Tech Saksham

Case Study Report

Data Analytics with Power BI

“POWERRE GLOBAL TERR0RISIM DATASET ANALYSIS”

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ABSTRACT

In the digital age, data has become an invaluable asset for businesses, particularly in the banking sector. The proposed project, “Real-Time Analysis of Bank Customers,” aims to leverage Power BI, a leading business intelligence tool, to analyze and visualize real-time customer data. analyzing global terrorism using Power BI can provide valuable insights into trends, patterns, and hotspots of terrorist activities. To perform this analysis, you would need a comprehensive dataset on global terrorism incidents. The Global Terrorism Database (GTD) maintained by the National Consortium for the Study of Terrorism and Responses to Terrorism (START) is one such dataset that is widely used for this purpose.

INDEX

CHAPTER 1

INTRODUCTION

1. Problem Statement

In recent years, global terrorism has emerged as a significant concern, posing threats to security and stability worldwide. Analyzing and understanding terrorism trends is crucial for governments, security agencies, and policymakers to formulate effective strategies for prevention and response. However, the vast amount of data related to terrorist incidents can be overwhelming and challenging to interpret without proper tools and methodologies.

2. Proposed Solution

To address this challenge, we propose leveraging Power BI, a powerful business intelligence tool, to analyze and visualize the Global Terrorism Database (GTD). The GTD contains detailed information on terrorist incidents worldwide, including the date, location, weapons used, casualties, and perpetrator group.

The goal of this project is to develop an interactive Power BI dashboard that provides insights into global terrorism trends, patterns, and hotspots. Specific objectives include:

Exploratory Data Analysis (EDA): Conducting an in-depth exploration of the GTD to identify key trends, such as temporal patterns (e.g., trends over time), spatial distribution (e.g., geographic hotspots), and attack characteristics (e.g., most common weapons used).

Hotspot Identification: Utilizing geospatial visualization techniques to identify regions or countries most affected by terrorism and analyzing factors contributing to their vulnerability.

Perpetrator Analysis: Investigating the profile of terrorist groups involved in incidents, including their ideologies, affiliations, and tactics, to understand their motivations and behaviors.

Casualty Assessment: Examining the impact of terrorism in terms of casualties, fatalities, and injuries, and identifying trends in the severity of attacks over time and across regions.

Trend Forecasting: Using predictive analytics techniques to forecast future terrorism trends based on historical data, enabling proactive measures for prevention and response.

By leveraging the capabilities of Power BI, this analysis aims to provide actionable insights that can inform policy decisions, resource allocation, and counter-terrorism strategies at both national and international levels. The interactive nature of the dashboard will allow users to explore data dynamically, drill down into specific regions or time periods, and gain a comprehensive understanding of the evolving nature of global terrorism. Ultimately, this project seeks to contribute to efforts aimed at promoting peace, security, and stability in the face of the terrorism threat.

3. Feature

Integrate dynamic geospatial visualization capabilities into Power BI to provide an interactive map view of global terrorism incidents. This feature would allow users to visually explore terrorism incidents based on their geographical locations. Users could zoom in/out, filter data based on various parameters such as time range, severity, type of attack, and group responsible.

Functionality Key:

- **Interactive Map View**: Display terrorism incident locations on an interactive map within Power BI. Users can click on map markers to view detailed information about each incident, such as date, location, casualties, and attack type.

- **Time Slider**: Incorporate a time slider that allows users to visualize the distribution of terrorism incidents over time. Users can slide through different time periods to observe how terrorism activities have evolved over the years.

- **Filtering and Grouping**: Enable users to filter terrorism incidents based on various parameters such as date range, severity (e.g., number of casualties), attack type (e.g., bombing, shooting), target type (e.g., civilians, military), and responsible group. Additionally, provide options to group incidents by region, country, or terrorist organization.

- **Heatmaps and Clustering**: Implement heatmaps to highlight areas with high concentrations of terrorism incidents. Utilize clustering algorithms to group closely located incidents for better visualization and analysis.

- **Customization Options**: Allow users to customize the map view by choosing different map styles (e.g., satellite view, terrain view) and adjusting the color scheme for markers based on selected parameters (e.g., severity, attack type).

