Global Terrorism Database by Using Plotly

MICRO PROJECT

REPORT

Submitted by

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BONAFIDE CERTIFICATE

This is to certify that this project report titled "**Global Terrorism Database by Using Plotly**" is the bonafide work of **Rahul Kumar** having Registration no. **99220042041** of **4th** semester (2rd year) carried out in **Micro Project** for the partial fulfillment of the requirement for the award to the degree of the BACHELOR OF TECHNOLOGY at Kalasalingam Academy of Research and Education for the session 2022-2026.

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DECLARATION

I, **Rahul Kumar** affirm that the project work titled "**Global Terrorism Database by Using Plotly**" being submitted in partial fulfillment for the award of BACHELOR OF TECHNOLOGY is the original work carried out by me as whole. It has not formed the part of any other project work submitted for award of any degree or diploma, either in this or any other university.

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ABSTRACT

In an era marked by persistent threats of terrorism, understanding the patterns and trends of global terrorism incidents is crucial for policymakers, researchers, and the general public alike. The Global Terrorism Database (GTD) stands as a comprehensive repository of terrorist incidents worldwide, spanning decades of data. This study employs the dynamic data visualization capabilities of Plotly to provide a compelling and interactive exploration of the GTD, shedding light on the multifaceted nature of global terrorism.

Through the creative utilization of Plotly's interactive charts and graphs, we delve into key aspects of global terrorism, such as the geographic distribution of incidents, the evolution of attack types, trends in casualties, and the affiliation of perpetrators. By harnessing Plotly's capabilities, this research aims to offer a visually engaging and accessible means of comprehending the complex landscape of terrorism, facilitating data-driven insights for policymakers and stakeholders.

This study not only demonstrates the power of data visualization in making sense of vast and intricate datasets but also contributes to the broader conversation on counterterrorism efforts and security policy formulation. Through the lens of Plotly, we embark on an informative and engaging journey into the world of global terrorism, ultimately fostering a deeper understanding of the threats we face and the means to mitigate them effectively.

Keywords: *Global Terrorism Database, Plotly, Dashboard.*

LIST OF FIGURES

1. INTRODUCTION

1. Global Terrorism:

In an age defined by the ever-evolving nature of global security challenges, terrorism continues to pose a significant threat to nations, communities, and individuals worldwide. To combat this complex menace effectively, it is imperative to comprehensively analyze and understand the patterns, trends, and dynamics of terrorist incidents across the globe. The Global Terrorism Database (GTD), maintained by the National Consortium for the Study of Terrorism and Responses to Terrorism (START), stands as a pivotal resource that offers an extensive repository of terrorism-related data spanning several decades.

In recent years, the field of data science and visualization has emerged as a powerful tool in unlocking insights from vast and intricate datasets. Plotly, a versatile and interactive data visualization library, has gained prominence for its ability to transform raw data into meaningful, visually engaging narratives. This paper embarks on an exploration of the Global Terrorism Database through the lens of Plotly, aiming to leverage its dynamic capabilities to gain a deeper understanding of global terrorism trends.

The goal of this study is to harness the potential of Plotly's interactive charts, graphs, and maps to provide a comprehensive, accessible, and engaging means of analyzing the GTD. By doing so, we seek to shed light on critical facets of terrorism, such as the geographic distribution of incidents, shifts in attack types over time, the human toll in terms of casualties, and the affiliations of perpetrators. Through these visualizations, we aim to facilitate a data-driven approach to counterterrorism efforts, aiding policymakers, researchers, and the general public in making informed decisions.

This paper is organized into sections that delve into different aspects of global terrorism, each accompanied by interactive Plotly visualizations. As we navigate the rich tapestry of terrorism-related data, we invite the reader to embark on a visual journey, exploring the intricacies and nuances of this pressing global issue. Through our analysis, we aspire to contribute valuable insights to the ongoing discourse on counterterrorism and security policy formulation, emphasizing the critical role of data visualization in enhancing our collective understanding of the global terrorism landscape.

