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DAEN 690

Project Report

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Data Analysis of Al-Qaeda and ISIS-affiliated Terrorist Organizations

**About the Cover**

The cover photo is an aerial view of Pearmund Cellars Winery. Located in Broad Run, Virginia it has been one of Virginias top wineries for over 20 years and has gathered over 200 gold medals in international competitions and national acclaim for its production of 100% Virginia grown wine. The winery's vineyard, Meriwether, is the oldest Chardonnay vineyard in Virginia, producing wine from its 30 acres for over 40 years.

Pearmund Cellars produces a variety of wines from Virginia grown fruit such as Viognier, Petit Manseng, Cabernet Franc, Petit Verdot and more. Their signature Ameritage, a blend of 5 different Bordeaux varietals, has won Best in Class at the Tasters Guild International.

Chris Pearmund, owner, and founder has consulted on over 20 winery openings in the state; most recently Effingham Manor located in Nokesville, Virginia. A sister winery to Pearmund Cellars, it marries the history of Virginia and the history of Virginia winemaking. Using varietals found in Virginia such as Traminette, Viognier, Petit Verdot and Tannat, Effingham Manor tells the story of Virginia’s wine history.

Together Effingham and Pearmund provides guests with education, history, quality and service unrivaled in the Virginia Wine business, and carry a reputation as the leaders in the Virginia Wine Industry.

Always an innovator, Pearmund Cellars uses geothermal heating and cooling in their winery to maintain a constant temperature for their wine production process. This helps them produce high-quality wines while also being environmentally friendly.

Pearmund Cellars is among the first Virginia wineries to incorporate statistical data analysis to aid in wine production. Partnering with a Fall 2022 DAEN capstone student project team resulted in a statistical data analysis tool which assisted in the creation of Pearmund’s “12 Pearls Chardonnay” — a new product that outsold other wines 2-to-1 during the summer.

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Abstract

Abstract

As the global landscape faces constant terrorist threats, it is important to understand the tactics and goals of major affiliated groups like ISIS and al-Qaeda. Our research is centered on the analysis of these incidents, aiming to uncover valuable insights for protection and security purposes and focusing on the main similarities and differences between the strategies and operations of Al Qaeda and ISIS-related groups. Previous research conducted by the Terrorism, Transnational Crime, and Corruption Center (TraCCC), such as the "Annex of Statistical Information on Terrorism 2021" report, has already delved into this field, forming the foundation for terrorism research projects. The importance of our research and visualizations helps national security agencies and terrorism researchers. Our work aims to apply innovative methods to analyze GTTAC data and derive insightful visualizations based on the data from 2018 to 2022. We use descriptive analysis, visualization techniques, and regression techniques to gain insights and predictive models of group events. Key findings highlight that both al-Qaeda and ISIS focus on shooting, followed by bombings & planting IEDs, as their primary tactic. ISIS, however, has a higher level of activity and more incidents, including more frequent attacks lasting several days. Al-Qaeda attacks military institutions more often with weapons, indicating their dominance, although ISIS is more active and attacks are generally more frequent. The visualizations highlight different strategies used by ISIS, leading to more deadly attacks, higher casualties, multi-location incidents, and increased extortion. Overall, this study provides critical insights and visualizations that help distinguish the strategies of these two major terrorist organizations, ISIS and Al-Qaeda.

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Report

# Problem Definition

## Background

The Terrorism, Transnational Crime and Corruption Center (TraCCC) is an innovative academic research center in the United States that concentrates in understanding the intricate links that exist between terrorism, transnational crime, and corruption. TraCCC is a department of the Schar School of Policy and Government at George Mason University that has been established to deal with these critical issues. Since it was established, TraCCC has been at the leading edge of initiatives to improve the understanding of the complicated relationships between these three interrelated areas and has made important contributions to the creation of policies as well as to research, education, and training in these crucial fields [1].

TraCCC's notable distinction is its role as the home of the esteemed Anti-Illicit Trade Institute. This innovative organization is crucial in tracking down and combating illegal trade operations all around the world. The Anti-Illicit Trade Institute works to develop strategies, policies, and solutions to combat various forms of illicit trade, such as counterfeit goods, drug trafficking, and illegal arms trade by integrating academic knowledge with real-world knowledge. It is a powerful player in the worldwide combat to fight illicit commerce because of its reputation for conducting high-quality research and its dedication to identifying efficient strategies for combating transnational criminal networks.

ISIS and Al-Qaeda are two of the most well-known and famous terrorist organizations in the world. Even though the major purpose of TraCCC is to cover a wide range of security concerns, the work that the organization does has shown to have an especially significant effect on shedding light on the strategies and risks that are faced by these two organizations. While we are aware that terrorism is a strategy of violence in which innocent civilians are knowingly targeted to further political, ideological, or religious agendas, we cannot deny that terrorist acts continue to occur. Because it poses a threat on a global scale, it is essential for countries all over the world to work together to combat it.

In the early 2010s, the Islamic State, which is also commonly referred to by its acronym ISIS, rose to prominence as a significant threat to the entire world. TraCCC has been in the forefront of the industry when it comes to conducting research to investigate the organization's history, philosophy, funding sources, employment methods, and strategic objectives. Through its in depth studies and partnerships with governmental and non-governmental groups, TraCCC has offered key insights that contributed to a better understanding of ISIS's rise to power, subsequent fall from power, and possible capability for reincarnation. These insights have proven essential in the process of formulating strategies and programs to combat terrorism on a worldwide basis. [2]

A group of people in military uniforms

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Figure : ISIS group [3]

Not just ISIS, TraCCC has also invested considerable effort in its research on Al-Qaeda, the terrorist group that carried out the 9/11 attacks and has an extensive track record of conducting terrorist attacks worldwide. The researchers at the center have done extensive research on the shifting dynamics, regional affiliates, and developing tactics of Al-Qaeda. This study has not only improved our comprehension of Al-Qaeda's adaptability, but it has also influenced counterterrorism initiatives meant to break the organization and disrupt its operations.

The Islamic state strategy follows a "near enemy" strategy, and the Islamic State primarily targets regional governments it sees as illegitimate such Somalia, Syria and Iraq. It acts in extreme brutality and sectarian violence, in contrast to Al Qaeda, and sees the purifying of the Islamic community as one of its primary goals. Controlling territory and governing it in accordance with its interpretation of Islamic law are both parts of the Islamic State's agenda. Modern social media platforms have been effectively used by the Islamic State to spread its ideology, making it appealing to young, angry Muslim men. Al Qaeda, on the other hand, relies more on traditional online sites, creating a generational divide between the two organizations.

To elaborate on the targets for these organizations, United States support for the other country governments, Al Qaeda's primary objective has been to topple what it views as corrupt pro-Western regimes in the Middle East. As a secondary objective, the United States of America serves as the ultimate target. While he was serving as the leader of the Islamic State, Abu Bakr al-Baghdadi had another purpose in mind. Baghdadi's movement, which had its roots in Iraq, placed a high priority on competing regional powers, particularly the governments of Iraq and Syria, and centered its efforts on establishing a caliphate. Because of this divergence, the two jihadist movements became much more distinct from one another.

The fact that Baghdadi established a caliphate while also rejecting Al Qaeda's control made it abundantly evident that the two groups had become distinct. This ultimately resulted in a frontal contest for leadership within the jihadist organization. The jihadist movement, its strategic goals, and the stability of the Middle East as a whole region are all going to suffer as a direct result of the ramifications of this fight, which have far-reaching repercussions. Because Al Qaeda believed that American support for Middle Eastern regimes was the primary cause of the problems that plagued the region, the organization typically focused its strategy on striking the "far enemy," which is the United States [4].

Despite the substantial amount of research and counterterrorism efforts, a proactive approach is required because of the evolving nature of the threat. To accomplish this goal, collaboration with qualified technical personnel is becoming increasingly essential. By harnessing the power of current data and applying new analytical tools, we may be able to probe further into the delicate intricacies of terrorist behavior. The capacity to identify newly emerging patterns and techniques is a crucial aspect of this relationship. It is critical to understand how terrorist assaults evolve over time, including their methodology, armament, and recruitment strategies. This knowledge enables the development of more specific and efficient countermeasures.

A person pointing at an object

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Figure 2: Former Al Qaeda Leaders [5]

In addition, the examination of attack patterns reveals the reasons why particular targets are selected. It helps us to understand the reason behind these attempts as well as identify flaws that could be exploited if the attackers were successful. This knowledge may be used to improve safety precautions, intelligence gathering efforts, and the formulation of public policy.

Terrorism is not a problem that is confined to a single region rather, it is an issue that is felt all around the world. It is very necessary to cooperate in order to properly map the enormous networks of terrorist groups, which are spread out over a number of different nations. If we identify the breadth and depth of their reach and influence, we will be in a better position to cope with the international character of the threat that we are facing. Because of this, it is essential for them to maintain track of the numerous sources of revenue they have, as well as links overseas and hotspots where they may recruit new members.

Certain patterns appear to be followed by terrorist actions, both in terms of when and where they take place and how they are carried out. This helps to a better understanding of the inner workings of terrorist groups and makes it possible for law enforcement and intelligence services to predict and respond to threats more effectively. Monitoring social media networks, doing content analysis, and deciding whether certain posts hold the potential for radicalization or recruitment are all essential components of the job.

In addition to the examination of extremism and the evaluation of the sentiments of the general population, another use for sentiment analysis is the investigation of extremism. It is possible that a map of the numerous people and organizations that are associated to terrorist operations can be created by doing an analysis of the data that was collected. Predictive analytics is a method that may be used to create predictions regarding the possibility of future terrorist attacks. This method involves evaluating historical data on terrorist attacks as well as the numerous factors that are linked with these attacks.

## Problem Space

We majorly focus here on the evolving dynamics of Al-Qaeda and ISIS, particularly through their affiliated organizations that operate across diverse regions such as Yemen, Syria, Afghanistan, Nigeria, and Mozambique. Amidst debates about their waning power, these groups have shown adaptability by aligning with entities like Al Shabaab, JNIM, and HTS for Al-Qaeda, and a broader range for ISIS. It aims to compare these organizations to evaluate which poses a greater threat to global security. This involves analyzing their operational capacities, tactics (like shootings, bombings, and beheadings), target preferences (government, military, law enforcement facilities), and victim profiles (civilians, politicians, bureaucrats, military personnel). The goal is to deepen understanding of the current terrorist landscape Terrorist assaults, which include suicide bombs, vehicle-ramming attacks, and shootings, have been among the most prominent tactics. The victims of these strikes have varied from citizens in crowded marketplaces to military personnel at checkpoints. The group's tendency to carry out high-profile and damaging attacks has been an integral component of the organization's strategy to instill fear and gain international attention [6].

In addition to conventional terrorist activities, ISIS has embraced guerrilla warfare tactics. In regions where they have established a presence, such as parts of Iraq and Syria, the group has relied on hit-and-run operations, kidnappings, and the use of improvised explosive devices to sustain their insurgency. This approach enables them to remain a persistent threat even after losing territorial control. Furthermore, ISIS has been at the forefront of utilizing internet propaganda to disseminate extremist ideologies, recruit new members, and incite "lone wolf" attacks worldwide. Their adept use of social media platforms and the internet has enabled them to reach a global audience, transforming their online presence into a potent recruitment and radicalization tool [7]

During its period of territorial control, ISIS imposed strict Islamic law within the areas it governed. They established a presence in both urban and rural settings, exerting authority and propagating radical ideologies among local populations. In pursuit of their objectives, ISIS has shown a willingness to target a wide array of organizations and individuals. Civilians have often been their primary focus, with attacks occurring in public spaces such as markets and transportation hubs, aiming to maximize casualties and instill fear within communities [6].

These attacks have resulted in significant casualties and lasting impacts on affected communities. Additionally, ISIS has frequently targeted military and security forces, viewing them as extensions of the authoritarian governments they oppose. This has led to direct confrontations with security personnel, as well as attacks on military facilities and checkpoints. Moreover, ISIS has a history of committing atrocities against religious and ethnic minorities, subjecting them to extreme oppression and violence. They have also sought to destroy cultural heritage sites and artifacts they deem incompatible with their radical interpretation of Islam. ISIS has greatly benefited from the growing support of terrorists operating beyond Syria and Iraq, actively seeking declarations of allegiance to bolster its position as the world's foremost terrorist organization [6].

## Research

Researching studies and government records serves as an important part of researching terrorist activity. By incorporating a wealth of academic research and fieldwork, articles provide significant understanding of the causes, beliefs, and strategies adopted by terrorist organizations. These articles are great for setting the context and learning in depth about Terrorism and Transactional Crime activities.

Government publications like the Annex of Statistical information from GTTAC Department, provides crucial data and evaluations of worldwide terrorist concerns, providing wide range of information on these terrorism activities. Known terrorist groups of ISIS, Al-Qaeda & other, their geographic reach, and current counterterrorism operations of the Jihadi activists from various countries can be found in the Global Terrorism Trends and Analytics Center's document Annex of Statistical information. This document elicits global terrorism statistics in the Perpetration and Fatalities, Geographical Trends and the Incidents that occurred in a global fashion, making it more informative. Diplomatic efforts, legislative frameworks, and international collaboration against terrorism are all areas where government reports are crucial. Using these papers, we put together a complete picture of how terrorism has changed over time, which helped us understand security tactics and policies [8].

