacks.
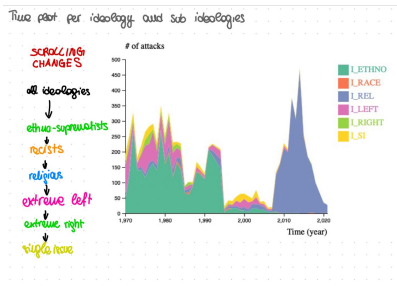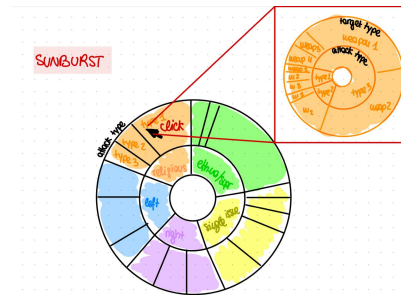

(a) Map of terrorist attacks

Part 2: A comparative analysis of terrorism by ideology

After having presented a general overview in the first part, we now consider the differences between terrorist attacks from groups with different ideologies. In this part, we present two visualizations made using **D3.js**:

- **Attack frequency by ideology:** A D3 **Stacked area chart** plot will show how the yearly frequency of attacks evolves over time for each of the five main ideologies (ethno-nationalism, religious, extreme left, extreme right, racism). The plot will evolve when the user scrolls by switching between each of the 5 main ideologies and displaying the stacked area chart for their respective sub-ideologies.
- **Attack types and targets:** A D3 **Zoomable Sunburst** diagram will show how attack strategy differs by ideology. The inner ring will cover the ideologies, the second ring will split the attacks by attack type and the outer ring will separate them by target type. Ideally, terrorist groups would be identified at the last layer.
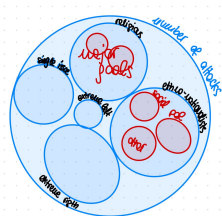

(a) Sketch of stacked area plot
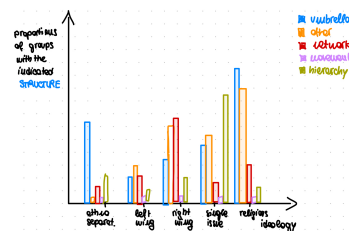

(b) Sketch of zoomable sunburst

Part 3: Differences between terrorist groups from different ideologies

Last, we take a closer look at the terrorist groups themselves. We consider their structure, the recruitment strategies and their financing.

- **Group philosophy**: We first analyze the founding philosophy of different terrorist groups. After preprocessing these textual features, such as the removal of stopwords and stemming, we will identify the key words that characterize the founding philosophies. We will then make a D3 **Circle packing chart** based on the ideologies and the founding philosophies of groups.
- **Group structure and recruitment strategy**: We will combine two D3 **Grouped bar charts** into a single plot using a toggle button. Both plots group the data by the five ideologies. The first plot shows the main recruitment strategies of the groups, whereas the second plot shows the different structures of the groups.

(a) Sketch of circle packing

(b) Sketch of grouped bar charts

3   Going further

Our main goal is to create an interactive site that is easy to use; we will limit the use of buttons and other widgets so that the only action required from the user is linear scrolling. We would like to add another visualization in the general part; perhaps a heatmap showing the regions most affected by terrorist attacks.

Another idea would be for the group section, to zoom in specific attacks from groups belonging to different ideologies to illustrate the differences in attack types as the user scrolls.

The website is not rendering the fading effect that should, however, if open locally and not from the github pages, it performs the fading effect while scrolling.