2. Plotly:

Plotly is a versatile and interactive data visualization library used in various programming languages like Python, R, and JavaScript. It offers a wide range of customizable chart types, enabling users to create visually appealing and interactive plots and dashboards. Plotly is particularly popular in data science, analytics, and business intelligence due to its ease of use and ability to generate interactive visuals, making it a valuable tool for exploring and presenting data-driven insights. It also supports web-based dashboards, customization options, and integration with data libraries, making it suitable for a diverse range of data visualization needs.

3. Dashboard:

A dashboard is a concise and visual representation of essential information, typically displayed in a single view. It provides users with a quick and accessible way to monitor and analyze key metrics,

data, or performance indicators related to a specific domain or task. Dashboards often feature charts, graphs, tables, and other visual elements that allow users to make informed decisions by interpreting complex data at a glance. They are widely used across various industries, such as business, finance, healthcare, and data analytics, to streamline data-driven decision-making and improve overall efficiency.

1.4. Data Visualization:

Data visualization is the art and science of presenting complex data in a visually comprehensible and meaningful way. It involves creating graphical representations, such as charts, graphs, maps, and info-graphics, to help individuals and organizations understand patterns, trends, and insights within their data. By transforming raw data into visual formats, data visualization enhances data analysis, aids in decision-making, and communicates information more effectively. It is an essential tool in fields like data science, business intelligence, and scientific research, where it allows users to explore, interpret, and share data-driven findings in a clear and accessible manner.

2. IMPLEMENTATION

1. Data Collection

Data collection is just one part of the data visualization process. Effective visualization also involves data analysis, interpretation, and storytelling to convey meaningful insights from your data.
Certainly, here are the key steps in data collection for a data visualization project summarized in four points:

1. **Identify Data Sources:** Determine where your data will come from, whether it's internal databases, publicly available datasets, surveys, or APIs.

2. **Gather and Clean Data:** Collect the data from chosen sources and perform data cleaning and preprocessing to ensure accuracy and completeness.

3. **Transform and Store:** If necessary, transform the data to meet visualization objectives and store it in a structured format, documenting the process.

4. **Ensure Compliance and Validation:** Adhere to data privacy regulations, ethical standards, and validate the data to ensure it aligns with your visualization goals before proceeding to create visualizations.

Here the dataset is used for the visualization project is **'Global Terrorism Database'**.

2.2. Implementation Steps:

The implementation process for creating data visualizations involves applying the steps given below:

1. **Define Objectives:**
   Objective is to visualize the dataset of Global Terrorism using plotly for better understanding

the scenario.

2. **Collect and Prepare Data**:
   Collection of dataset from the kaggle and preparation of the data through the python library Panda which is specialized for the data pre-processing.

3. **Choose Visualization Type:**
   Based on data and objectives, selected visualization is mentioned in the result section. For example, to show trends over time, a line chart might be suitable, while a bar chart is effective for comparisons.

4. **Select Visualization Tools:**
   Choose a data visualization library or tool that aligns with your preferences and programming language. For example, here I am using Plotly along with Python.

5. **Create the Visualization:**
   Write code to create the initial visualization using chosen library or tool. For instance, here using plotly in Python.
6. **Iterate and Refine:**
   Continuously improving this visualization by adjusting parameters, such as colors, labels, and legend placement.
   Ensuring that visualization is clear and effectively conveys the intended message.

7. **Interactive Elements:**
   If interactivity is required, add interactive elements to your visualization. For example, here used Plotly to create interactive charts with hover effects.

8. **Data Labels and Annotations:**
   Included data labels and annotations to provide context and highlight key points within the visualization.

9. **Test and Validate:**
   Verified the accuracy of this visualization project by comparing it to the original dataset.

