

VISUALIZATION FINAL REPORT

Video link: <https://youtu.be/NFCZmw2iHLs>

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Introduction:

The world is suffering and bleeding day by day. Too many people are dying among both civilians and soldiers. Words are not needed when you know they will not change this horrifying scenario. How can we fight terrorism, then? The answer is participation, the answer is comprehension. The world needs to stay logical, to not fill its heart with anger, because anger carries blindness.

Dataset:

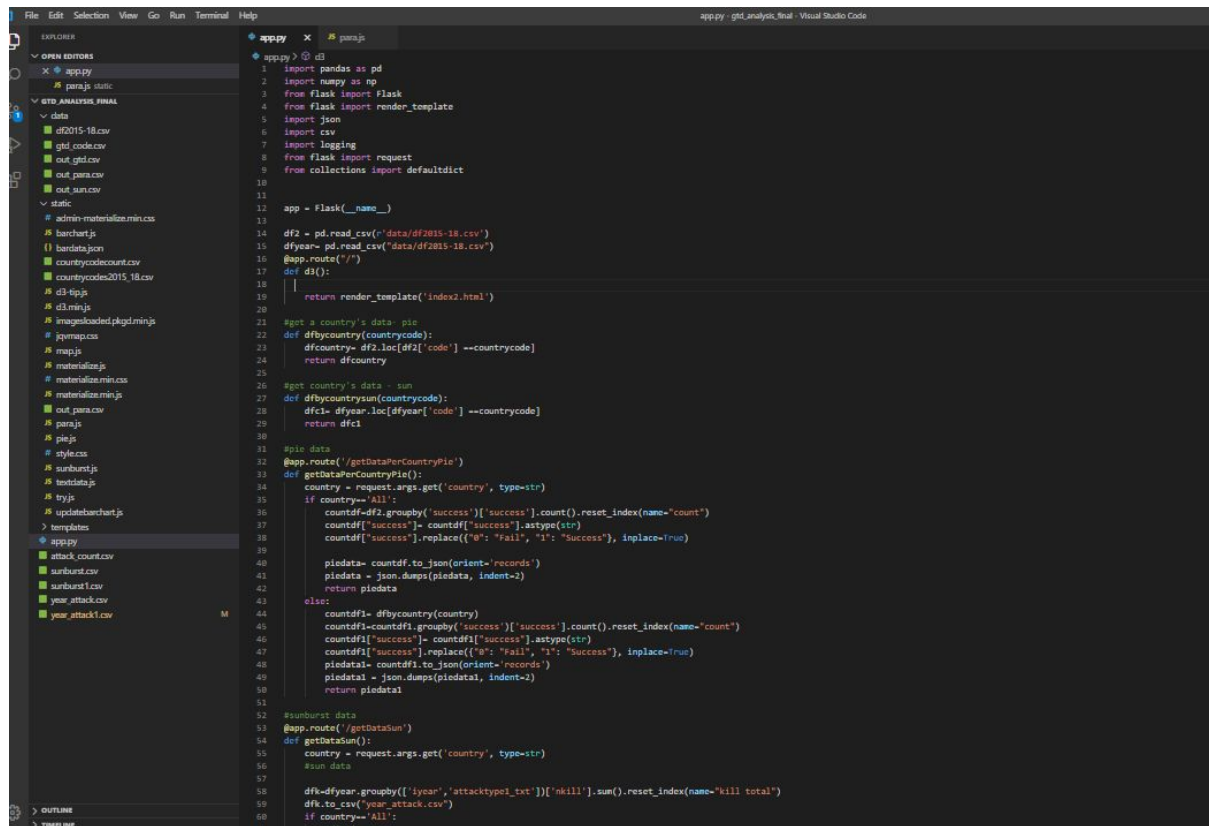
The Global Terrorism Database (GTD)TM is the most comprehensive unclassified database of terrorist attacks in the world. The National Consortium for the Study of Terrorism and Responses to Terrorism (START) makes the GTDTM available via <https://gtd.terrorismdata.com/> in an effort to increase understanding of terrorist violence, so that it can be more readily studied and defeated. For this project we are using the dataset — '*Data on terrorist attacks between 1970–2018*' available on this website under *individual research only use* license. The Global Terrorism Database advisory board estimated that they only collected data on roughly 15% of attacks for that year. Some of the more standout columns include; Date columns, region, county, attack type, target type and the number of kills. There is no data of 1993 as enough data was not collected that year. You can read more about the data collection process and finer details about the dataset on the codebook at <http://start.umd.edu/gtd/downloads/Codebook.pdf>.