The issue of terrorism is an essential component of our project. We start by figuring out what "terrorism" means before getting into the analysis process. As we gained more knowledge about this subject, we came to realize that it poses a big risk to most countries. During our research, we came across several articles from Dr. Mahmut Cengiz that explores between the threats posed by ISIS and those posed by Al-Qaeda, which are now the two most prominent terrorist organizations. It is noteworthy to observe that power and control appear to have been the key reasons driving the establishment of these two organizations.

We implemented a step-by-step strategy for researching Terrorism data while utilizing the various articles and resources at our disposal. Initially, we record all the project's specifications, including its scope, available resources, and deadlines, according to the instructor’s provided schedule. This crucial phase ensures that we have a clear, well-organized plan for conducting our research.

The objectives include focusing on specific groups and making an informed decision influenced by our partner's excellent ideas. Perform a comprehensive analysis of the selected groups to gain a deeper understanding of their objectives, strategies, beliefs, victims, weapon selection, operational capacities, and other patterns. After focusing on the goal objectives, we have tried to narrow down to work on the problem statement only on particular sub-groups with the minimum threshold of 10 incidents per group with 25 groups as the maximum threshold as a whole, from each of ISIS and Al-Qaeda groups: Core, DRC, West Africa, Mozambique, Khorasan, Sinai Province are few of them, which pertain to ISIS and Al-Qaeda affiliates operating as Jama’at Nusrat al-Islam Wal-Muslimin, Lashkar-e-Tayyiba, Tehrik-e Taliban Pakistan, Hay’at Tahrir al-Sham, Al-Shabaab [9] and few other.

Following the move on to gaining an in-depth knowledge of how the problem is described. The foundation of our study strategy, which enables us to approach the problem in a systematic and effective manner, is a solid understanding of how these terror groups and activists operate, which can be gained through educating ourselves on the problem's specifics and domain.

To achieve these objectives, we utilize information from numerous sources to ensure a well-rounded and exhaustive research strategy. These include papers from government reports, intelligence briefings, and credible news sources. Few of the data gathered from various articles, such as 'Names Are Never Just Names: A Nominal Analysis of Terrorist Organizations' and ISIS or al-Qaeda: Which Looms a Greater Threat to Global Security?', which elicits information about the franchise approach of ISIS, its unique model, operational capabilities, geographical expansions, and Taliban's takeover, contribute to our objective of categorizing and analyzing the groups. This method of collaboration ensures that our research is not only complete, but also able to include the most recent developments and ideas in the field of terrorism studies.

According to multiple reports its stated that 58% of the overall number of terrorist organizations had religious Jihadist goals. This emphasizes the significance of ideological and religious motivations for terrorist activities, which often depend on extreme readings of religious texts [10].

In addition, racial nationalism and separatism account for 45% of all objectives. To obtain autonomy or independence, these groups often resort to violent tactics to further the interests of a particular ethnic or national group. Jihadist terrorist organizations, such as ISIS-Core and Al Qaeda associates, were still very active in 2022 and continued to pose a threat to international security. Indicating continuous threats to regional security, ISIS-Core and its regional affiliates continued to target areas in Asia, the Middle East, and Africa. At the same time, other attacks were carried out by Al Qaeda-affiliated groups in conflict areas like Syria, Yemen, the Sahel, and the Horn of Africa. Ayman al-Zawahiri's murder added fuel to the fire of worries about Al Qaeda's potential haven following the Taliban takeover of Afghanistan. Al Qaeda's power was also growing in Africa. These changes demonstrated how flexible and resilient these groups are, which justifies ongoing counterterrorism measures [11].

According to the global terrorism dataset which is considered as the open-source information about the terroristic activities, there analysis is based on the largest terrorist organization, The graph shows an exponential rise in the frequency of attacks over time, highlighting the necessity for scholars to examine the behavior and attack patterns of these two well-known terrorist groups. Such research is essential for creating successful counterterrorism plans and reducing the threat presented by terrorist organizations. The existing projects on ISIS and Al Qaeda provides innovative approach to uncover associations between these two notorious terrorist organizations. Additionally, the earlier study automates the process of determining whether attacks were carried out by ISIS or Al-Qaeda using machine learning classification algorithms, with Support Vector Machine emerging as the most effective classifier compared to Naive Bayes and decision tree algorithms [12].

Seven critical feature sets, including target, city, location, weapon type, nationality, country, and attack type description, were identified to establish association rules. Notably, the research reveals that when the attack type is characterized as "bombing" or "explosion," and the nationality of the attack is Iraqi, the perpetrating group is likely ISIS. Conversely, when explosives, bombs, or dynamite are the primary weapons used, along with the involvement of vehicles as weapons, the attacking group is more likely to be Al-Qaeda. But this could only give us a foundation to start the work with the dataset however using data bricks platform and programming language like python we can implement certain analysis like regression that could help us understand in better way regarding the outspread of the terrorist activities and the way the expansion is being done.

## Solution Space

In this project focused on terrorism analysis, the primary objective is to leverage the Global Terrorism Trends and Analysis Center (GTTAC) database to gain insights into domestic and international terrorism incidents. To provide a comprehensive picture of worldwide terrorist patterns, the analysis uses several approaches, such as data visualization, regression analysis, clustering, and spatial mapping.

Data retrieval and preparation are the first steps in the process, when the dataset from GTTAC is retrieved and prepared for analysis. The project enters the EDA stage once the data has been prepared. Here, the property of the dataset is investigated, and simple visualizations are made to gain a first understanding of trends in terrorism over time, by area, and by attack type. Visualizations like Matplotlib and Seaborn are used in the project to learn more about the data. Part of these images are heatmaps that show where terrorism trends are. Regression analysis is also used to find possible links and warning signs of terrorist attacks. Regression models provides illuminating data for predicting future trends or assessing the impact of various tactics of terrorist attacks.

The project's ultimate objective is to give stakeholders useful insights and knowledge they can use. The public can obtain a better understanding of the global terrorist scene, as can policymakers who can make well-informed judgments about counterterrorism measures and researchers who want to understand the evolution of terrorism. The project's influence is broad and considerable since businesses and organizations can utilize the study to evaluate risks in various locations. This project seeks to support informed decision-making and improved security measures by providing a thorough analysis of terrorism patterns. Our analysis also informs you of specific ISIS and Al-Qaeda-affiliated groups with incidents reported in 2018 and 2022, as well as their tactics and methods.

## Project Objectives

TraCCC's research interests include significant terrorist organizations such as ISIS and Al-Qaeda. The primary objective of this data analytics research is to do an in-depth comparison between ISIS and Al-Qaeda, two significant and very influential terrorist organizations. This analysis seeks to provide a deeper understanding of their respective threats to world security. We intend to delve thoroughly into many aspects of these businesses activities and capacities by utilizing data analytics and visualization approaches.

Our main objective is to compare the atrocious actions of ISIS and Al-Qaeda. This entails a thorough investigation of their historical records, tracking the number of attacks, fatalities, and extent of destruction associated with each group. We establish which organization has been responsible for most deadly attacks over time by doing a perpetrator analysis. This analysis assists us in determining the relative importance of these groups to global security.

The second important goal is to thoroughly assess both organizations' operating capacity. This comprehensive examination involved a detailed examination of their strategies, including the methods used in their attacks, such as shootings, suicide bombs, car bombings, beheadings, and storming operations. We investigated their target selection, including if they preferentially target government buildings, military sites, law enforcement organizations, or other key institutions. We evaluated the categories of victims they target, such as people, politicians, bureaucrats, and military personnel. This extensive operational capacity analysis seeks to shed light on the range and depth of their activities.

Our third purpose is to perform a detailed geographic analysis of ISIS and Al-Qaeda. This investigation maps the regions in which these organizations operate, define their spheres of influence, and investigates the worldwide scope of their activities. We got to develop a better understanding of their international presence and ability to form and maintain cross-border networks by analyzing their geographic distribution.

We are going to apply cutting-edge data analytics approaches for achieving these high objectives. We are going to collect and preprocess massive databases which includes information on historical ISIS and Al-Qaeda attacks, casualties, methods, targets, and geographic locations. We use statistical models and data visualization tools to find hidden patterns, trends, and relationships using these datasets.

We aspire to obtain crucial insights through comprehensive data analysis that influence our conclusions of the relative potential risks presented by these organizations. This initiative greatly contributes to the fields of counterterrorism by offering light on the complicated dynamics of ISIS and Al-Qaeda. Finally, our goal is to provide essential information to policymakers and security specialists for them to better understand and handle these dangers, so contributing to a more secure global environment.

## Primary User Stories

As per the project's objectives, the following user stories have been developed:

### Security Analyst

As a security analyst, I did visualizations of government reports for terrorism threats of ISIS & Al-Kaida Sub-groups, to make informed decisions and recommendations to safeguard national/international security.

### Terrorism Researcher

As a researcher, I analyzed the past terrorist attacks of ISIS and Al-Kaida sub-groups including dates, locations, attack techniques, and victims, so that I can analyze, detect patterns, and understand terrorist activities and their nature.

## Product Vision

### Scenario #1- Consultant for International Security

In the field of international security advice, there is a seasoned expert known as the "Consultant for International Security." This expert works with big companies and carefully looks at their foreign operations from a security point of view, including the chance of terrorism. They may have to figure out what security risks there are, how bad they are, and come up with special ways to protect both resources and people. They use cutting-edge tools like the Terrorism Research Solution to get a full picture of global terrorism trends, find high-risk areas, and figure out what motivates terrorist operations.

Our platform gives customized views instead of general security reports. This lets experts fine-tune security methods based on what the client wants and where they are. With this option, experts can do data-driven risk assessments and make well-informed choices using personalized reports, interactive maps, and regression models. For accuracy and effectiveness, it's important to remember that this analysis is a big part of security ratings, but it needs to be paired with information about the client and real data.

### Scenario #2 – Counter Terrorism Analyst representative

The Counter-Terrorism Analyst's agent is a government expert whose most important job is to watch for and stop terrorist dangers. To use resources well, fight terrorism, and improve national security, they need to know a lot about how terrorist behavior trends change. They are the ones who are most likely to have correct and up-to-date knowledge about where terrorist attacks happen and why they happen. As part of their goal, they use the Terrorism Research Solution to look at hotspots, types of attacks, social factors, and political security.

Our product stands out because it makes choices based on facts from the present, not from the past or from anecdotes. Researchers can use our dynamic, interactive program to map terrorist strikes around the world, find groups of similar patterns, and do regression studies to find triggers. It stands as a tool that gives experts the information, they need to make good decisions about how to stop terrorists. For a full understanding of terrorism risks, it's important to remember that this analysis is very helpful, but it needs to be paired with accurate data from the GTTAC database as well as human skills and information from other intelligence sources.

# Datasets

## Overview

To keep track of terrorist attacks in the United States and around the world, the Global Terrorism Trends and Analysis Center (GTTAC) Record of Incident Database (GRID) employs open-source data. A wide range of users, including federal agencies, academic institutions, counterterrorism specialists, professionals in the criminal justice and other sectors, and members of the public, can navigate the data with the aid of GTTAC. The steps GTTAC takes to make sure the information provided by GRID is as complete and accurate as feasible [13].

The GTTAC created GRID to collect and consolidate the data on terrorist incidents needed for the Annex of Statistical Information on Terrorism. GTTAC searches through comprehensive open-source intelligence gathered from multi-media data aggregators to look for reports of potential terrorist attacks. The first stage of the data collection process involves the use of open-source Python script created on a Linux platform for text analysis, predictive modeling, and feature extraction. The GTTAC uses ontologies to define terrorist incidents, perpetrators, attack plans, weapons, and the targeting of individuals and locations. As soon as the automated processes have produced a body of data for human review and validation, GTTAC aggregates the data based on region and other geographic characteristics. The GTTAC staff examines the information before entering it into GRID.

GTTAC uses ontologies to describe terrorist incidents, offenders, attack tactics, weaponry, and the targeting of people and places. An incident file, a perpetrator file, and a source file make up the three files that make up GRID.

Each row in the Incident File is dedicated to a unique incident. A terrorist incident is a violent act committed by lone actors or non-state actors. The incidence file has a row for each distinct incidence. To include the information in an incident report, the following requirements must be satisfied: The goal of the violent act could be political, economic, religious, or societal. Evidence of a desire to force, intimidate, or communicate another message to an audience (or audiences) other than the immediate victims is present in the violent act. Given that it was directed at civilians, the violent act violated international humanitarian law. Only instances that satisfy all three requirements are included in GRID. GRID categorizes the occurrence as a terrorist incident and views the non-civilian targets as non-combatants.

This data collection includes details on the date, summary, weapon kinds, tactic types, city, province, and many other fields related to the incident.