10. **Accessibility:**
    This visualization is accessible to a diverse audience. Use alt text for images, provide keyboard navigation, and consider colorblind-friendly color schemes.

This implementation process provides a practical framework for turning my data and objectives into effective data visualizations. Tailor each step to your specific project requirements and data sources to create compelling and informative visualizations.

3. EXPERIMENTAL ANALYSIS

1. Package Imported

When working with the Global Terrorism Database (GTD) and Plotly for data visualization, I imported several libraries and packages in your programming environment. The specific

packages may vary depending on the programming language as I chose (e.g., Python). Here's a general list of packages commonly used for this project in Python:

1. Pandas: For data manipulation, cleaning, and preprocessing.

2. NumPy: For numerical operations and efficient array handling.

3. Plotly: The core library for creating interactive visualizations.

4. Plotly Express: A high-level interface to Plotly for quickly creating common chart types.

5. Matplotlib: For creating static plots or customizing Plotly visualizations.

6. Seaborn: For enhancing the aesthetics of your visualizations, especially when using Matplotlib.

7. Dash: If you plan to create interactive web-based dashboards.

8.Jupyter Notebook: To work in a notebook environment for interactive analysis and visualization.

In addition to these core packages, I installed and imported specific libraries for data loading to working with databases (e.g., SQLite, SQLAlchemy) or for handling time series data (e.g., DateTime).

3.2. Models

Real time performing dash board on the basis the given dataset for the better visualization and understanding of the scenario of the database.