For the scope of this project we have used gtd from 2015 to 2018.

Approach:

Using D3.js and python flask, we created a visual analytics dashboard which gives insight into the data. In the app.py file, the main logic for data handling and processing is written. Data from the csv file is first loaded into pandas dataframe and then it is aggregated and manipulated for different charts as per the requirements.

Code Structure:



```
File Edit Selection View Go Run Terminal Help
app.py ght_analysis_final - Visual Studio Code

EXPLORER
  app.py
  para.js static
  GIT_ANALYSIS_FINAL
    data
      df2015-18.csv
      ght_codes.csv
      out_ghl.csv
      out_para.csv
      out_sun.csv
    static
      admin-materialize.min.css
      barchart.js
      bardata.json
      countrycodescount.csv
      countrycodes2015_18.csv
      d3-tips
      d3.min.js
      imagesloaded.pkgd.min.js
      jquery.min.js
      map.js
      materialize.js
      materialize.min.css
      materialize.min.js
      out_para.csv
      para.js
      pie.js
      style.css
      sunburst.js
      testdata.js
      try.js
      updatebarchart.js
    templates
      app.py
      attack_count.csv
      sunburst.csv
      sunburst1.csv
      year_attack.csv
      year_attack1.csv

  OUTLINE
  TIMELINE

app.py > d3
1 import pandas as pd
2 import numpy as np
3 from flask import Flask
4 from flask import render_template
5 import json
6 import csv
7 import logging
8 from flask import request
9 from collections import defaultdict
10
11
12 app = Flask(__name__)
13
14 df2 = pd.read_csv('data/df2015-18.csv')
15 dfyear = pd.read_csv('data/df2015-18.csv')
16 @app.route('/')
17 def d3():
18     |
19     | return render_template('index2.html')
20
21 #get a country's data pie
22 def dfbycountry(countrycode):
23     dfcountry = df2.loc[df2['code'] == countrycode]
24     return dfcountry
25
26 #get country's data - sun
27 def dfbycountrysun(countrycode):
28     dfc1 = dfyear.loc[dfyear['code'] == countrycode]
29     return dfc1
30
31 #pie data
32 @app.route('/getDataPerCountryPie')
33 def getDataPerCountryPie():
34     country = request.args.get('country', type=str)
35     if country == 'all':
36         countdf = df2.groupby('success')['success'].count().reset_index(name='count')
37         countdf['success'] = countdf['success'].astype(str)
38         countdf['success'].replace({'0': 'Fail', '1': 'Success'}, inplace=True)
39
40         piedata = countdf.to_json(orient='records')
41         piedata = json.dumps(piedata, indent=2)
42         return piedata
43     else:
44         countdf1 = dfbycountry(country)
45         countdf1 = countdf1.groupby('success')['success'].count().reset_index(name='count')
46         countdf1['success'] = countdf1['success'].astype(str)
47         countdf1['success'].replace({'0': 'Fail', '1': 'Success'}, inplace=True)
48         piedata1 = countdf1.to_json(orient='records')
49         piedata1 = json.dumps(piedata1, indent=2)
50         return piedata1
51
52 #sunburst data
53 @app.route('/getDataSun')
54 def getDataSun():
55     country = request.args.get('country', type=str)
56     #sun data
57
58     df1 = dfyear.groupby(['year', 'attacktype1_txt'])['kill'].sum().reset_index(name='kill total')
59     df1.to_csv('year_attack.csv')
60     if country == 'all':
61         |
```

Fig 1: Code Structure

Dashboard:

Dashboard has multiple charts, all of them are dynamically created from the data received fetched from the flask backend. Details and functionality about each graph is given below.