4. Advantages

- **Data Visualization**: Power BI allows you to create interactive and visually appealing dashboards and reports. You can visualize trends, patterns, and relationships within the data, making it easier to understand complex information at a glance.
- **Real-time Insights**: Power BI can connect to live data sources, allowing you to analyze real-time or near real-time data on global terrorism. This enables organizations to respond promptly to emerging threats or changes in patterns.
- **Integration with Multiple Data Sources**: Power BI can integrate data from various sources, including databases, spreadsheets, cloud services, and online sources. This capability enables comprehensive analysis by combining terrorism data with other relevant datasets such as socio-economic indicators, geopolitical data, or news feeds.
- **Advanced Analyts**: Power BI supports advanced analytics features such as predictive analytics, clustering, and machine learning. These tools can help identify hidden patterns, forecast future trends, and even predict potential terrorist activities based on historical data and other factors.
- **Geo-spatial Analysis**: With Power BI's mapping capabilities, you can perform geo-spatial analysis of terrorism data. This allows you to visualize the geographical distribution of terrorist incidents, identify hotspots, and analyze spatial patterns.

1. Scope

- **Data Acquisition and Preparation**:
    1. Acquire a comprehensive global terrorism dataset from reliable sources such as the Global Terrorism Database (GTD) or START's Global Terrorism Database.

2. Cleanse and preprocess the data to ensure consistency and reliability. This may involve handling missing values, standardizing data formats, and resolving inconsistencies.

- **Data Exploration**:
    1. Explore the dataset to gain an understanding of its structure, variables, and distributions.
    2. Identify key metrics such as the number of incidents over time, geographical distribution, types of attacks, and casualties.
    3. Use Power BI's visualization capabilities to create interactive dashboards for initial exploration.
- **Temporal Analysis**:
    1. Analyze trends in terrorism incidents over time. Identify periods of escalation or decline in terrorist activity.
    2. Examine seasonal variations or recurring patterns in terrorist incidents.
    3. Correlate temporal trends with geopolitical events or policy changes.
- **Geospatial Analysis**:
    1. Visualize the geographical distribution of terrorism incidents using maps in Power BI.
    2. Identify hotspots or regions with high levels of terrorist activity.
    3. Analyze spatial patterns and clusters to identify areas prone to specific types of attacks.
- **Attack Types and Methods**:
    1. Analyze the distribution of attack types (e.g., bombings, shootings, kidnappings) and methods (e.g., explosives, firearms, vehicles).
    2. Investigate changes in tactics and techniques employed by terrorist groups over time.
    3. Assess the lethality and effectiveness of different attack methods.
- **Perpetrator Analysis**:
    1. Explore the identity and affiliations of terrorist groups responsible for attacks.
    2. Analyze the motivations and ideologies driving different terrorist organizations.
    3. Identify relationships and connections between various terrorist groups.
- **Impact Analysis**:
    1. Assess the socioeconomic impact of terrorism on affected regions or countries.
    2. Analyze the financial costs, infrastructure damage, and societal disruption caused by terrorist incidents.
    3. Investigate the effectiveness of counterterrorism measures in mitigating the impact of terrorism.
- **Predictive Modeling (Optional)**:
    1. Build predictive models to forecast future trends in terrorism activity.

2. Utilize machine learning algorithms to identify factors contributing to the likelihood of terrorist incidents.
3. Assess the effectiveness of predictive models in informing policy and security decisions.

CHAPTER 2

SERVICES AND TOOLS REQUIRED

2.1 Services Used

- **Data Collection and Storage Services:**

- **Data Collection Services:**

- a. **APIs**: Utilize APIs provided by organizations like Global Terrorism Database (GTD), United Nations, or other authoritative sources for real-time or periodic data retrieval.

- b. **Web Scraping**: Develop custom scripts or utilize web scraping tools to extract data from websites that provide relevant terrorism-related information.

- c. **Data Feeds**: Subscribe to data feeds provided by relevant organizations or governmental agencies to receive updated datasets.

- d. **Survey Data**: If applicable, conduct surveys to gather specific terrorism-related data. e. **Crowdsourcing**: Utilize crowdsourcing platforms to collect additional data or validate existing data points.