The Perpetrator File contains a row for each specific perpetrator who participated in an occurrence. Some incidents are listed more than once in the Perpetrator File due to the possibility of many perpetrators being involved in a single incident. The information is on acts of international terrorism to analyze offenders and their categories. The reporting media may not precisely name the culprits, but they may categorize them as jihadists, ethnonationalists, or right-wingers.

Every row in the source file represents a different source that was consulted during the process of compiling an incident report. As a result of the fact that several sources may have reported on the same incident, the source file may contain multiple instances of certain incidents. It has fields like incident ID, publication date, headline, and publication name.

## Field Descriptions

Table : Attribute name, data type and description for incident dataset

| Column Name | Data Type | Description |
| --- | --- | --- |
| unique\_incident\_id | Numeric variable | Each record of an incident has a unique nine-digit incident ID number |
| incident\_id | Numeric variable | Each record of an incident also has a seven-digit incident\_id that is used to identify a multi-incident event. An event can include one or more incidents. Multiple related incidents that form an event share the same incident ID but have a different incident sequence number (incident\_seq). |
| incident\_seq | Numeric variable | Each record of an incident contains an incident sequence number used to identify multiple, related incidents that form an event. When only one incident occurred, the sequence number is always “00.” In cases of related incidents, the incident sequence begins with “01.” |
| incident\_date | Date variable | This field contains the date of the incident in a dd/mm/yyyy format. |
| incident\_day | Date variable | This field contains the day of the month in which the incident occurred and is entered as a numeric value (e.g., “15”). Days before “10” always have “0” as the first digit. |
| incident\_month | Date variable | This field contains the month in which the incident occurred and is entered as a numeric value (e.g., “04” for April). Months before “10” always have “0”as the first digit. |
| incident\_year | Date variable | This field contains the year the incident occurred and is entered as a numeric value (e.g., “2018”). |
| is\_assassination | Binary variable | This variable indicates whether Assassination characteristics were present in the incident. Assassination is the targeted killing, or attempted killing, of a specific individual who holds a position of high authority.  1 = “Yes” – The incident included an assassination.  0 = “No” – The incident did not include an assassination. |
| is\_ied | Binary variable | This variable indicates whether an improvised explosive device (IED) was used in the incident.  1 = “Yes” – An IED was used in the incident.  0 = “No” – An IED was not used in the incident. |
| is\_multi\_day | Binary variable | This variable indicates whether an incident occurred over the course of more than one day.  1 = “Yes” – The incident occurred over the course of more than one day.  0 = “No” – The incident only occurred within one day. |
| is\_multi\_location | Binary variable | This variable indicates whether the incident occurred in multiple locations.  1 = “Yes” – The incident occurred in more than one location.  0 = “No” – The incident only occurred in one location. |
| is\_suicide | Binary variable | This variable indicates whether suicide tactics, including suicide bombing, were used. 1 = “Yes” – A suicide tactic was used  in the incident.  0 = “No” – A suicide tactic was not used in the incident. |
| country\_genc\_txt | String variable | This variable is the appropriate country text label from the Geographical Entities, Names, and Codes (GENC) Register (Edition 3, Update 11). More information about GENC, including the full library of codes, is available here: <https://nsgreg.nga.mil/genc/> |
| region\_txt | String variable | This variable is the appropriate region text label from the Geographical Entities, Names, and Codes (GENC) Register (Edition 3, Update 11). More information about GENC, including the full library of codes, is available here:  <https://nsgreg.nga.mil/genc/> |
| Claimed | Binary variable | This variable indicates whether the perpetrator of the incident claimed responsibility for the incident. If there is no indication of a claim of responsibility, the default is “0” or “No.”  1 = “Yes” – The perpetrator claimed responsibility for the incident.  0 = “No” – The perpetrator did not claim responsibility for the incident. |
| num\_killed | Numeric scale variable | This variable is the total sum of persons (both U.S. and non-U.S. citizens) killed in the incident, including victims and perpetrators. The default number is “0” if no one was killed. |
| num\_killed\_perp | Numeric scale variable | This variable is the number of perpetrators killed in the incident. The default number is “0” if no perpetrators were killed. |
| num\_killed\_us | Numeric scale variable | This variable is the number of U.S. citizens killed in the incident. The default number is “0” if no U.S. citizens were killed. |
| num\_wounded | Numeric scale variable | This variable is the total sum of persons (both U.S. and non-U.S. citizens) wounded in the incident, including victims and perpetrators. The default number is “0” if no one was wounded. |
| num\_wounded\_us | Numeric scale variable | This variable is the number of U.S. citizens wounded in the incident. The default number is “0” if no U.S. citizens were wounded. |
| num\_hostkid | Numeric scale variable | This variable is the total sum of persons taken hostage, kidnapped, and/or reported “missing” in the incident, including both U.S. and non-U.S. citizens. The default number is “0” if no one was taken hostage, kidnapped, or reported “missing.” |
| num\_hostkid\_us | Numeric scale variable | This variable is the number of U.S. citizens taken hostage or kidnapped in the incident. The default number is “0” if no U.S. citizens were taken hostage or kidnapped. |
| tactic\_lvl1\_as | Binary Variable | Parent category for Assault tactic types.  1 = “Yes” – This tactic has been implemented.  0 = “No” – This tactic has not been used. |
| tactic\_lvl1\_co | Binary Variable | Parent category for Coordinated tactic types.  1 = “Yes” – This tactic has been implemented.  0 = “No” – This tactic has not been used. |
| tactic\_lvl1\_cv | Binary Variable | Parent category for Covert tactic types.  1 = “Yes” – This tactic has been implemented.  0 = “No” – This tactic has not been used. |
| tactic\_lvl1\_ex | Binary Variable | Parent category for Exploitive tactic types.  1 = “Yes” – This tactic has been implemented.  0 = “No” – This tactic has not been used. |
| tactic\_lvl1\_tr | Binary Variable | Parent category for Trauma-associated tactic types.  1 = “Yes” – This tactic has been implemented.  0 = “No” – This tactic has not been used. |
| tactic\_lvl1\_un | Binary Variable | Parent category for Unknown tactic types.  1 = “Yes” – This tactic has been implemented.  0 = “No” – This tactic has not been used. |
| tactic\_lvl2\_tr\_01 | Binary variable | Gender–based violence and rape are always viewed as a tactic, whether the rape itself is characterized as the terrorist incident, or it accompanies other terrorist incidents such as looting or armed assaults. Rape is considered an injury, so the number of rape victims, if cited, is added to the number of injured victims. |
| tactic\_lvl2\_tr\_02 | Binary variable | Deliberate killing of a detained individual, usually in a public or publicized manner (e.g., beheading, public execution of hostages or prisoners). |
| tactic\_lvl2\_tr\_03 | Binary variable | Deliberate maiming or amputation, as well as torture that does not result in death. When terrorist groups control territory and have established a judicial system that calls for mutilations as standard punishments, the mutilations are not considered terrorist incidents. However, the mutilations may qualify as incidents if they were publicized with the goal of intimidating others. |
| tactic\_lvl2\_tr\_04 | Binary variable | The assailant intended to die during the attack. These incidents usually involve a bomb or other explosive device |
| tactic\_lvl2\_tr\_05 | Binary variable | The main distinctions between a kidnapping and a hostage-taking are the location and targeting of the victims. Kidnapping is usually more targeted, with the perpetrators selecting specific victims in advance, taking control of them, and moving them to a different site. |
| tactic\_lvl2\_tr\_06 | Binary variable | A car, truck, or other vehicle was driven into individuals or crowds with the intent of causing casualties. |
| tactic\_lvl2\_tr\_07 | Binary variable | In a hostage-taking, unlike a kidnapping, the victims are generally held at the site where they are captured until the hostagetakers’ conditions are met. The victims of a hostage-taking are often random individuals captured at the site of the attack. |
| tactic\_lvl2\_tr\_08 | Binary variable | An act of violence aiming to murder a public figure or a prominent person for political or ideological motives. The victim is usually a well-known individual within the context of the incident. |
| tactic\_lvl2\_tr\_09 | Binary variable | A sharp object was used to publicly maim or kill a targeted person. |
| tactic\_lvl2\_tr\_10 | Binary variable | An armed attack aimed at taking over any vehicle (e.g., airplane, truck, car, boat, train, bus) for a specific purpose, such as achieving political goals, releasing prisoners, or acquiring transport out of the country. Hijacking often involves hostagetaking; the vehicle carrying the hostages is the target of the attack. |
| tactic\_lvl2\_as\_01 | Binary variable | The perpetrator shot at the target from a static point, or a firearm was used but details about the tactic are not given. |
| tactic\_lvl2\_as\_02 | Binary variable | The perpetrator assaulted the target’s location with the intent of forcefully entering or occupying it. |
| tactic\_lvl2\_as\_03 | Binary variable | The perpetrator fired on a target and quickly vacated the area by means of a vehicle. |
| tactic\_lvl2\_as\_04 | Binary variable | A bomb or munition was used with the intent of destroying the target. Includes conventional bombs (e.g., TNT, car bombs, mail bombs, pipe bombs) and most IEDs and suicide bombs. |
| tactic\_lvl2\_as\_05 | Binary variable | Any physical attack that aims to harm, intimidate, or kill victims without using conventional weapons (e.g., firearms, knives, incendiaries, explosives). Examples: attacks with fists, rocks, or sticks. |
| tactic\_lvl2\_cv\_01 | Binary variable | An explosive device was concealed in an object or piece of infrastructure, with the aim of injuring or killing anyone who walks by, touches, or seeks to use it. |
| tactic\_lvl2\_cv\_02 | Binary variable | A surprise attack, usually from a concealed place, on an intended victim traveling through the area under attack. |
| tactic\_lvl2\_cv\_03 | Binary variable | The act of damaging structures or facilities (e.g., buildings, bridges, power supplies) to make them unusable, and, in certain cases, to injure or kill those who seek to use them. Includes an initial effort to conceal the damage, unlike the Property Damage Only category. |
| tactic\_lvl2\_cv\_04 | Binary variable | Anti-personnel mines, anti-vehicle mines, or IEDs placed or planted to deny access to an area, route, or structure. |
| tactic\_lvl2\_cv\_05 | Binary variable | Men wearing women’s clothing to conceal weapons, or individuals wearing military, police, or other types of uniforms to access sites or people. |
| tactic\_lvl2\_co\_01 | Binary variable | The incident involved coordination in one country. |
| tactic\_lvl2\_co\_02 | Binary variable | The incident involved coordination in multiple countries. |
| tactic\_lvl2\_co\_03 | Binary variable | The incident involved coordination in one location. |
| tactic\_lvl2\_co\_04 | Binary variable | The incident involved coordination across multiple locations |
| tactic\_lvl2\_co\_05 | Binary variable | The incident involved coordination with one team of perpetrators. |
| tactic\_lvl2\_co\_06 | Binary variable | The incident involved coordination across multiple teams of perpetrators. |
| tactic\_lvl2\_ex\_01 | Binary variable | The perpetrator’s tactics included utilizing foreign fighters. |
| tactic\_lvl2\_ex\_02 | Binary variable | The perpetrator’s tactics included utilizing female fighters. |
| tactic\_lvl2\_ex\_03 | Binary variable | The perpetrator’s tactics included utilizing children. |
| tactic\_lvl2\_ex\_04 | Binary variable | The perpetrator’s tactics included illicit trade. |
| tactic\_lvl2\_ex\_05 | Binary variable | The perpetrator’s tactics included extortion, ransom, robbery, or racketeering. |
| tactic\_lvl2\_ex\_06 | Binary variable | The perpetrator’s tactics included corruption practices. |
| tactic\_lvl2\_ex\_07 | Binary variable | The perpetrator’s tactics included money laundering processes. |
| tactic\_lvl2\_ex\_08 | Binary variable | The perpetrators deliberately targeted property or infrastructure in their attack with no intention of inflicting direct casualties. |
| tactic\_lvl2\_ex\_10 | Binary variable | The perpetrators used computer systems to carry out an attack. Examples: ransomware attack, cyberattack on infrastructure, unauthorized access of computer systems to inflict physical or monetary damage on a system or institution. |