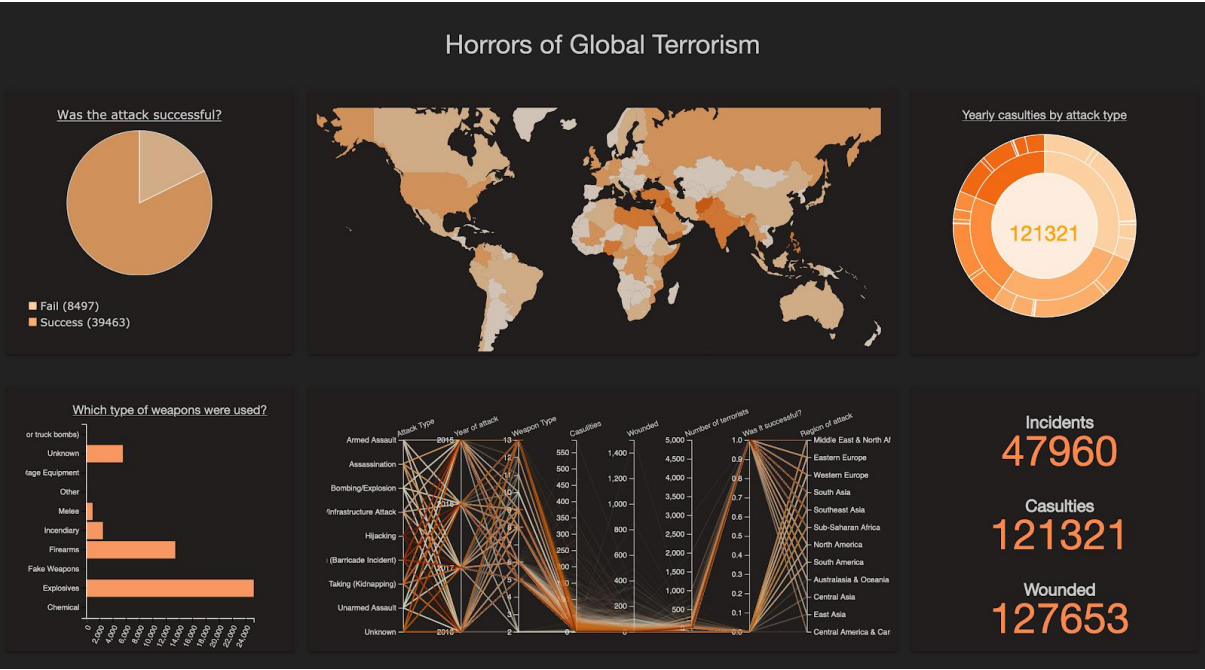


Fig 2: Dashboard for the world data

Number of Attacks per Country(Choropleth)

The Choropleth map for the world is plotted in the middle and the chart is color coded according to the frequency of the attacks in each country. Users can easily identify the countries with greater numbers of attacks. Map is zoomable and on hovering over the countries, a tooltip shows the details like country name and number of attacks.

This chart works as the main driver of other charts. Users can click on any of the country and all the other charts will be updated with the data corresponding to that specific country. For deselecting the country, a click on the ocean or non land area will take back to the world view.