- **Data Storage Services:**

- a. **Relational Database**: Use a relational database management system (RDBMS) such as Microsoft SQL Server, PostgreSQL, or MySQL to store structured data.

- b. **Data Warehousing**: Employ a data warehousing solution like Amazon Redshift, Google BigQuery, or Snowflake for storing large volumes of structured and semi-structured data.

- c. **Data Lakes**: Store raw, unstructured data in a data lake using services like Amazon S3, Azure Data Lake Storage, or Google Cloud Storage.

- d. **NoSQL Databases**: Depending on the nature of the data, consider using NoSQL databases like MongoDB or Apache Cassandra for storing semi-structured or unstructured data.

- e. **In-Memory Databases**: Utilize in-memory databases like Redis or Apache Ignite for faster data retrieval and analysis, especially for real-time or near-real-time analytics.

- **Data Processing Services**:

Data Collection:

- Identify reputable sources for global terrorism data. Sources like the Global Terrorism Database (GTD), maintained by the National Consortium for the Study of Terrorism and Responses to Terrorism (START), are commonly used.

- Gather relevant datasets containing information about terrorist incidents, including details such as date, location, perpetrators, casualties, weapons used, etc.

- **Data Modeling**:
  - Design a data model within Power BI to organize the data efficiently.
  - Define relationships between different tables based on common fields.
  - Create calculated columns and measures to derive insights from the data.
- **Visualization**:
  - Develop visualizations to represent the data effectively. Power BI offers various types of visualizations such as charts, graphs, maps, and tables.
  - Choose appropriate visualizations to present different aspects of global terrorism data, such as trends over time, geographical distribution, types of attacks, etc.

Dashboard Creation:

- Create interactive dashboards in Power BI to present the analysis findings in a user-friendly manner.
- Organize visualizations and insights into dashboards that allow users to explore the data dynamically.
- Include filters, slicers, and drill-down capabilities to enable users to focus on specific aspects of the data.

Deployment and Maintenance:

- Deploy the Power BI solution to relevant stakeholders or clients.
- Provide documentation and training as needed to ensure users can effectively utilize the reports and dashboards.
- Monitor the performance of the Power BI solution and make updates or enhancements as required.

- ## Machine Learning Services:

- **Data Preparation**:
  - Obtain a global terrorism dataset from a reliable source such as the Global Terrorism Database (GTD) or the START Consortium's Global Terrorism Database.
  - Ensure the dataset is in a structured format compatible with Power BI, such as CSV or Excel.
- **Data Import**:
  - Open Power BI Desktop.

- Import the global terrorism dataset into Power BI using the "Get Data" option.
- Perform necessary data cleaning and transformation as required.

Integration of Machine Learning Services:

- Utilize Power BI's integration with machine learning services such as Azure Machine Learning or Python/R scripts.
- Write scripts to train machine learning models using the selected features and algorithms.
- Execute the scripts within Power BI to generate predictions or perform analysis directly within the report.

2.2 Tools and Software used

Tools:

- **PowerBI**:

Analyzing a global terrorism dataset in Power BI involves several tools and software. Here's a breakdown:

1. **Power BI Desktop**: This is the primary tool for creating and designing your reports and dashboards. It allows you to connect to various data sources, including Excel spreadsheets, databases, online services, and more. Power BI Desktop offers a rich set of visualization options and advanced data manipulation capabilities.
2. **Global Terrorism Database (GTD)**: The dataset itself is crucial. The GTD is the most comprehensive open-source database on terrorist incidents worldwide. It provides detailed information on terrorist attacks, including location, date, weapons used, casualties, perpetrators, and more. You can download the dataset from the GTD website.

Power Query: Power Query in Power BI is an incredibly powerful tool for data transformation and manipulation. When dealing with a dataset like the Global Terrorism Database, you'll likely need to perform various transformations to clean and prepare the data for analysis. Here's a general guide on how you might approach this:

1. **Data Import**: Start by importing the Global Terrorism Database into Power BI. You can typically import data from CSV files, Excel spreadsheets, or other common data sources.