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| --- | --- | --- |
| weapon\_lvl1\_ex | Binary Variable | Parent category for Explosives weapon type. |
| weapon\_lvl1\_fi | Binary Variable | Parent category for Firearms weapon type |
| weapon\_lvl1\_im | Binary Variable | Parent category for Improvised Explosive Device (IED) weapon type. |
| weapon\_lvl1\_in | Binary Variable | Parent category for Incendiary weapon type. |
| weapon\_lvl1\_ml | Binary Variable | Parent category for Melee weapon type. |
| weapon\_lvl1\_ot | Binary Variable | Parent category for Other weapon type |
| weapon\_lvl1\_ua | Binary Variable | Parent category for Unmanned Aerial Vehicle (UAV) weapon type. |
| weapon\_lvl1\_un | Binary Variable | Parent category for Unknown weapon type. |
| Weapon\_lvl2\_fi\_02 | Binary Variable | Handgun (e.g., Glock, M1911, M9, 9 mm, .45 caliber, pistol); long gun/rifle; and intermediate-caliber rifle. Examples: AK-47, AK-74, M4, M16, assault rifle, bolt action rifle, submachine gun. |
| Weapon\_lvl2\_fi\_03 | Binary Variable | Intermediate-caliber firearms that provide sustained automatic fire, such as squad automatic weapons and beltfed weapons. Examples: M249, SAW, RPK, RPD, PKM, machine gun. |
| Weapon\_lvl2\_fi\_04 | Binary Variable | A homemade firearm was used. |
| Weapon\_lvl2\_fi\_05 | Binary Variable | High-caliber rifles and machine guns designed to damage vehicles and provide sustained automatic fire. Examples: .50 caliber rifle, anti-tank rifle, anti-vehicle rifle, large-caliber rifle, DShK |
| Weapon\_lvl2\_im\_03 | Binary Variable | An improvised explosive device (IED) attached to a person (i.e., a suicide bomber) by means of a vest or other object (e.g., backpack, belt, clothing, footwear). |
| Weapon\_lvl2\_im\_04 | Binary Variable | Any improvised explosive device (IED) not attached to a person that is created with easily obtained materials. Includes magnetic vehicle-borne improvised explosive devices (VBIEDs) and sticky bombs. The explosive could be manufactured using common chemicals. Alternatively, it could be a retrofitted artillery shell, an old military explosive, or another type of manufactured explosive. |
| Weapon\_lvl2\_ex\_02 | Binary variable | Artillery and other ground-to-ground munitions propelled by their own explosive/fuel charge and designed to deliver artillery payloads across medium-range distances. Examples: Qassam rocket, rocket, rocket artillery. |
| Weapon\_lvl2\_ex\_03 | Binary variable | Mortars and artillery not propelled by their own explosive charge. Often referred to as “shelling.” |
| Weapon\_lvl2\_ex\_04 | Binary variable | Explosives (generally military explosives) designed as weapons that cause explosive damage. Examples: simple bomb, C-4, Semtex, 500 lb. bomb, dynamite. |
| Weapon\_lvl2\_ex\_05 | Binary variable | Shoulder-fired, rocket-propelled grenades (RPGs); rocket-propelled munitions designed as anti-tank weapons; and non-RPGs such as stun grenades and hand grenades (antipersonnel explosive devices designed to be thrown that explode and fragment their metal shells). Includes all types of grenades except incendiary grenades. |
| Weapon\_lvl2\_ex\_06 | Binary variable | Mines manufactured for military use |
| Weapon\_lvl2\_ex\_07 | Binary variable | Self-propelled explosive munitions equipped with guidance technology that allow direction to be changed in midflight. |
| Weapon\_lvl2\_ua\_02 | Binary variable | An unmanned aerial vehicle (UAV) [i.e., a drone] manufactured for military purposes. |
| Weapon\_lvl2\_ua\_03 | Binary variable | An unmanned aerial vehicle (UAV) [i.e., a drone] manufactured for commercial purposes. |
| Weapon\_lvl2\_in\_02 | Binary variable | An improvised incendiary device. Normally consists of a glass bottle filled with gasoline or another highly flammable substance and a cloth that is lit; the contents of the bottle ignite on impact. |
| Weapon\_lvl2\_in\_03 | Binary variable | A weapon designed for military use that ignites and causes fire damage. Examples: napalm, other incendiary weapons, incendiary grenades. Does not include other types of grenades, such as fragmentation, high-explosive, antitank, stun, smoke, flash, and nonlethal grenades. |
| Weapon\_lvl2\_in\_04 | Binary variable | Fuel (gasoline, diesel, oil, or a similar substance) used as a weapon without any other device. |
| Weapon\_lvl2\_ml\_02 | Binary variable | An attack involving any sharp object. |
| Weapon\_lvl2\_ml\_03 | Binary variable | Blunt objects such as stones and unarmed attacks using fists. |
| Weapon\_lvl2\_ot\_02 | Binary variable | Fake guns, fake knives, and fake bombs. |
| Weapon\_lvl2\_ot\_03 | Binary variable | A vehicle was used as a weapon rather than as a method of transport. Example: A car was employed to ram civilians. |
| Weapon\_lvl2\_ot\_05 | Binary variable | Chemical, biological, radiological, and nuclear (CBRN) weapons of mass destruction (WMDs). |
| logistic\_lvl1\_mp | Binary Variable | Parent category for Mail/Postage delivery type. |
| logistic\_lvl1\_nn | Binary Variable | Parent category for No Logistics Type found or used. |
| logistic\_lvl1\_ot | Binary Variable | Parent category for Other logistics types (i.e., types other than those listed in the GRID Codebook) |
| logistic\_lvl1\_un | Binary Variable | Parent category for Unknown logistics type. |
| logistic\_lvl1\_ve | Binary Variable | Parent category for Vehicle logistics type. |
| logistic\_lvl2\_ve\_01 | Binary variable | Civilian and military aircraft. |
| logistic\_lvl2\_ve\_02 | Binary variable | Civilian and military helicopters. |
| logistic\_lvl2\_ve\_03 | Binary variable | The weapon was delivered by a vehicle such as a car, truck, or van. Examples: car bomb, vehicle-borne improvised explosive device (VBIED), sticky bomb attached to a car, drive-by shooting in which the perpetrator used a civilian vehicle. |
| logistic\_lvl2\_ve\_04 | Binary variable | Unarmored and wheeled military vehicle (e.g., jeep, truck, car). |
| logistic\_lvl2\_ve\_05 | Binary variable | Wheeled or tracked vehicle professionally built with armor and intended for use by a military force (i.e., not an improvised armored vehicle consisting of a civilian vehicle with armor added to it). Examples: tank, armored car, Humvee, armored self propelled gun, armored personnel carrier. |
| logistic\_lvl2\_ve\_06 | Binary variable | An improvised fighting vehicle that operates like a light (unarmored) military gun truck and is typically an open-backed civilian pickup truck or four wheel-drive vehicle mounting a heavy weapon. Examples: machine gun, anti-aircraft gun, rotary cannon, anti-tank weapon, anti-tank gun, ATGM, mortar, howitzer, multiple rocket launcher, recoilless rifle. |
| logistic\_lvl2\_ve\_08 | Binary variable | Any type of unmanned aerial vehicle (UAV) [i.e., a drone]. |
| logistic\_lvl2\_ve\_09 | Binary variable | Trains, trams, buses, and official government cars and limousines. |
| logistic\_lvl2\_ve\_10 | Binary variable | Any waterborne vehicle |
| logistic\_lvl2\_ve\_11 | Binary variable | Any two-wheeled vehicle (e.g., bicycle, motorcycle, moped). |
| logistic\_lvl2\_mp\_01 | Binary variable | Any incident in which the weapon was delivered by mail/postage and the goal was to harm or intimidate a specific intended target or individual, rather than create fear within a larger community. |
| logistic\_lvl2\_mp\_02 | Binary variable | Any incident in which the weapon was delivered by mail/postage and the apparent goal was to create fear rather than harm a specific individual. |
| logistic\_lvl2\_ot\_01 | Binary variable | Any logistics type that is thrown or dropped. |
| logistic\_lvl2\_ot\_02 | Binary variable | Kites (e.g., in Gaza) were set aflame and flown with the intent of setting fire to a property or fields. |
| logistic\_lvl2\_ot\_03 | Binary variable | Balloons were used to deliver a payload or munition (e.g., Molotov cocktail, explosives) to a specific or random target. |
| logistic\_lvl2\_ot\_04 | Binary variable | Slingshots were used to launch or fire a projectile. |
| logistic\_lvl2\_ot\_05 | Binary variable | Aerosols were used to spread contaminants (i.e., chemical, Binary variable biological, or radiological agents). |
| logistic\_lvl2\_ot\_06 | Binary variable | Improvised explosive devices (IEDs) were attached to animals and detonated. |
| victim\_lvl1\_ci | Binary Variable | Parent category for civilians who are identified as belonging to a specific societal, religious, or ethnic group. |
| victim\_lvl1\_go | Binary Variable | Parent category for individuals who hold positions in government. |
| victim\_lvl1\_gp | Binary Variable | Parent category for General Population. |
| victim\_lvl1\_mi | Binary Variable | Parent category for individuals who are actively serving in a country’s military. |
| victim\_lvl1\_ot | Binary Variable | Parent category for Other victim types. |
| victim\_lvl1\_po | Binary Variable | Parent category for individuals who are involved in a country’s political system, including those who do not hold positions in government. |
| victim\_lvl1\_pr | Binary Variable | Parent category for civilians who are identified and targeted based on their profession. |
| victim\_lvl1\_nn | Binary Variable | Parent category denoting that there were no victims. |
| victim\_lvl2\_ci\_02 |  | Attacks on women’s schools or other incidents in which a large majority of the victims belong to the same gender. |
| victim\_lvl2\_ci\_03 | Binary Variable | A large majority of the victims belong to a specific racial or ethnic group and may have been targeted for that reason. |
| victim\_lvl2\_ci\_05 | Binary Variable | LGBTQIA Victims identified as LGBTQIA were targeted or likely to be present in large numbers (e.g., incidents involving gay bars or gay parades). |
| victim\_lvl2\_ci\_07 | Binary Variable | Refugees or internally displaced persons (IDPs) were among the victims, whether or not they were the targets. |
| Victim\_lvl2\_ci\_08 | Binary Variable | Students or children were targeted, or an attack occurred at a site where students or children normally congregate (e.g., school, university building, dormitory, playground). |
| Victim\_lvl2\_ci\_09 | Binary Variable | Followers of Islam or members of a Muslim minority group formed a large majority of the victims and may have been targeted for that reason. |
| Victim\_lvl2\_ci\_10 | Binary variable | Followers of Christianity or members of a Christian minority group formed a large majority of the victims and may have been targeted for that reason. |
| Victim\_lvl2\_ci\_11 | Binary variable | Followers of Judaism or members of a Jewish minority group formed a large majority of the victims and may have been targeted for that reason. |
| Victim\_lvl2\_ci\_12 | Binary variable | Followers of Hinduism or members of a Hindu minority group formed a large majority of the victims and may have been targeted for that reason. |
| Victim\_lvl2\_ci\_13 | Binary variable | Followers of Buddhism or members of a Buddhist minority group formed a large majority of the victims and may have been targeted for that reason. |
| Victim\_lvl2\_ci\_14 | Binary variable | Followers of another specific religion or members of another religious minority group formed a large majority of the victims and may have been targeted for that reason. |
| Victim\_lvl2\_go\_01 | Binary variable | Government employees and low-level officials unless they fall into any of the categories below. Includes local dignitaries who are not employed by the government (e.g., tribal leaders, social leaders) and others who occupy honorary posts in the community. |
| Victim\_lvl2\_go\_02 | Binary variable | All foreign diplomatic personnel (including employees of international organizations with diplomatic status such as the UN and World Bank) and military attachés who are attached to embassies. |
| Victim\_lvl2\_go\_04 | Binary variable | High-level officials (e.g., the president, prime minister, royalty, other heads of state); and high-level officials below the rank of head of state (e.g., governors, senators, ministers, chief justices). Some individuals are classified under two categories. For example, a senator is under 1) High Level Officials and 2) Legislators, and a chief justice is under 1) High Level Officials and 2) Judiciary & Legal Personnel. |
| victim\_lvl2\_go\_05 | Binary variable | Only members of the government’s official intelligence services. Does not include members of military intelligence, who are classified under Military - National; or alleged informants, who are under Other - Informants (real/alleged). |
| victim\_lvl2\_go\_06 | Binary variable | All individuals involved in the judiciary and legal profession, whether or not they are government officials. |
| victim\_lvl2\_go\_07 | Binary variable | All individuals who work for the country’s law enforcement. Does not include military police, who are classified as Military - National, or individuals working for private security companies, who are classified as Professions - Private Security. When a recognized government is not in control of the area, individuals from armed groups can be classified under Law Enforcement if they were acting as de facto law enforcement and were targeted for that reason. victim\_lvl2\_go\_08 [0] or [1] Legislators Anyone who works in the go |
| victim\_lvl2\_gp\_01 | Binary variable | Insufficient information is available about the victims, or they appear to have been victimized solely because they were at the site of the incident. Applies to most cases of “random” shootings and bombings in public places or along major transportation routes. Also applies when there appear to have been casualties, but the number is unknown. |
| victim\_lvl2\_mi\_01 | Binary variable | Third-country militaries that are present in the country, whether or not they are there at the invitation of the government. Does not include U.S. or NATO forces, or third-country militaries that are present as part of an internationally sanctioned peacekeeping operation. |
| victim\_lvl2\_mi\_03 | Binary variable | All members of internationally sanctioned multinational peacekeeping units in a country (e.g., NATO, the African Union Transition Mission in Somalia [ATMIS]), except U.S. forces. |
| victim\_lvl2\_mi\_04 | Binary variable | All members of the national military, whether or not they are engaged in military operations. |
| victim\_lvl2\_mi\_05 | Binary variable | Only members of the U.S. military and U.S. military contractors. |
| victim\_lvl2\_ot\_01 | Binary variable | Known informants and individuals believed to have been informants for the authorities or for a terrorist group or militia, who were targeted for that reason. |
| victim\_lvl2\_ot\_04 | Binary variable | Processions whose main impetus is social, religious, or cultural rather than political. Such processions can often take on a strong political tone during periods of conflict or political strife, but they can still be classified in this category. |
| victim\_lvl2\_ot\_02 | Binary variable | Officials or members of labor unions, whether pro- or anti-government. |
| victim\_lvl2\_ot\_03 | Binary variable | Perpetrators of an attack who were killed or wounded in the incident. |
| victim\_lvl2\_ot\_06 | Binary variable | Pro-government forces that are present in a country, whether or not they receive funding from the government, as long as they are not the official forces of a national government. |
| victim\_lvl2\_ot\_05 | Binary variable | Members of other groups, members of factions, and individuals in the perpetrator’s group who were targeted because they were deemed disloyal or who were accidental victims of the attack. |
| victim\_lvl2\_po\_01 | Binary variable | All individuals who are running for office, either as incumbents or as opposition candidates. Includes defeated opposition candidates if they were targeted as part of election or post-election violence. |
| victim\_lvl2\_po\_02 | Binary variable | All election workers, including election observers and individuals who work at election sites, register voters, or canvass for candidates (other than themselves). |
| victim\_lvl2\_po\_03 | Binary variable | Members of political parties who were targeted because of their membership. Includes legal, illegal, and government parties. |
| victim\_lvl2\_po\_04 | Binary variable | Victims of assaults on demonstrators by terrorist groups or individuals. Does not cover actions by government forces to break up peaceful demonstrations. |
| victim\_lvl2\_pr\_01 | Binary variable | Anyone involved in agriculture, including peasants, laborers, and landowners. |
| victim\_lvl2\_pr\_03 | Binary variable | Anyone involved in business, whether foreign or domestic (e.g., small and large businesses, street sellers, hairdressers). |
| victim\_lvl2\_pr\_04 | Binary variable | Musicians and all other kinds of performers, film crew and athletes. |
| victim\_lvl2\_pr\_05 | Binary variable | All persons who work in schools, from cleaners to directors. Schools include all levels, from daycare to university. |
| victim\_lvl2\_pr\_06 | Binary variable | All persons who work on any kind of infrastructure (e.g., roads, bridges, all utilities, pipelines, mines, oil fields). |
| victim\_lvl2\_pr\_08 | Binary variable | All individuals involved with maritime trade and fisheries, but not ferries. |
| victim\_lvl2\_pr\_10 | Binary variable | All civilians who work or volunteer for any type of domestic or international organization that is not beholden to a state’s government. |
| victim\_lvl2\_pr\_11 | Binary variable | All individuals involved in security who are not paid by a state, local government, or military group. |
| victim\_lvl2\_pr\_12 | Binary variable | Religious leaders, such as priests, imams, preachers, prominent religious scholars, and others who hold authority or are in positions of prominence. |
| victim\_lvl2\_pr\_13 | Binary variable | Tourists and all individuals involved in the tourism industry. |
| victim\_lvl2\_pr\_14 | Binary variable | All individuals involved in public and private transport (e.g., buses, taxis, rickshaws, ferries). Includes airport staff and all aviation workers, except the military. |
| victim\_lvl2\_pr\_15 | Binary variable | All individuals working in gas, oil, electricity, water, hydroelectric power, coal, telecommunication, and mining. |
| victim\_lvl2\_pr\_16 | Binary variable | All individuals involved in the provision of abortion services, whether or not they are medical personnel. |
| victim\_lvl2\_pr\_17 | Binary variable | All medical personnel who are responding to emergency situations outside a hospital facility; other first responders (e.g., emergency medical technicians, firefighters, detonation experts) when they are responding to an emergency; and military medics if they are responding to an emergency. |
| victim\_lvl2\_pr\_18 | Binary variable | All medical personnel working in medical settings (e.g., hospitals, clinics, doctor’s offices); all public health workers and officials (e.g., midwives, vaccination workers); and all staff working in the emergency departments of hospitals and other medical facilities. Does not include emergency medical technicians and other medical personnel who are responding to emergencies outside a hospital facility. |
| victim\_lvl2\_nn\_01 | Binary variable | Denotes that there were no victims and no intended victims. |
| intended\_victim\_lvl1\_ci | Binary Variable | Parent category for civilians who are identified as belonging to a specific societal, religious, or ethnic group. |
| intended\_victim\_lvl1\_go | Binary Variable | Parent category for individuals who hold positions in government. |
| intended\_victim\_lvl1\_gp | Binary Variable | Parent category for General Population. |
| intended\_victim\_lvl1\_mi | Binary Variable | Parent category for individuals who are actively serving in a country’s military. |
| intended\_victim\_lvl1\_ot | Binary Variable | Parent category for Other victim types. |
| intended\_victim\_lvl1\_po | Binary Variable | Parent category for individuals who are involved in a country’s political system, including those who do not hold positions in government. |
| intended\_victim\_lvl1\_pr | Binary Variable | Parent category for civilians who are identified and targeted based on their profession. |
| intended\_victim\_lvl1\_nn | Binary Variable | Parent category denoting that there were no victims. |