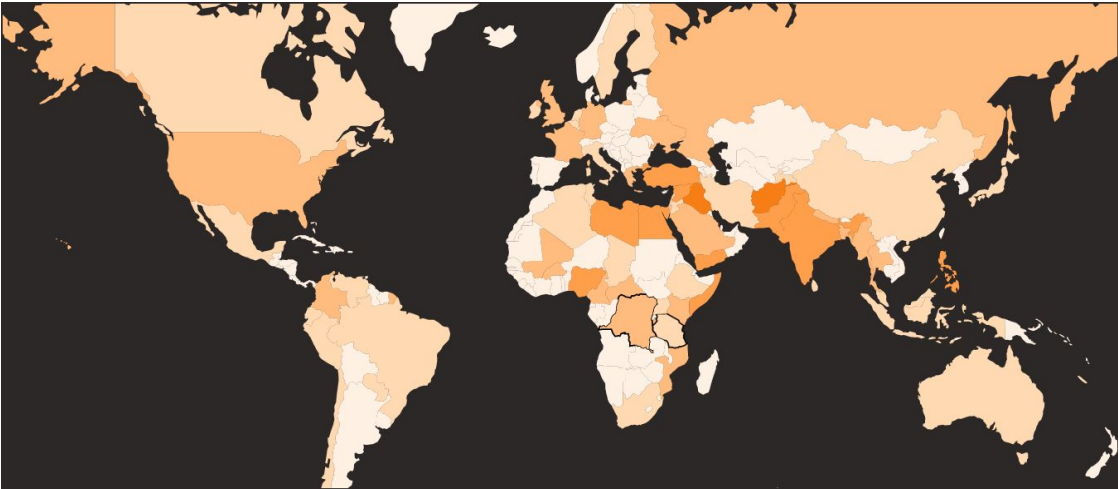


Fig 2: Choropleth map for the world data

Top five countries for the terrorist attacks are as follows:

1. Iran (7938)
2. Afghanistan (5480)
3. India (2872)
4. Pakistan (2599)
5. Nigeria (2108)

Relationship between Attack Types, Target Types (Zoomable SunBurst):

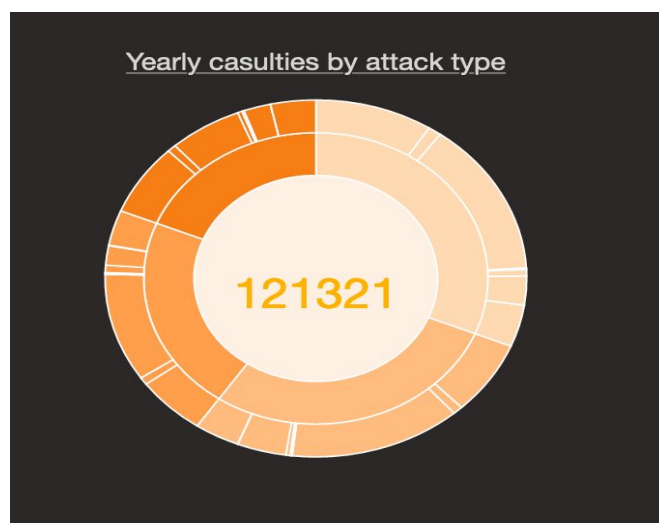


Fig 3: Sunburst chart for the world data

A zoomable sunburst chart is chosen to show the relationship between the years in which numerous attacks took place, name of the attack type and number of people killed in those attacks. Using this chart we can compare the number of armed assaults which took place in the United States in the years 2016 and 2017. This gives an interesting insight that in 2016 the majority of attacks were Hostage Taking and Armed Assaults constituted only 26% of the total number of attacks in that year. In 2017, Armed Assaults were the major attacks in the US constituting 90% of the total number of attacks.

Overall relationship between all the important parameters (Parallel coordinates):

To show the relationship between multiple features of the dataset, a parallel coordinates graph is the best option. N parallel axes are drawn vertically and a line goes from each axis intersecting at respective values on them. All records on this chart ultimately give an overview of the dataset. Users can select a specific portion

from each axis in order to filter more data. This is achieved using the brushing feature in d3.js. It gives full control of the data to the user.

Some of the interesting insights we found out from this chart was when the casualties are more than 300, the type of attack is mostly from bombing/explosion and Hostage situations. Such attacks were more frequent in the middle east region and sub saharan africa region.