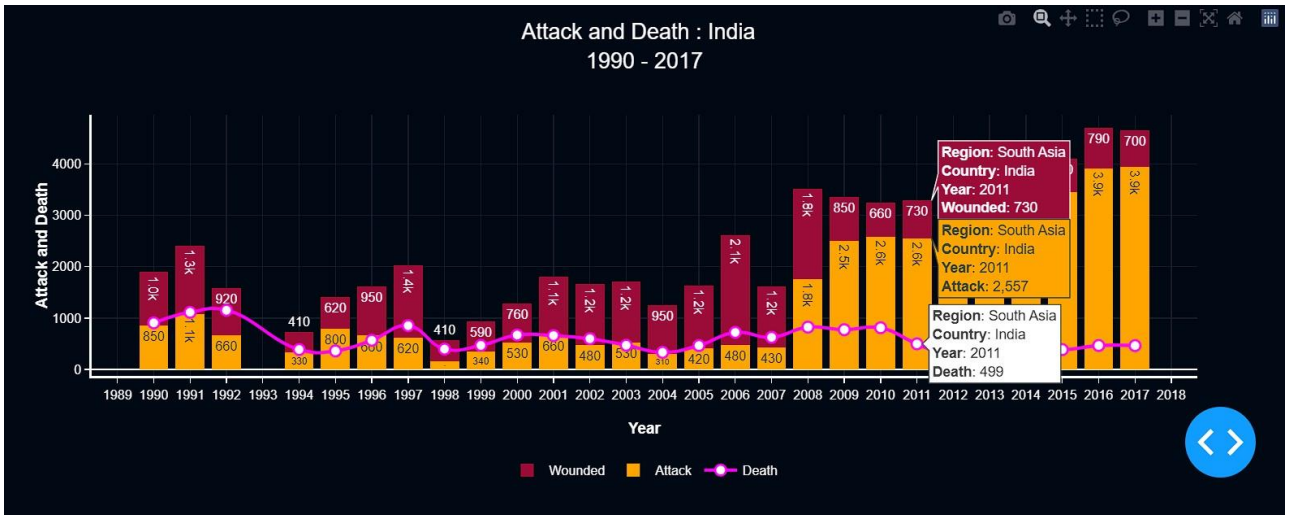

Figure 1: Model view 1

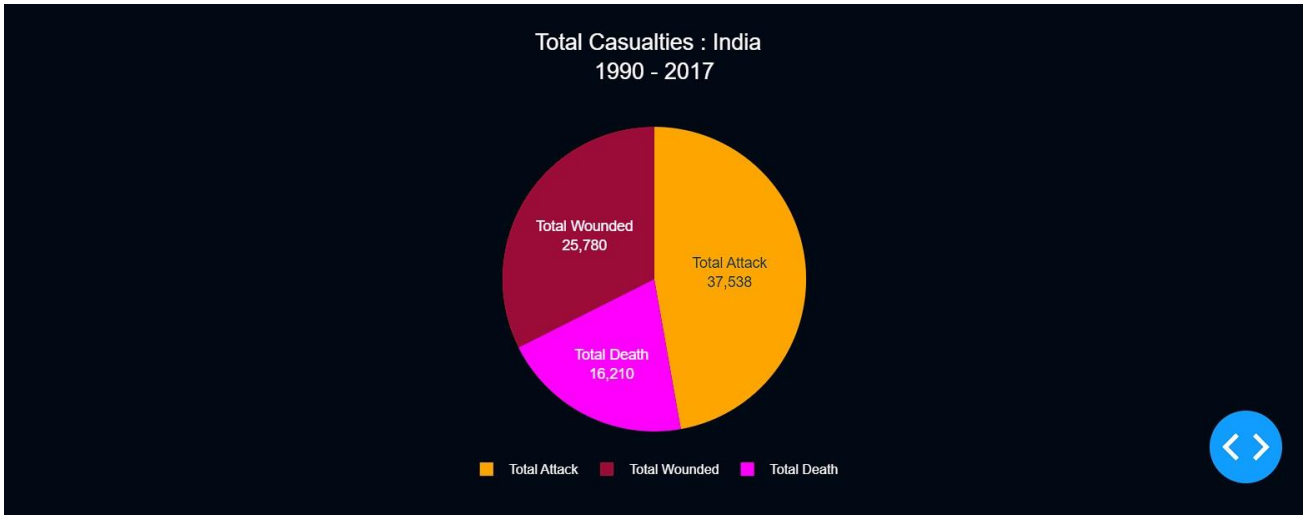

Figure 2: Model view 2

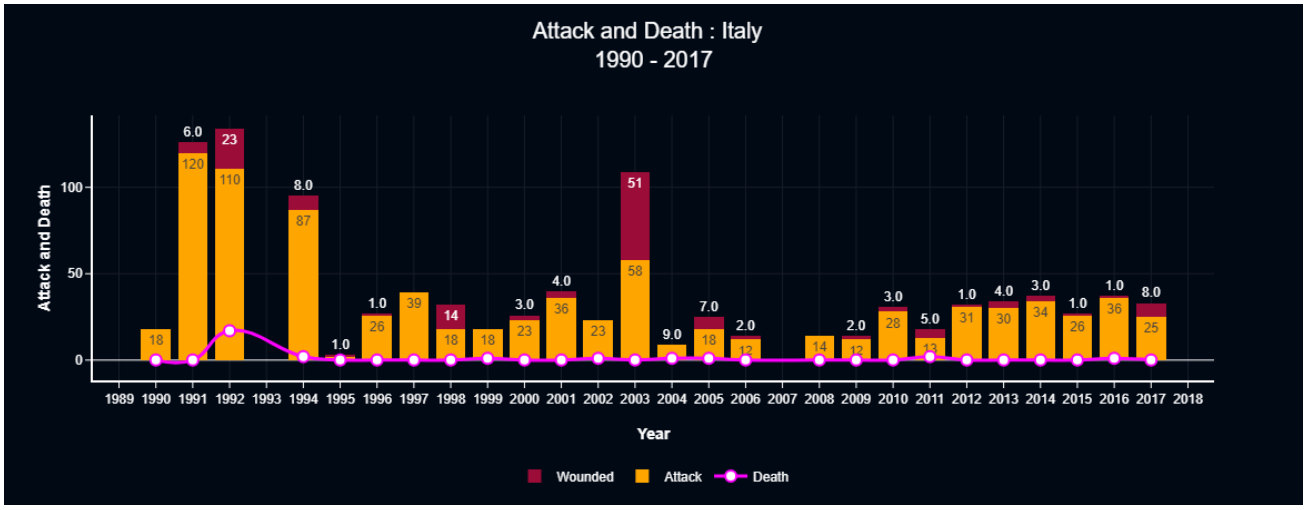

Figure 3: Model view 3

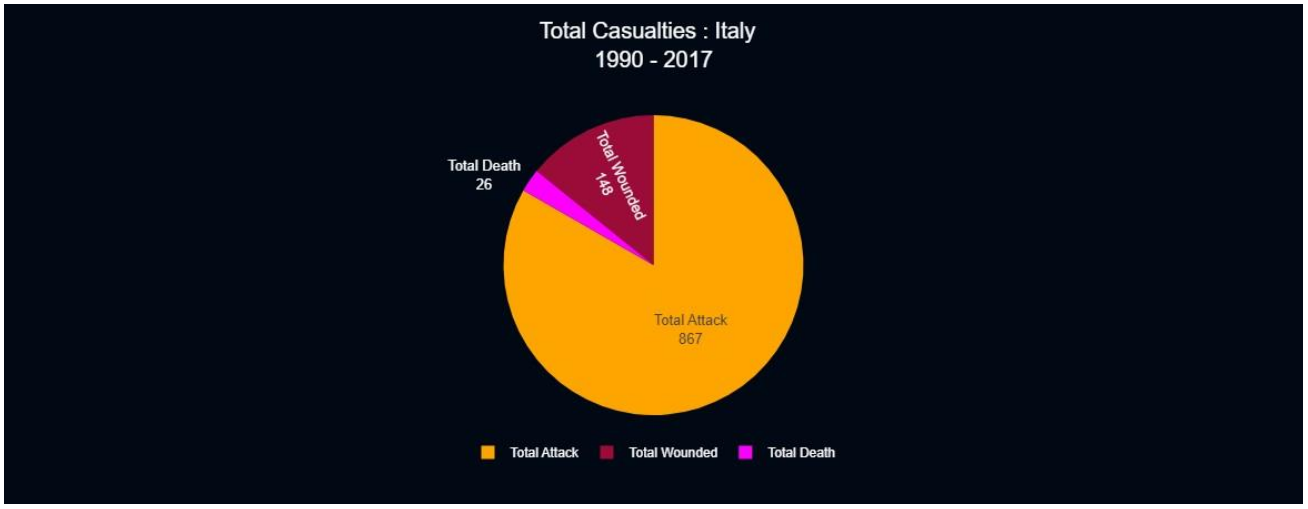

Figure 4: Model view 4

3.3. Performance

The performance of a dashboard created using Plotly, based on several factors, including:

1. **Data Accuracy:** Assess whether the data used in the dashboard is accurate and up to date. Data accuracy is critical for drawing meaningful insights.

2. **Visual Clarity:** Evaluate the clarity of the visualizations. Ensure that the charts and graphs are easy to understand and effectively convey the intended message.

3. **Interactivity:** If the dashboard is interactive, assess how well it allows users to explore and interact with the data. Ensure that interactive elements are intuitive and responsive.

4. **Speed and Responsiveness:** Evaluate the speed and responsiveness of the dashboard, especially when dealing with large datasets. Slow-loading visualizations can hinder user experience.

5. **Relevance:** Consider whether the visualizations and insights presented in the dashboard align with the project's objectives and the questions it aims to answer.

6. **Usability:** Assess the overall usability of the dashboard. Is it user-friendly? Can users easily find and access the information they need?

7. **Insightfulness:** Evaluate whether the dashboard provides valuable insights into the data. Does it help answer important questions or uncover trends and patterns?