| intended\_victim\_lvl2\_ci\_02 | Binary variable | Attacks on women’s schools or other incidents in which a large majority of the victims belong to the same gender. |
| intended\_victim\_lvl2\_ci\_03 | Binary variable | A large majority of the victims belong to a specific racial or ethnic group and may have been targeted for that reason. |
| intended\_victim\_lvl2\_ci\_05 | Binary variable | Victims identified as LGBTQIA, were targeted or likely to be present in large numbers (e.g., incidents involving gay bars or parades). |
| intended\_victim\_lvl2\_ci\_07 | Binary variable | Refugees or internally displaced persons (IDPs) were among the targets. |
| intended\_victim\_lvl2\_ci\_08 | Binary variable | Students or children were targeted, or an attack occurred at a site where students or children normally congregate (e.g., school, university building, dormitory, playground). |
| intended\_victim\_lvl2\_ci\_09 | Binary variable | Followers of Islam or members of a Muslim minority group formed a large majority of the victims and may have been targeted for that reason. |
| intended\_victim\_lvl2\_ci\_10 | Binary variable | Followers of Christianity or members of a Christian minority group formed a large majority of the victims and may have been targeted for that reason. |
| intended\_victim\_lvl2\_ci\_11 | Binary variable | Followers of Judaism or members of a Jewish minority group formed a large majority of the victims and may have been targeted for that reason. |
| intended\_victim\_lvl2\_ci\_12 | Binary variable | Followers of Hinduism or members of a Hindu minority group formed a large majority of the victims and may have been targeted for that reason. |
| intended\_victim\_lvl2\_ci\_13 | Binary variable | Followers of Buddhism or members of a Buddhist minority group formed a large majority of the victims and may have been targeted for that reason. |
| intended\_victim\_lvl2\_ci\_14 | Binary variable | Followers of another specific religion or members of another religious minority group formed a large majority of the victims and may have been targeted for that reason. |
| intended\_victim\_lvl2\_go\_01 | Binary variable | Government employees and lowlevel officials unless they fall into any of the categories below. Includes local dignitaries who are not employed by the government (e.g., tribal leaders, social leaders) and others who occupy honorary posts in the community. |
| intended\_victim\_lvl2\_go\_02 | Binary variable | All foreign diplomatic personnel, including employees of international organizations with diplomatic status such as the UN and World Bank. Includes military attachés who are attached to embassies. |
| intended\_victim\_lvl2\_go\_04 | Binary variable | High-level officials (e.g., the president, prime minister, royalty, other heads of state); and high-level officials below the rank of head of state (e.g., governors, senators, ministers, chief Justices). Some individuals are classified under two categories. For example, a senator is classified under 1) High Level Officials and 2) Legislators, and a chief justice is under 1) High Level Officials and 2) Judiciary & Legal Personnel. |
| intended\_victim\_lvl2\_go\_05 | Binary variable | Only members of the official intelligence services of the government. Does not include members of military intelligence, who are classified under Military - National or alleged informants, who are under Other - Informants (real/alleged). |
| intended\_victim\_lvl2\_go\_06 | Binary variable | All individuals who are involved in the judiciary and legal profession, whether or not they are government officials. |
| intended\_victim\_lvl2\_go\_07 | Binary variable | All individuals who work for the country’s law enforcement. Does not include military police, who are classified under Military - National, or individuals who are working for private security companies, who are under Professions - Private Security. When a recognized government is not in control of the area, individuals from armed groups can be classified under Law Enforcement if they were acting as de facto law enforcement and were targeted for that reason. |
| intended\_victim\_lvl2\_go\_08 | Binary variable | Anyone who works in the government’s legislative branch (e.g., staffers, advisors). A senator or parliamentarian is classified under both Government - Legislators and Government - High Level Officials. |
| intended\_victim\_lvl2\_gp\_01 | Binary variable | Insufficient information is available about the victims, or they appear to have been victimized solely because they were at the site of the incident. Applies to most “random” shootings and bombings in public places or along major transportation routes. Also applies when there appear to have been casualties, but the number is unknown. |
| intended\_victim\_lvl2\_mi\_01 | Binary variable | Third-country militaries that are present in the country, whether or not they are there at the invitation of the government. Does not include U.S. or NATO forces, or third-country militaries that are present as part of an internationally sanctioned peacekeeping operation. |
| intended\_victim\_lvl2\_mi\_03 | Binary variable | All members of internationally sanctioned multinational peacekeeping units in a country (e.g., NATO, the African Union Transition Mission in Somalia [ATMIS]), except U.S. forces. |
| intended\_victim\_lvl2\_mi\_04 | Binary variable | All members of the national military, whether or not they are engaged in military operations. Includes military contractors. |
| intended\_victim\_lvl2\_mi\_05 | Binary variable | Only members of the U.S. military and U.S. military contractors. |
| intended\_victim\_lvl2\_ot\_01 | Binary variable | Known informants or individuals believed to have been informants for the authorities or for a terrorist group or militia, who were targeted for that reason. |
| intended\_victim\_lvl2\_ot\_04 | Binary variable | Processions whose main impetus is social, religious, or cultural rather than political. Such processions can often take on a strong political tone during periods of conflict or political strife, but they can still be classified in this category. |
| intended\_victim\_lvl2\_ot\_02 | Binary variable | Officials or members of labor unions, whether pro- or anti-government. |
| intended\_victim\_lvl2\_ot\_03 | Binary variable | Perpetrators of an attack who are killed or wounded in the incident. |
| intended\_victim\_lvl2\_ot\_06 | Binary variable | Pro-government forces that are present in a country, whether or not they receive funding from the government, as long as they are not the official forces of a national government. |
| intended\_victim\_lvl2\_ot\_05 | Binary variable | Members of other groups, members of factions, and individuals in the perpetrator’s group who targeted because they were deemed disloyal or who were accidental victims of the attack. |
| intended\_victim\_lvl2\_po\_01 | Binary variable | All individuals who are running for office, either as incumbents or as opposition candidates. Includes defeated opposition candidates if they were targeted as part of election or post-election violence. |
| intended\_victim\_lvl2\_po\_02 | Binary variable | All election workers, including election observers and individuals who work at election sites, register voters, or canvass for candidates (other than themselves). |
| intended\_victim\_lvl2\_po\_03 | Binary variable | Members of political parties who were targeted because of their membership. Includes legal, illegal and government parties. |
| intended\_victim\_lvl2\_po\_04 | Binary variable | Victims of assaults on demonstrators are made by terrorist groups or individuals. Does not cover actions by government forces to break up peaceful demonstrations. |
| intended\_victim\_lvl2\_pr\_01 | Binary variable | Anyone involved in agriculture, including peasants, laborers, and landowners |
| intended\_victim\_lvl2\_pr\_03 | Binary variable | Anyone involved in business, whether foreign or domestic (e.g., small and large businesses, street sellers, hairdressers). |
| intended\_victim\_lvl2\_pr\_04 | Binary variable | Musicians and all other kinds of performers, film crew, and athletes. |
| intended\_victim\_lvl2\_pr\_05 | Binary variable | Everyone who works in schools, from cleaners to directors. Schools include all levels, from daycare to university. |
| intended\_victim\_lvl2\_pr\_06 | Binary variable | Everyone who works on any kind of infrastructure (e.g., roads, bridges, all utilities, pipelines, mines, oil fields). |
| intended\_victim\_lvl2\_pr\_07 | Binary variable | All persons who work in any form of media in any capacity, including radio and TV news personnel and online journalists. |
| intended\_victim\_lvl2\_pr\_08 | Binary variable | All individuals involved in maritime trade and fisheries, but not ferries. |
| intended\_victim\_lvl2\_pr\_10 | Binary variable | All civilians who work, or volunteer for, any type of domestic or international aid organization that is not beholden to a state’s government. |
| intended\_victim\_lvl2\_pr\_11 | Binary variable | All individuals involved in security who are not paid by a state, local government, military group, or terrorist organization. |
| intended\_victim\_lvl2\_pr\_12 | Binary variable | Religious leaders, such as priests, imams, preachers, prominent religious scholars, and others who hold authority or are in positions of prominence. |
| intended\_victim\_lvl2\_pr\_13 | Binary variable | Tourists and all individuals involved in the tourism industry. |
| intended\_victim\_lvl2\_pr\_14 | Binary variable | All individuals involved in public and private transport (e.g., buses, taxis, rickshaws, ferries). Includes airport staff and all aviation workers except the military. |
| intended\_victim\_lvl2\_pr\_15 | Binary variable | All individuals involved in gas, oil, electricity, water, hydroelectric power, coal, telecommunication, and mining. |
| Intended\_victim\_lvl2\_pr\_16 | Binary variable | All individuals involved in the provision of abortion services, whether or not they are medical personnel |
| intended\_victim\_lvl2\_pr\_17 | Binary variable | All medical personnel who are responding to emergency situations outside a hospital facility. Includes other first responders (e.g., emergency medical technicians, firefighters, detonation experts) and military medics when they are responding to an emergency. |
| intended\_victim\_lvl2\_pr\_18 | Binary variable | All medical personnel who are working in medical settings (e.g., hospitals, clinics, doctor’s offices); all public health workers and officials (e.g., midwives, vaccination workers); and all staff working in the emergency departments of hospitals and other medical facilities. Does not include emergency medical technicians and other medical personnel who are responding to emergencies outside a hospital facility. |
| intended\_victim\_lvl2\_nn\_01 | Binary variable | Denotes that there were no victims and no intended or targeted victims. |
| facility\_lvl1\_co | Binary Variable | Parent category for any facilities used for commercial purposes. |
| facility\_lvl1\_cu | Binary Variable | Parent category for any facilities that are used for cultural purposes or have cultural significance. |
| facility\_lvl1\_go | Binary Variable | Parent category for any government-owned or operated facilities. |
| facility\_lvl1\_in | Binary Variable | Parent category for any facilities related to infrastructure and development. |
| facility\_lvl1\_mi | Binary Variable | Parent category for any military-owned or operated facilities. |
| facility\_lvl1\_ms | Binary Variable | Parent category for any miscellaneous facility types. |
| facility\_lvl1\_nn | Binary Variable | Parent category for if there was no specific facility type. |
| facility\_lvl1\_un | Binary Variable | Parent category for unknown or unclear facility types. |
| facility\_lvl2\_co\_01 | Binary variable | Retail stores, department stores, and indoor malls. |
| facility\_lvl2\_co\_02 | Binary variable | All offices and office buildings. |
| facility\_lvl2\_co\_03 | Binary variable | Hotels and other destinations that are primarily frequented by foreigners and tourists. |
| facility\_lvl2\_cu\_01 | Binary variable | All theaters, movie theaters, night clubs, bars, concert halls, arenas, sports facilities, and similar venues, both indoor and outdoor. |
| facility\_lvl2\_cu\_02 | Binary variable | All media offices (e.g., newspaper headquarters or field offices, radio stations), printing plants and other facilities, and any vehicle (e.g., boat, jeep, helicopter) that transports media personnel. |
| facility\_lvl2\_cu\_03 | Binary variable | All buildings of all religious faiths and groups, including houses of worship, schools, and any other buildings or compounds that they own or occupy. Includes religious shrines, cemeteries, and other monuments. |
| facility\_lvl2\_cu\_04 | Binary variable | Museums, historical buildings, secular cemeteries, monuments, castles, archeological sites, ruins, and other settings that are of cultural importance to the local, national, and/or international community. |
| facility\_lvl2\_go\_01 | Binary variable | All buildings and facilities known to belong to any level of government. Examples: local government buildings, courthouses and judicial buildings, buildings used by the governing party, all election facilities, buildings temporarily used as polling places during an election. Includes government buses, limousines, and other vehicles. |
| facility\_lvl2\_go\_02 | Binary variable | Buildings with diplomatic status (e.g., embassies, consulates, cultural centers) and offices of international entities with diplomatic status such as the World Bank and UN organizations. |
| facility\_lvl2\_go\_03 | Binary variable | All police buildings and vehicles, checkpoints, check posts, patrols, prisons, and jails attached to the national, state, or local government; and buildings and facilities associated with government intelligence services. Does not include any checkpoints or other installations associated with military, paramilitary, or militia forces. |
| facility\_lvl2\_in\_01 | Binary variable | All farms, farm equipment, and farm produce and food storage and distribution networks. |
| facility\_lvl2\_in\_02 | Binary variable | All civilian aircraft, airfields, airports, offices of commercial aviation companies, and other infrastructure. Does not include any kind of military aircraft. |
| facility\_lvl2\_in\_03 | Binary variable | All television and radio broadcast infrastructure (e.g., broadcasting equipment, studios, offices) and telephone infrastructure, cell towers, and computer servers. |
| facility\_lvl2\_in\_04 | Binary variable | All construction sites, working and abandoned factories, warehouses, and other industrial infrastructure. |
| facility\_lvl2\_in\_05 | Binary variable | All buildings, buses, and facilities of schools, universities, and other educational facilities (e.g., libraries, language schools, computing schools, training centers, daycare centers). However, certain specialized or affiliated schools are classified under other categories because they are often targeted because of their affiliations. Examples: Police academies are entered under Government - Law Enforcement & Intelligence. Military academies are under Military Facility - National or Military Facility - Multi-National. Religious schools are under Culture - Religious Sites. When the incident involves a school classified under a category other than education, mention is made in the summary that the facility is a school. |
| facility\_lvl2\_in\_06 | Binary variable | All medical offices, hospitals, clinics, and abortion-related facilities; all ambulances, fire engines, and other first-responder vehicles; and all military medical facilities. |
| facility\_lvl2\_in\_07 | Binary variable | All kinds of land vehicles (e.g., cars, trains, buses, subways) and the infrastructure that supports them (e.g., railroad tracks, railroad stations, bus stations, roads). Does not include special-purpose vehicles (e.g., police cars, military vehicles, ambulances, government vehicles). |
| facility\_lvl2\_in\_08 | Binary variable | All water vehicles used in transport, trade, commerce, fishing, or leisure; the infrastructure supporting them (e.g., docks, ferry stations, warehouses); and all vessels used in the transport of natural resources and fuel (e.g., oil tankers). |
| facility\_lvl2\_in\_09 | Binary variable | Privately owned land, apartment buildings, and individual homes. |
| facility\_lvl2\_in\_10 | Binary variable | All outdoor public spaces (e.g., marketplaces, city streets, plazas, parks, parking lots, garages, beaches). |
| facility\_lvl2\_in\_11 | Binary variable | Offices of domestic and international NGOs and their vehicles, refugee camps, internally displaced person (IDP) camps and informal refugee settlements, relief shipments and their distribution network, de-militarized zones, and any areas or facilities established to protect civilian populations in conflict zones. However, emergency medical technicians’ vehicles, ambulances, and Red Cross vehicles are classified as Infrastructure - Healthcare Facilities, not Infrastructure - Relief. |
| facility\_lvl2\_in\_12 | Binary variable | All energy infrastructure (e.g., coal, charcoal, oil, gas, hydroelectric power, nuclear power, solar, wind); other domestic utilities (e.g., water, sewage); and extraction, transport, and distribution networks for all minerals and energy sources, including commercial and artisanal mining. |
| facility\_lvl2\_mi\_01 | Binary variable | Third-country military facilities that are present in the country, whether or not they are there by invitation of the government, and all installations, checkpoints, weapons, and vehicles. Does not include U.S. or NATO forces, nor third-country militaries that are present as part of an internationally sanctioned peacekeeping operation. |
| facility\_lvl2\_mi\_04 | Binary variable | All facilities of members of internationally sanctioned multinational peacekeeping units in a country (e.g., NATO, the African Union Transition Mission in Somalia [ATMIS]), except U.S. forces. |
| facility\_lvl2\_mi\_05 | Binary variable | All facilities, installations, weapons, and vehicles of the national military (whether or not they are engaged in military operations) and military contractors. |
| facility\_lvl2\_mi\_06 | Binary variable | Only facilities of the U.S. military and U.S. military contractors. Includes all installations, checkpoints, weapons, and vehicles. |
| facility\_lvl2\_ms\_01 | Binary variable | Facilities of labor unions, other organized social groups, and any political parties except the governing party, which is classified under Government - Buildings or Vehicles. |
| facility\_lvl2\_ms\_02 | Binary variable | Property that is targeted because the owners are Politically Exposed Persons (PEPs) [persons who are susceptible to involvement in corruption or bribery] or who are believed to be involved in corruption, bribery, money laundering, or similar practices. |
| facility\_lvl2\_ms\_04 | Binary variable | Facilities owned and operated by a perpetrator group. |
| facility\_lvl2\_ms\_03 | Binary variable | All facilities, installations, checkpoints, weapons, and vehicles of pro-government forces that are not part of the official military, whether or not the progovernment forces receive funding from the government. |
| facility\_lvl2\_ms\_05 | Binary variable | Facilities owned and operated by a violent non-state actor. |
| facility\_lvl2\_un\_01 | Binary variable | The site is unknown, impossible to determine, or not important to the incident. Examples: attacks targeting specific individuals or groups of people, random rocket and mortar attacks, incidents resulting from interactions with police. In such cases, there is no need to try to track down the facility category. |
| Facility\_lvl2\_nn\_01 | Binary variable | No facility was targeted. |
| ICat\_ANA | Binary Variable | Anarchist |
| ICat\_Ethn | Binary Variable | Ethnonationalist/Separatist |
| ICat\_Iran | Binary Variable | Iranian-Backed |
| ICat\_Left | Binary Variable | Left-Wing/Revolutionary Extremist |
| ICat\_Right | Binary Variable | Right-Wing Extremists |
| ICat\_Rhbjc | Binary Variable | Religious (Other - Hindu, Buddhist, Jewish, Christian) |
| ICat\_Rjih | Binary Variable | Religious (Jihadist) |
| ICat\_Single | Binary Variable | Single Issue |
| ICat\_Unknown | Binary Variable | Unknown |
| ICat\_Vig | Binary Variable | Vigilante (Pro-Government) |