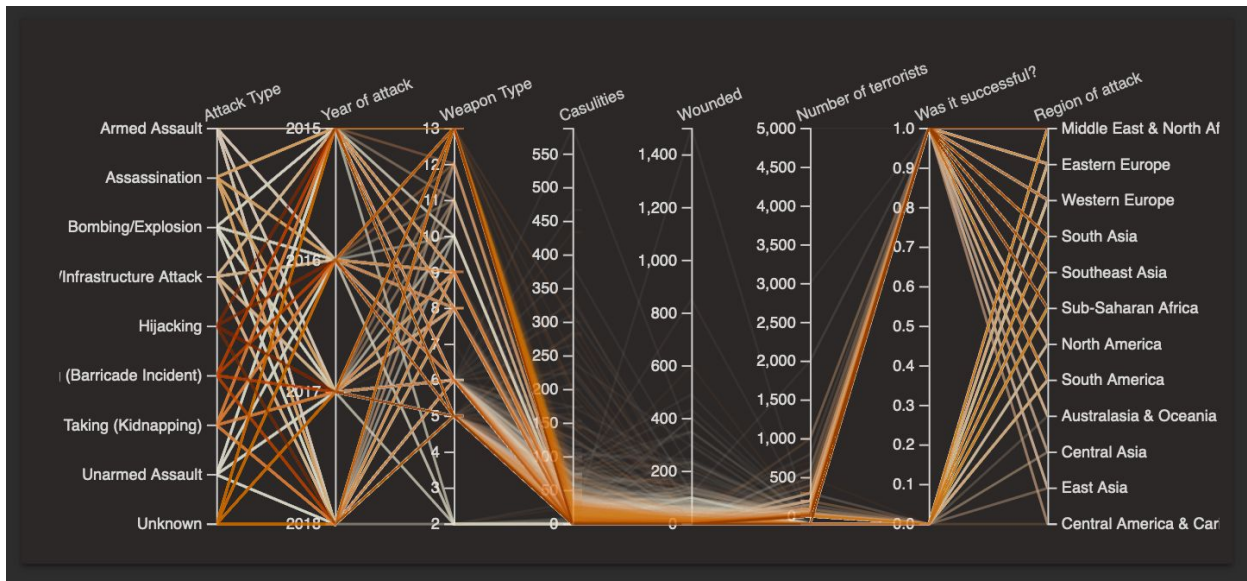


Fig 4: Parallel coordinates for the world data

Number of successful and failed attacks (pie chart):

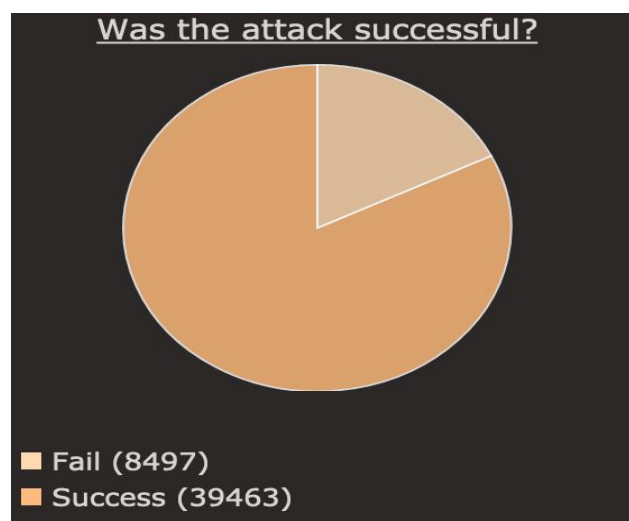


Fig 5: Pie chart for the world data

The pie chart gives us information about how many attacks were successful and failed in the country chosen on the Choropleth Map. One of the interesting insights

would be that India comes in the top 5 hotspots for terrorist attacks from 2015-18. Also, 1/4th of the attempted attacks failed in this country. In Libya, the failure percentage is much lesser in comparison to the success rate.