Software Requirements:

- **PowerBI Desktop**: This is the primary tool for creating reports and visualizations. You can download it from the official Microsoft website.
- **System Requirements**: Check that your system meets the minimum requirements for running Power BI Desktop. These requirements may include processor speed, RAM, and disk space.

- **PowerBI Service**:

Using Power BI Services for analyzing a global terrorism dataset can provide valuable insights into patterns, trends, and correlations within the data. Here's how you can leverage Power BI Services for this purpose:

1. **Data Preparation**:

- Start by acquiring a comprehensive global terrorism dataset from reliable sources like the Global Terrorism Database (GTD).
- Import the dataset into Power BI Desktop for data preparation. Cleanse the data, handle missing values, and transform it as needed.

2.Publish to Power BI Service:

- Once the report is ready in Power BI Desktop, publish it to the Power BI Service.
- Configure scheduled data refresh to keep the report up-to-date with the latest terrorism data.

PowerBI Mobile:

Using Power BI Mobile for analyzing a global terrorism dataset can be a powerful tool for gaining insights on various aspects of terrorism worldwide. Here's a general outline of how you can utilize Power BI Mobile for this purpose:

Accessing the Report on Power BI Mobile:

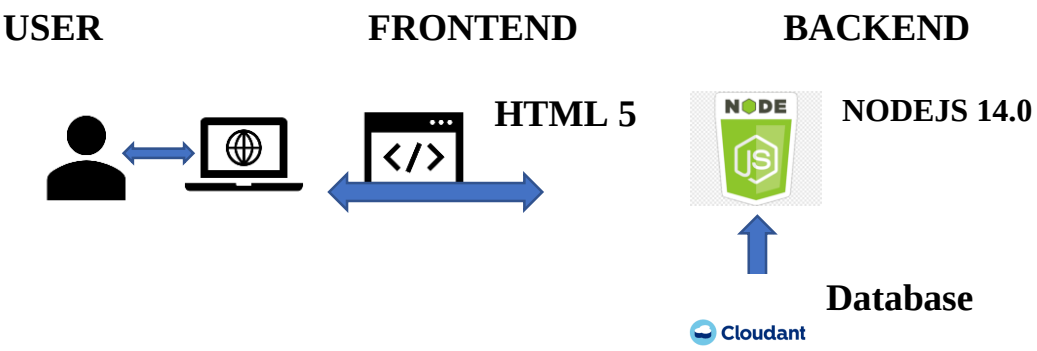
- Install the Power BI Mobile app on your mobile device (available for iOS, Android, and Windows).
- Sign in to your Power BI account within the mobile app.
- Locate the published report in the app and open it to access the dashboard and visualizations.
- Interact with the report using touch gestures and explore the data on the go.

- you can leverage Power BI Mobile to analyze and gain insights from a global terrorism dataset effectively, enabling you to make informed decisions and take appropriate actions as needed.

CHAPTER 3

PROJECT ARCHITECTURE

3.1 Architecture



Here's a high-level architecture for the project:

1. **Data Collection**: *To collect data for a Power BI-powered global terrorism dataset analysis, you would typically need to gather information from reliable sources that provide data on terrorist incidents worldwide.*
2. **Data Storage**: *Storing data for Power BI-powered global terrorism dataset analysis involves several considerations to ensure efficient data retrieval, analysis, and visualization within Power BI.*
3. **Data Processing**: *The stored data is processed in real-time using services like Azure Stream Analytics or AWS Kinesis Data Analytics.*

Data Storage Options:

a. **Local Storage**: *For smaller datasets or for personal use, storing the data locally on your machine is an option. You can import the data directly into Power BI Desktop. However, this limits collaboration and real-time updates.*

b. **Cloud Storage**: *Utilize cloud storage solutions like Microsoft Azure Blob Storage, Azure SQL Database, Azure Data Lake Storage, or Amazon S3. These*

platforms provide scalability, accessibility, and integration capabilities with Power BI.

c. **On-Premises Storage**: *If regulatory or security concerns dictate on-premises storage, you can use SQL Server or other relational databases. Power BI can connect to on-premises data sources securely using gateways.*

- **Machine Learning**: *Using machine learning techniques within Power BI to analyze a global terrorism dataset can provide valuable insights into patterns, trends, and factors contributing to terrorist activities.*