Table 2: Attribute name, data type and description for Perpetrators dataset

| Column Name | Data Type | Description |
| --- | --- | --- |
| perp\_incident\_id | String | Unique alphanumeric identifier for a perpetrator's involvement in an incident. |
| perp\_cd | Categorical | Unique code (1-4 digits) identifying each perpetrator. |
| perp\_name | String | Name of the perpetrator. |
| unique\_incident\_id | Numeric | Unique nine-digit incident ID number. |
| incident\_id | Numeric | Seven-digit incident ID used to identify multi-incident events. |
| incident\_seq | Numeric | Sequence number for related incidents within an event. |
| incident\_date | Date | Date of the incident in dd/mm/yyyy format. |
| incident\_day | Date | Numeric day of the month when the incident occurred. |
| incident\_month | Date | Numeric month when the incident occurred. |
| incident\_year | Date | Numeric year when the incident occurred. |
| is\_assassination | Binary | Indicates if assassination characteristics were present in the incident (1 = Yes, 0 = No). |
| is\_ied | Binary | Indicates if an improvised explosive device (IED) was used in the incident (1 = Yes, 0 = No). |
| is\_multi\_day | Binary | Indicates if the incident occurred over more than one day (1 = Yes, 0 = No). |
| is\_multi\_location | Binary | Indicates if the incident occurred in multiple locations (1 = Yes, 0 = No). |
| is\_suicide | Binary | Indicates if suicide tactics, including suicide bombing, were used in the incident (1 = Yes, 0 = No). |
| country\_genc\_txt | String | Text label corresponding to the country code from the GENC Register. |
| country\_nongenc\_txt | String | Given country names (if not listed in the GENC Register). |
| region\_txt | String | Text label corresponding to the region code from the GENC Register. |