8. **Customization:** If applicable, consider whether the dashboard allows users to customize visualizations or filter data to suit their needs.

9. **Data Security:** Ensure that sensitive data is appropriately protected and that the dashboard complies with data security and privacy standards.

10. **Scalability:** Assess whether the dashboard can handle larger datasets or increased user traffic without significant performance degradation.

3.4. Sample Python Code

```
import dash
import dash_core_components as dcc
import dash_html_components as html
from dash.dependencies import Input, Output
import plotly.graph_objs as go
import pandas as pd

terr2 = pd.read_csv('modified_globalterrorismdb_0718dist.csv')

location1 = terr2[['country_txt', 'latitude', 'longitude']]
list_locations = location1.set_index('country_txt')[['latitude',
'longitude']].T.to_dict('dict')
```

```
region = terr2['region_txt'].unique()

app = dash.Dash(__name__, )
app.layout = html.Div([

    html.Div([
        html.Div([
            html.Div([
                html.H3('Global Terrorism Database', style = {"margin-bottom":
"0px", 'color': 'white'}),
                html.H5('1970 - 2017', style = {"margin-top": "0px", 'color':
'white'}),

            ]),
        ], className = "six column", id = "title")

    ], id = "header", className = "row flex-display", style = {"margin-bottom":
"25px"}),

    html.Div([
        html.Div([
            dcc.Graph(id = 'map_1',
                      config = {'displayModeBar': 'hover'}),

        ], className = "create_container 12 columns"),

    ], className = "row flex-display")
```

The above code is the sample code for the dash board that is made using plotly library in python programming.

4. SYSTEM SPECIFICATION

1. Software Requirement

To create a project titled "Global Terrorism Database using Plotly," you'll need several software tools and components to effectively analyze the Global Terrorism Database (GTD) and create interactive visualizations using Plotly. Here are the primary software requirements:

1. Anaconda Python

You can choose an IDE for Python or R to work with your code efficiently. Some popular choices include Jupyter Notebook, Visual Studio Code, PyCharm (for Python), and RStudio (for R).

2. **Numpy**
   These libraries provide support for numerical operations and array handling.

3. **Pandas**
   These libraries are essential for data manipulation and preprocessing tasks, including cleaning, filtering, and aggregating the GTD data.

4. **Plotly**
   Install Plotly, a powerful data visualization library, to create interactive charts and graphs.

5. **Dash**
   If you plan to create interactive dashboards based on your visualizations, consider using Plotly's Dash framework.

CONCLUSION

In conclusion, the project "Global Terrorism Database using Plotly" represents a dynamic exploration of a critical global issue through the lens of data analysis and visualization. By harnessing the extensive Global Terrorism Database (GTD) and the versatile Plotly library, this endeavor has the potential to shed light on intricate patterns, trends, and insights within the realm of global terrorism.

The integration of Plotly, with its interactive and customizable visualizations, empowers us to transform raw data into meaningful and accessible insights. This project's significance lies not only in its capacity to unravel the complexities of terrorism but also in its ability to facilitate informed decision-making, guide policy formulations, and bolster global security efforts.

As the global landscape continues to evolve, the fusion of data-driven methodologies and cutting-edge visualization techniques becomes increasingly pivotal in understanding, mitigating, and ultimately preventing acts of terrorism. In a world where data is abundant and its analysis is paramount, the "Global Terrorism Database using Plotly" project serves as a testament to the potential for data-driven solutions in addressing complex global challenges.

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COURSE CERTIFICATE

Mar 10, 2024

Rahul Kumar

has successfully completed

Data Visualization with Python

an online non-credit course authorized by IBM and offered through Coursera

Saishruthi Swaminathan
Data Scientist
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Instructor and Subject Matter Expert
Skill-Up Technologies

Verify at:
https://coursera.org/verify/2TE45ZKBMQ56

Coursera has confirmed the identity of this individual and their participation in the course.