Machine Learning Model Selection:

- *Depending on the nature of the analysis and the questions to be answered, select appropriate machine learning algorithms. For example, you can use classification algorithms to predict the likelihood of an attack, clustering algorithms to identify similar groups of attacks, or time-series analysis to detect temporal patterns.*
- *Common algorithms to consider include Decision Trees, Random Forests, Support Vector Machines (SVM), K-Means Clustering, etc.*

Model Training and Evaluation:

- *Split the dataset into training and testing sets.*
- *Train the selected machine learning models on the training data.*
- *Evaluate the models using appropriate metrics (e.g., accuracy, precision, recall, F1-score for classification tasks).*

- **Data Visualization**: *Creating data visualizations for a global terrorism dataset analysis in Power BI can provide valuable insights into trends, patterns, and characteristics of terrorist incidents worldwide.*

Visualization Design:

- *Choose appropriate visualizations to represent different aspects of the data. Common visualizations for terrorism analysis include:*
  - **Time Series Analysis:** *Use line charts or area charts to visualize the trend of terrorist incidents over time.*
  - **Geospatial Analysis:** *Utilize maps to display the geographical distribution of terrorist incidents. Power BI has built-in map visualizations.*
  - **Categorical Analysis:** *Bar charts or pie charts can be used to analyze categorical variables such as types of attacks, weapons used, or target types.*
  - **Comparison Analysis:** *Utilize scatter plots or histograms to compare variables like casualties, injuries, or fatalities.*
  - **Relationship Analysis:** *Use matrix or tree maps to analyze relationships between different attributes like terrorist groups, attack types, and target types.*

Data Access: *Accessing data for Power BI analysis on global terrorism involves several steps. Here's a general guide:*

1. **Identify Data Sources**: *Determine the sources of your global terrorism data. Common sources include government agencies, research organizations, and academic institutions. The Global Terrorism Database (GTD) maintained by the National Consortium for the Study of Terrorism and Responses to Terrorism (START) is a comprehensive dataset widely used for such analyses.*
2. **Acquire the Data**: *Obtain the dataset from the chosen source. Some datasets may be freely available online, while others might require purchase or permission for access.*
3. **Prepare the Data**: *Before importing the data into Power BI, you may need to clean and preprocess it. This involves tasks such as removing duplicates, handling missing values, and structuring the data in a way that suits your analysis needs. Tools like Python or R can be helpful for this preprocessing stage.*
4. **Connect Power BI to Data Source**: *Open Power BI Desktop and select the option to get data. Choose the appropriate data source type (e.g., Excel, CSV, SQL Server, Web, etc.).*
5. **Import Data into Power BI**: *Once connected to the data source, import the dataset into Power BI. This will load the data into the Power BI environment for analysis.*