| Column Name | Data Type | Description |
| --- | --- | --- |
| claimed | Binary | Indicates whether the perpetrator of the incident claimed responsibility (1 = Yes, 0 = No). |
| num\_killed | Numeric | Total number of persons killed in the incident, including victims and perpetrators. Default is 0 if no one was killed. |
| num\_killed\_perp | Numeric | Number of perpetrators killed in the incident. Default is 0 if no perpetrators were killed. |
| num\_killed\_us | Numeric | Number of U.S. citizens killed in the incident. Default is 0 if no U.S. citizens were killed. |
| num\_wounded | Numeric | Total number of persons wounded in the incident, including victims and perpetrators. Default is 0 if no one was wounded. |
| num\_wounded\_us | Numeric | Number of U.S. citizens wounded in the incident. Default is 0 if no U.S. citizens were wounded. |
| num\_hostkid | Numeric | Total number of persons taken hostage, kidnapped, or reported "missing" in the incident, including both U.S. and non-U.S. citizens. Default is 0 if no one was taken hostage, kidnapped, or reported "missing." |
| num\_hostkid\_us | Numeric | Number of U.S. citizens taken hostage or kidnapped in the incident. Default is 0 if no U.S. citizens were taken hostage or kidnapped. |
| tactic\_lvl1\_as | [0] or [1] | Indicates if the incident belongs to the "ASSAULT" parent category for Assault tactic types. |
| tactic\_lvl1\_co | [0] or [1] | Indicates if the incident belongs to the "COORDINATED" parent category for Coordinated tactic types. |
| tactic\_lvl1\_cv | [0] or [1] | Indicates if the incident belongs to the "COVERT" parent category for Covert tactic types. |
| tactic\_lvl1\_ex | [0] or [1] | Indicates if the incident belongs to the "EXPLOITIVE" parent category for Exploitive tactic types. |
| tactic\_lvl1\_tr | [0] or [1] | Indicates if the incident belongs to the "TRAUMA" parent category for Trauma-associated tactic types. |
| tactic\_lvl1\_un | [0] or [1] | Indicates if the incident belongs to the "UNKNOWN" parent category for Unknown tactic types. |
| tactic\_lvl2\_tr\_01 | Binary variable | Gender–based violence and rape are always viewed as a tactic, whether the rape itself is characterized as the terrorist incident, or it accompanies other terrorist incidents such as looting or armed assaults. Rape is considered an injury, so the number of rape victims, if cited, is added to the number of injured victims. |
| tactic\_lvl2\_tr\_02 | Binary variable | Deliberate killing of a detained individual, usually in a public or publicized manner (e.g., beheading, public execution of hostages or prisoners). |
| tactic\_lvl2\_tr\_04 | Binary variable | The assailant intended to die during the attack. These incidents usually involve a bomb or other explosive device |
| tactic\_lvl2\_tr\_05 | Binary variable | The main distinctions between a kidnapping and a hostage-taking are the location and targeting of the victims. Kidnapping is usually more targeted, with the perpetrators selecting specific victims in advance, taking control of them, and moving them to a different site. |
| tactic\_lvl2\_tr\_06 | Binary variable | A car, truck, or other vehicle was driven into individuals or crowds with the intent of causing casualties. |
| tactic\_lvl2\_tr\_07 | Binary variable | In a hostage-taking, unlike a kidnapping, the victims are generally held at the site where they are captured until the hostagetakers’ conditions are met. The victims of a hostage-taking are often random individuals captured at the site of the attack. |
| tactic\_lvl2\_tr\_08 | Binary variable | An act of violence aiming to murder a public figure or a prominent person for political or ideological motives. The victim is usually a well-known individual within the context of the incident. |
| tactic\_lvl2\_tr\_09 | Binary variable | A sharp object was used to publicly maim or kill a targeted person. |
| tactic\_lvl2\_tr\_10 | Binary variable | An armed attack aimed at taking over any vehicle (e.g., airplane, truck, car, boat, train, bus) for a specific purpose, such as achieving political goals, releasing prisoners, or acquiring transport out of the country. Hijacking often involves hostagetaking; the vehicle carrying the hostages is the target of the attack. |
| tactic\_lvl2\_as\_01 | Binary variable | The perpetrator shot at the target from a static point, or a firearm was used but details about the tactic are not given. |
| tactic\_lvl2\_as\_02 | Binary variable | The perpetrator assaulted the target’s location with the intent of forcefully entering or occupying it. |
| tactic\_lvl2\_as\_03 | Binary variable | The perpetrator fired on a target and quickly vacated the area by means of a vehicle. |
| tactic\_lvl2\_as\_04 | Binary variable | A bomb or munition was used with the intent of destroying the target. Includes conventional bombs (e.g., TNT, car bombs, mail bombs, pipe bombs) and most IEDs and suicide bombs. |
| tactic\_lvl2\_as\_05 | Binary variable | Any physical attack that aims to harm, intimidate, or kill victims without using conventional weapons (e.g., firearms, knives, incendiaries, explosives). Examples: attacks with fists, rocks, or sticks. |
| tactic\_lvl2\_cv\_01 | Binary variable | An explosive device was concealed in an object or piece of infrastructure, with the aim of injuring or killing anyone who walks by, touches, or seeks to use it. |
| tactic\_lvl2\_cv\_02 | Binary variable | A surprise attack, usually from a concealed place, on an intended victim traveling through the area under attack. |
| tactic\_lvl2\_cv\_03 | Binary variable | The act of damaging structures or facilities (e.g., buildings, bridges, power supplies) to make them unusable, and, in certain cases, to injure or kill those who seek to use them. Includes an initial effort to conceal the damage, unlike the Property Damage Only category. |
| tactic\_lvl2\_cv\_04 | Binary variable | Anti-personnel mines, anti-vehicle mines, or IEDs placed or planted to deny access to an area, route, or structure. |
| tactic\_lvl2\_cv\_05 | Binary variable | Men wearing women’s clothing to conceal weapons, or individuals wearing military, police, or other types of uniforms to access sites or people. |
| tactic\_lvl2\_co\_01 | Binary variable | The incident involved coordination in one country. |
| tactic\_lvl2\_co\_02 | Binary variable | The incident involved coordination in multiple countries. |
| tactic\_lvl2\_co\_03 | Binary variable | The incident involved coordination in one location. |
| tactic\_lvl2\_co\_04 | Binary variable | The incident involved coordination across multiple locations |
| tactic\_lvl2\_co\_05 | Binary variable | The incident involved coordination with one team of perpetrators. |
| tactic\_lvl2\_co\_06 | Binary variable | The incident involved coordination across multiple teams of perpetrators. |
| tactic\_lvl2\_ex\_01 | Binary variable | The perpetrator’s tactics included utilizing foreign fighters. |
| tactic\_lvl2\_ex\_02 | Binary variable | The perpetrator’s tactics included utilizing female fighters. |
| tactic\_lvl2\_ex\_03 | Binary variable | The perpetrator’s tactics included utilizing children. |
| tactic\_lvl2\_ex\_04 | Binary variable | The perpetrator’s tactics included illicit trade. |
| tactic\_lvl2\_ex\_05 | Binary variable | The perpetrator’s tactics included extortion, ransom, robbery, or racketeering. |
| tactic\_lvl2\_ex\_06 | Binary variable | The perpetrator’s tactics included corruption practices. |
| tactic\_lvl2\_ex\_07 | Binary variable | The perpetrator’s tactics included money laundering processes. |
| tactic\_lvl2\_ex\_08 | Binary variable | The perpetrators deliberately targeted property or infrastructure in their attack with no intention of inflicting direct casualties. |
| tactic\_lvl2\_ex\_10 | Binary variable | The perpetrators used computer systems to carry out an attack. Examples: ransomware attack, cyberattack on infrastructure, unauthorized access of computer systems to inflict physical or monetary damage on a system or institution. |