Number of weapon types (bar chart)

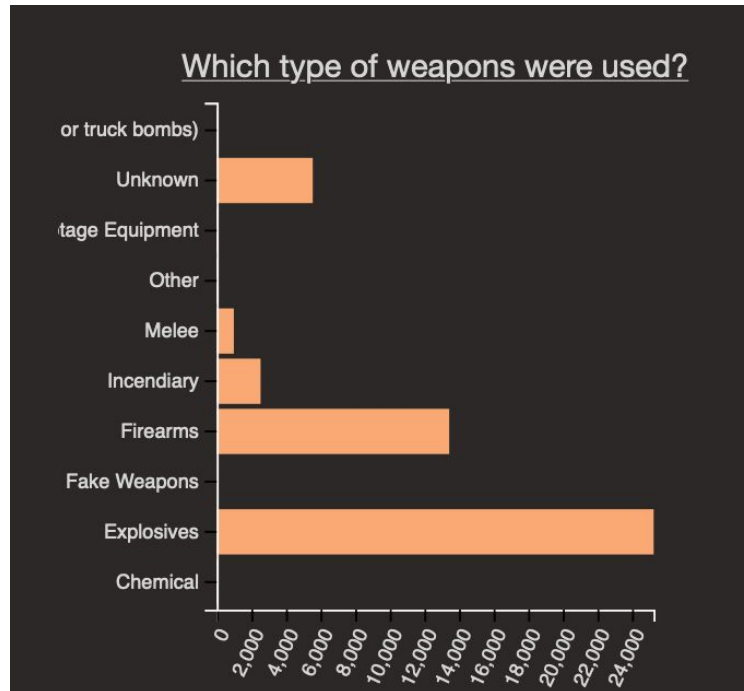


Fig 3: Bar chart for the world data

The bar chart determines the relationship between the types of weapons used and the number of attacks which took place. According to the data from the entire world, we observed that Explosives and Firearms are the frequently used weapons during various attacks. On comparing African countries Libya, Nigeria and Egypt which almost had the same number of attacks, we noticed that Nigeria had more attacks where Firearms were used the most. The other two countries had more Explosive attacks.

Statistical Info Panel (text box)

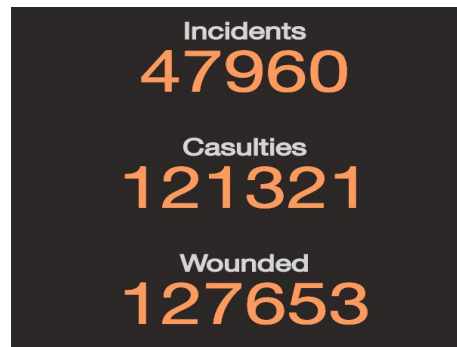


Fig 3:World data Statistics

This gives us details about the number of incidents, casualties and wounded in the country which is selected on the Choropleth Map.

Tableau Implementation:

We have implemented some basic ideas in Tableau for the project. This done in ideation phase. It is an interactive dashboard, highlighting some of the key insights from the dataset. Dashboard is published on Tableau Public —

<https://public.tableau.com/profile/ajit.rajurkar#!/vizhome/HorrorsofGlobalTerrorism/Horrors>

Conclusion:

Our aim was to create a dashboard which would help finding interesting insights in the data available about Terrorism. Through this project we observed many meaningful insights and reported them.

References:

- [1] <http://bl.ocks.org/diethardsteiner/3287802>
- [2] <https://bl.ocks.org/maybelinot/5552606564ef37b5de7e47ed2b7dc099>
- [3] <https://public.tableau.com/profile/ajit.rajurkar#!/vizhome/HorrorsofGlobalTerrorism/Horrors>
- [4] <http://bl.ocks.org/micahstubbs/8e15870eb432a21f0bc4d3d527b2d14f>
- [5] <https://www.start.umd.edu/research-projects/global-terrorism-database-gtd>