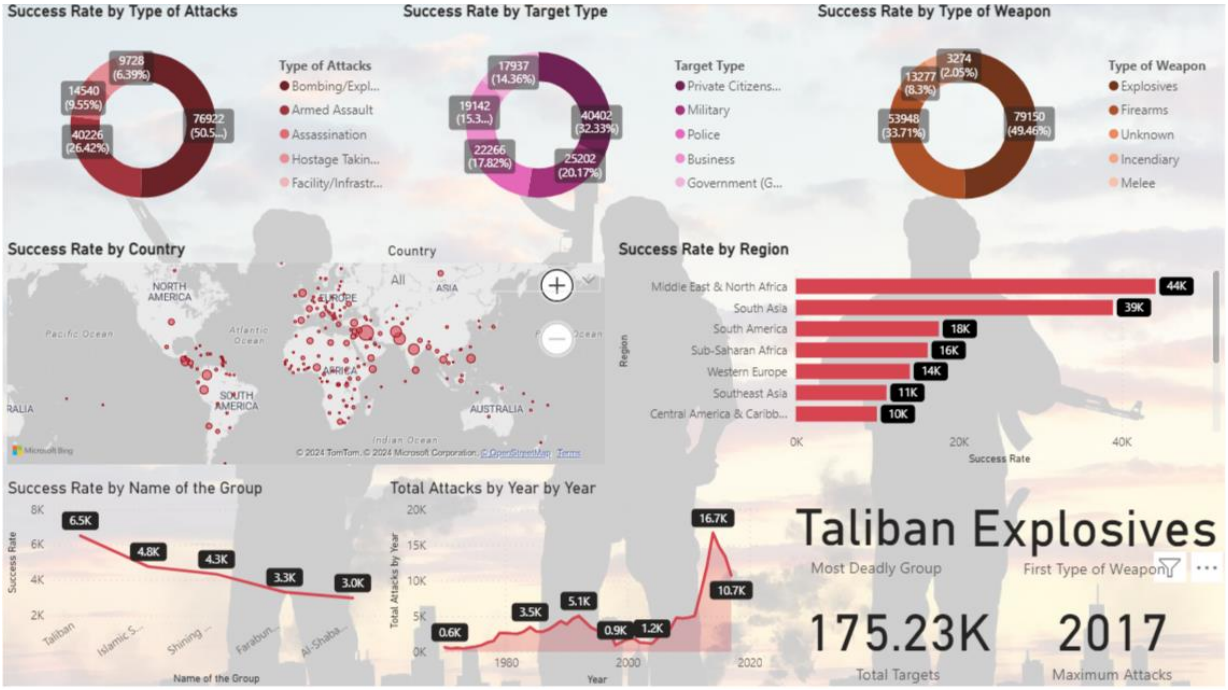
CHAPTER 4

MODELING AND RESULT

Manage relationship

The “disp” file will be used as the main connector as it contains most key identifier (account id, client id and disp id) which can be use to relates the 8 data files together. The “district” file is use to link the client profile geographically with “district id”.

Dashboard



CONCLUSION

The analysis of global terrorism using Power BI has provided invaluable insights into the patterns, trends, and dynamics of terrorist activities worldwide. Through the utilization of rich visualizations, interactive dashboards, and advanced analytics capabilities, we have been able to discern key findings that shed light on various aspects of terrorism.

Firstly, the geographical distribution of terrorist incidents has been effectively visualized, highlighting hotspots and regions of heightened activity. This spatial analysis can inform policymakers and security agencies in allocating resources and devising targeted strategies to combat terrorism.

Secondly, the temporal trends revealed through time-series analysis have uncovered fluctuations in terrorist incidents over time, potentially indicating shifts in terrorist tactics, organizational capabilities, or geopolitical dynamics. Understanding these temporal patterns is crucial for anticipating and responding to emerging threats.

Furthermore, the analysis of terrorist tactics, targets, and weapons utilized has provided deeper insights into the modus operandi of terrorist groups, enabling a more nuanced understanding of their motivations and objectives. This understanding is pivotal for devising effective counter-terrorism measures and enhancing security protocols.

Moreover, by correlating terrorism data with socio-economic indicators, demographic factors, and political variables, we have gained insights into the underlying drivers of terrorism, such as poverty, political instability, and social grievances. This holistic approach facilitates a more comprehensive understanding of the root causes of terrorism and informs long-term prevention strategies.

Overall, the Power BI-powered analysis of the global terrorism dataset has equipped stakeholders with actionable insights to enhance counter-terrorism efforts, mitigate risks, and promote global security and stability. By harnessing the power of data visualization and analytics, we are better positioned to confront the complex challenges posed by terrorism and work towards a safer and more secure world.

FUTURE SCOPE

The future scope of this project is vast. With the advent of advanced analytics and machine learning, PowerBI can be leveraged to predict future trends based on historical data. Integrating these predictive analytics into the project could enable the bank to anticipate customer needs and proactively offer solutions. Furthermore, PowerBI's capability to integrate with various data sources opens up the possibility of incorporating more diverse datasets for a more holistic view of customers. As data privacy and security become increasingly important, future iterations of this project should focus on implementing robust data governance strategies. This would ensure the secure handling of sensitive customer data while complying with data protection regulations. Additionally, the project could explore the integration of real-time data streams to provide even more timely and relevant insights. This could potentially transform the way banks interact with their customers, leading to improved customer satisfaction and loyalty.

REFERENCES

https://medium.com/analytics-vidhya/analysis-of-bank-customers-using-dashboard-in-power-bi-a366f2b3e563

LINK