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| Column Name | Data Type | | Description | |
| weapon\_lvl1\_fi | [0] or [1] | | Parent category for Firearms weapon type. | |
| weapon\_lvl1\_im | [0] or [1] | | Parent category for Improvised Explosive Device (IED) weapon type. | |
| weapon\_lvl1\_in | [0] or [1] | | Parent category for Incendiary weapon type. | |
| weapon\_lvl1\_ml | [0] or [1] | | Parent category for Melee weapon type. | |
| weapon\_lvl1\_ot | [0] or [1] | | Parent category for Other weapon type. | |
| weapon\_lvl1\_ua | [0] or [1] | | Parent category for Unmanned Aerial Vehicle (UAV) weapon type. | |
| weapon\_lvl1\_un | [0] or [1] | | Parent category for Unknown weapon type. | |
| Weapon\_lvl2\_fi\_02 | Binary Variable | | Handgun (e.g., Glock, M1911, M9, 9 mm, .45 caliber, pistol); long gun/rifle; and intermediate-caliber rifle. Examples: AK-47, AK-74, M4, M16, assault rifle, bolt action rifle, submachine gun. | |
| Weapon\_lvl2\_fi\_03 | Binary Variable | | Intermediate-caliber firearms that provide sustained automatic fire, such as squad automatic weapons and beltfed weapons. Examples: M249, SAW, RPK, RPD, PKM, machine gun. | |
| Weapon\_lvl2\_fi\_04 | Binary Variable | | A homemade firearm was used. | |
| Weapon\_lvl2\_fi\_05 | Binary Variable | | High-caliber rifles and machine guns designed to damage vehicles and provide sustained automatic fire. Examples: .50 caliber rifle, anti-tank rifle, anti-vehicle rifle, large-caliber rifle, DShK | |
| Weapon\_lvl2\_im\_03 | Binary Variable | | An improvised explosive device (IED) attached to a person (i.e., a suicide bomber) by means of a vest or other object (e.g., backpack, belt, clothing, footwear). | |
| Weapon\_lvl2\_im\_04 | Binary Variable | | Any improvised explosive device (IED) not attached to a person that is created with easily obtained materials. Includes magnetic vehicle-borne improvised explosive devices (VBIEDs) and sticky bombs. The explosive could be manufactured using common chemicals. Alternatively, it could be a retrofitted artillery shell, an old military explosive, or another type of manufactured explosive. | |
| Weapon\_lvl2\_ex\_02 | Binary variable | | Artillery and other ground-to-ground munitions propelled by their own explosive/fuel charge and designed to deliver artillery payloads across medium-range distances. Examples: Qassam rocket, rocket, rocket artillery. | |
| Weapon\_lvl2\_ex\_03 | Binary variable | | Mortars and artillery not propelled by their own explosive charge. Often referred to as “shelling.” | |
| Weapon\_lvl2\_ex\_04 | Binary variable | | Explosives (generally military explosives) designed as weapons that cause explosive damage. Examples: simple bomb, C-4, Semtex, 500 lb. bomb, dynamite. | |
| Weapon\_lvl2\_ex\_05 | Binary variable | | Shoulder-fired, rocket-propelled grenades (RPGs); rocket-propelled munitions designed as anti-tank weapons; and non-RPGs such as stun grenades and hand grenades (antipersonnel explosive devices designed to be thrown that explode and fragment their metal shells). Includes all types of grenades except incendiary grenades. | |
| Weapon\_lvl2\_ex\_06 | Binary variable | | Mines manufactured for military use | |
| Weapon\_lvl2\_ex\_07 | Binary variable | | Self-propelled explosive munitions equipped with guidance technology that allow direction to be changed in midflight. | |
| Weapon\_lvl2\_ua\_02 | Binary variable | | An unmanned aerial vehicle (UAV) [i.e., a drone] manufactured for military purposes. | |
| Weapon\_lvl2\_ua\_03 | Binary variable | | An unmanned aerial vehicle (UAV) [i.e., a drone] manufactured for commercial purposes. | |
| Weapon\_lvl2\_in\_02 | | | Binary variable | An improvised incendiary device. Normally consists of a glass bottle filled with gasoline or another highly flammable substance and a cloth that is lit; the contents of the bottle ignite on impact. |
| Weapon\_lvl2\_in\_03 | | | Binary variable | A weapon designed for military use that ignites and causes fire damage. Examples: napalm, other incendiary weapons, incendiary grenades. Does not include other types of grenades, such as fragmentation, high-explosive, antitank, stun, smoke, flash, and nonlethal grenades. |
| Weapon\_lvl2\_in\_04 | | | Binary variable | Fuel (gasoline, diesel, oil, or a similar substance) used as a weapon without any other device. |
| Weapon\_lvl2\_ml\_02 | | | Binary variable | An attack involving any sharp object. |
| Weapon\_lvl2\_ml\_03 | | | Binary variable | Blunt objects such as stones and unarmed attacks using fists. |
| Weapon\_lvl2\_ot\_02 | | | Binary variable | Fake guns, fake knives, and fake bombs. |
| Weapon\_lvl2\_ot\_03 | | | Binary variable | A vehicle was used as a weapon rather than as a method of transport. Example: A car was employed to ram civilians. |
| Weapon\_lvl2\_ot\_05 | | | Binary variable | Chemical, biological, radiological, and nuclear (CBRN) weapons of mass destruction (WMDs). |
| logistic\_lvl1\_mp | Binary Variable | | Parent category for Mail/Postage delivery type. | |
| logistic\_lvl1\_nn | | | Binary Variable | Parent category for No Logistics Type found or used. |
| logistic\_lvl1\_ot | | | Binary Variable | Parent category for Other logistics types (i.e., types other than those listed in the GRID Codebook) |
| logistic\_lvl1\_un | | | Binary Variable | Parent category for Unknown logistics type. |
| logistic\_lvl1\_ve | | | Binary Variable | Parent category for Vehicle logistics type. |
| logistic\_lvl2\_ve\_01 | | | Binary variable | Civilian and military aircraft. |
| logistic\_lvl2\_ve\_02 | | | Binary variable | Civilian and military helicopters. |
| logistic\_lvl2\_ve\_03 | | | Binary variable | The weapon was delivered by a vehicle such as a car, truck, or van. Examples: car bomb, vehicle-borne improvised explosive device (VBIED), sticky bomb attached to a car, drive-by shooting in which the perpetrator used a civilian vehicle. |
| logistic\_lvl2\_ve\_04 | | | Binary variable | Unarmored and wheeled military vehicle (e.g., jeep, truck, car). |
| logistic\_lvl2\_ve\_05 | Binary variable | | Wheeled or tracked vehicle professionally built with armor and intended for use by a military force (i.e., not an improvised armored vehicle consisting of a civilian vehicle with armor added to it). Examples: tank, armored car, Humvee, armored selfpropelled gun, armored personnel carrier. | |
| logistic\_lvl2\_ve\_06 | Binary variable | | An improvised fighting vehicle that operates like a light (unarmored) military gun truck and is typically an open-backed civilian pickup truck or fourwheel-drive vehicle mounting a heavy weapon. Examples: machine gun, anti-aircraft gun, rotary cannon, anti-tank weapon, anti-tank gun, ATGM, mortar, howitzer, multiple rocket launcher, recoilless rifle. | |
| logistic\_lvl2\_ve\_08 | Binary variable | | Any type of unmanned aerial vehicle (UAV) [i.e., a drone]. | |
| logistic\_lvl2\_ve\_09 | Binary variable | | Trains, trams, buses, and official government cars and limousines. | |
| logistic\_lvl2\_ve\_10 | Binary variable | | Any waterborne vehicle | |
| logistic\_lvl2\_ve\_11 | Binary variable | | Any two-wheeled vehicle (e.g., bicycle, motorcycle, moped). | |
| logistic\_lvl2\_mp\_01 | Binary variable | | Any incident in which the weapon was delivered by mail/postage and the goal was to harm or intimidate a specific intended target or individual, rather than create fear within a larger community. | |
| logistic\_lvl2\_mp\_02 | Binary variable | | Any incident in which the weapon was delivered by mail/postage and the apparent goal was to create fear rather than harm a specific individual. | |
| logistic\_lvl2\_ot\_01 | Binary variable | | Any logistics type that is thrown or dropped. | |
| logistic\_lvl2\_ot\_02 | Binary variable | | Kites (e.g., in Gaza) were set aflame and flown with the intent of setting fire to a property or fields. | |
| logistic\_lvl2\_ot\_03 | Binary variable | | Balloons were used to deliver a payload or munition (e.g., Molotov cocktail, explosives) to a specific or random target. | |
| logistic\_lvl2\_ot\_04 | Binary variable | | Slingshots were used to launch or fire a projectile. | |
| logistic\_lvl2\_ot\_05 | Binary variable | | Aerosols were used to spread contaminants (i.e., chemical, Binary variable biological, or radiological agents). | |
| logistic\_lvl2\_ot\_06 | Binary variable | | Improvised explosive devices (IEDs) were attached to animals and detonated. | |
| victim\_lvl1\_ci | Binary Variable | | Parent category for civilians who are identified as belonging to a specific societal, religious, or ethnic group. | |
| victim\_lvl1\_go | Binary Variable | | Parent category for individuals who hold positions in government. | |
| victim\_lvl1\_gp | Binary Variable | | Parent category for General Population. | |
| victim\_lvl1\_mi | Binary Variable | | Parent category for individuals who are actively serving in a country’s military. | |
| victim\_lvl1\_ot | Binary Variable | | Parent category for Other victim types. | |
| victim\_lvl1\_po | Binary Variable | | Parent category for individuals who are involved in a country’s political system, including those who do not hold positions in government. | |
| victim\_lvl1\_pr | Binary Variable | | Parent category for civilians who are identified and targeted based on their profession. | |
| victim\_lvl1\_nn | Binary Variable | | Parent category denoting that there were no victims. | |
| victim\_lvl2\_ci\_02 |  | | Attacks on women’s schools or other incidents in which a large majority of the victims belong to the same gender. | |
| victim\_lvl2\_ci\_03 | | Binary Variable | A large majority of the victims belong to a specific racial or ethnic group and may have been targeted for that reason. | |
| victim\_lvl2\_ci\_05 | | Binary Variable | LGBTQIA Victims identified as LGBTQIA were targeted or likely to be present in large numbers (e.g., incidents involving gay bars or gay parades). | |
| victim\_lvl2\_ci\_07 | | Binary Variable | Refugees or internally displaced persons (IDPs) were among the victims, whether or not they were the targets. | |
| Victim\_lvl2\_ci\_08 | | Binary Variable | Students or children were targeted, or an attack occurred at a site where students or children normally congregate (e.g., school, university building, dormitory, playground). | |
| Victim\_lvl2\_ci\_09 | | Binary Variable | Followers of Islam or members of a Muslim minority group formed a large majority of the victims and may have been targeted for that reason. | |
| Victim\_lvl2\_ci\_10 | | Binary variable | Followers of Christianity or members of a Christian minority group formed a large majority of the victims and may have been targeted for that reason. | |
| Victim\_lvl2\_ci\_11 | | Binary variable | Followers of Judaism or members of a Jewish minority group formed a large majority of the victims and may have been targeted for that reason. | |
| Victim\_lvl2\_ci\_12 | | Binary variable | Followers of Hinduism or members of a Hindu minority group formed a large majority of the victims and may have been targeted for that reason. | |
| Victim\_lvl2\_ci\_13 | | Binary variable | Followers of Buddhism or members of a Buddhist minority group formed a large majority of the victims and may have been targeted for that reason. | |
| Victim\_lvl2\_ci\_14 | | Binary variable | Followers of another specific religion or members of another religious minority group formed a large majority of the victims and may have been targeted for that reason. | |
| Victim\_lvl2\_go\_01 | | Binary variable | Government employees and low-level officials unless they fall into any of the categories below. Includes local dignitaries who are not employed by the government (e.g., tribal leaders, social leaders) and others who occupy honorary posts in the community. | |
| Victim\_lvl2\_go\_02 | | Binary variable | All foreign diplomatic personnel (including employees of international organizations with diplomatic status such as the UN and World Bank) and military attachés who are attached to embassies. | |
| Victim\_lvl2\_go\_04 | | Binary variable | High-level officials (e.g., the president, prime minister, royalty, other heads of state); and high-level officials below the rank of head of state (e.g., governors, senators, ministers, chief justices). Some individuals are classified under two categories. For example, a senator is under 1) High Level Officials and 2) Legislators, and a chief justice is under 1) High Level Officials and 2) Judiciary & Legal Personnel. | |
| victim\_lvl2\_go\_05 | | Binary variable | Only members of the government’s official intelligence services. Does not include members of military intelligence, who are classified under Military - National; or alleged informants, who are under Other - Informants (real/alleged). | |
| victim\_lvl2\_go\_06 | | Binary variable | All individuals involved in the judiciary and legal profession, whether or not they are government officials. | |
| victim\_lvl2\_go\_07 | | Binary variable | All individuals who work for the country’s law enforcement. Does not include military police, who are classified as Military - National, or individuals working for private security companies, who are classified as Professions - Private Security. When a recognized government is not in control of the area, individuals from armed groups can be classified under Law Enforcement if they were acting as de facto law enforcement and were targeted for that reason. victim\_lvl2\_go\_08 [0] or [1] Legislators Anyone who works in the go | |
| victim\_lvl2\_gp\_01 | | Binary variable | Insufficient information is available about the victims, or they appear to have been victimized solely because they were at the site of the incident. Applies to most cases of “random” shootings and bombings in public places or along major transportation routes. Also applies when there appear to have been casualties, but the number is unknown. | |
| victim\_lvl2\_mi\_01 | | Binary variable | Third-country militaries that are present in the country, whether or not they are there at the invitation of the government. Does not include U.S. or NATO forces, or third-country militaries that are present as part of an internationally sanctioned peacekeeping operation. | |
| victim\_lvl2\_mi\_03 | | Binary variable | All members of internationally sanctioned multinational peacekeeping units in a country (e.g., NATO, the African Union Transition Mission in Somalia [ATMIS]), except U.S. forces. | |
| victim\_lvl2\_mi\_04 | | Binary variable | All members of the national military, whether or not they are engaged in military operations. | |
| victim\_lvl2\_mi\_05 | | Binary variable | Only members of the U.S. military and U.S. military contractors. | |
| victim\_lvl2\_ot\_01 | | Binary variable | Known informants and individuals believed to have been informants for the authorities or for a terrorist group or militia, who were targeted for that reason. | |
| victim\_lvl2\_ot\_04 | | Binary variable | Processions whose main impetus is social, religious, or cultural rather than political. Such processions can often take on a strong political tone during periods of conflict or political strife, but they can still be classified in this category. | |
| victim\_lvl2\_ot\_02 | | Binary variable | Officials or members of labor unions, whether pro- or anti-government. | |
| victim\_lvl2\_ot\_03 | | Binary variable | Perpetrators of an attack who were killed or wounded in the incident. | |
| victim\_lvl2\_ot\_06 | | Binary variable | Pro-government forces that are present in a country, whether or not they receive funding from the government, as long as they are not the official forces of a national government. | |
| victim\_lvl2\_ot\_05 | | Binary variable | Members of other groups, members of factions, and individuals in the perpetrator’s group who were targeted because they were deemed disloyal or who were accidental victims of the attack. | |
| victim\_lvl2\_po\_01 | | Binary variable | All individuals who are running for office, either as incumbents or as opposition candidates. Includes defeated opposition candidates if they were targeted as part of election or post-election violence. | |
| victim\_lvl2\_po\_02 | | Binary variable | All election workers, including election observers and individuals who work at election sites, register voters, or canvass for candidates (other than themselves). | |
| victim\_lvl2\_po\_03 | | Binary variable | Members of political parties who were targeted because of their membership. Includes legal, illegal, and government parties. | |
| victim\_lvl2\_po\_04 | | Binary variable | Victims of assaults on demonstrators by terrorist groups or individuals. Does not cover actions by government forces to break up peaceful demonstrations. | |
| victim\_lvl2\_pr\_01 | | Binary variable | Anyone involved in agriculture, including peasants, laborers, and landowners. | |
| victim\_lvl2\_pr\_03 | | Binary variable | Anyone involved in business, whether foreign or domestic (e.g., small and large businesses, street sellers, hairdressers). | |
| victim\_lvl2\_pr\_04 | | Binary variable | Musicians and all other kinds of performers, film crew and athletes. | |
| victim\_lvl2\_pr\_05 | | Binary variable | All persons who work in schools, from cleaners to directors. Schools include all levels, from daycare to university. | |
| victim\_lvl2\_pr\_06 | | Binary variable | All persons who work on any kind of infrastructure (e.g., roads, bridges, all utilities, pipelines, mines, oil fields). | |
| victim\_lvl2\_pr\_08 | | Binary variable | All individuals involved with maritime trade and fisheries, but not ferries. | |
| victim\_lvl2\_pr\_10 | | Binary variable | All civilians who work or volunteer for any type of domestic or international organization that is not beholden to a state’s government. | |
| victim\_lvl2\_pr\_11 | | Binary variable | All individuals involved in security who are not paid by a state, local government, or military group. | |
| victim\_lvl2\_pr\_12 | | Binary variable | Religious leaders, such as priests, imams, preachers, prominent religious scholars, and others who hold authority or are in positions of prominence. | |
| victim\_lvl2\_pr\_13 | | Binary variable | Tourists and all individuals involved in the tourism industry. | |
| victim\_lvl2\_pr\_14 | | Binary variable | All individuals involved in public and private transport (e.g., buses, taxis, rickshaws, ferries). Includes airport staff and all aviation workers, except the military. | |
| victim\_lvl2\_pr\_15 | | Binary variable | All individuals working in gas, oil, electricity, water, hydroelectric power, coal, telecommunication, and mining. | |
| victim\_lvl2\_pr\_16 | | Binary variable | All individuals involved in the provision of abortion services, whether or not they are medical personnel. | |
| victim\_lvl2\_pr\_17 | | Binary variable | All medical personnel who are responding to emergency situations outside a hospital facility; other first responders (e.g., emergency medical technicians, firefighters, detonation experts) when they are responding to an emergency; and military medics if they are responding to an emergency. | |
| victim\_lvl2\_pr\_18 | | Binary variable | All medical personnel working in medical settings (e.g., hospitals, clinics, doctor’s offices); all public health workers and officials (e.g., midwives, vaccination workers); and all staff working in the emergency departments of hospitals and other medical facilities. Does not include emergency medical technicians and other medical personnel who are responding to emergencies outside a hospital facility. | |
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| victim\_lvl2\_nn\_01 | | Binary variable | Denotes that there were no victims and no intended victims. | |
| intended\_victim\_lvl1\_ci | | Binary Variable | Parent category for civilians who are identified as belonging to a specific societal, religious, or ethnic group. | |
| intended\_victim\_lvl1\_go | | Binary Variable | Parent category for individuals who hold positions in government. | |
| intended\_victim\_lvl1\_gp | | Binary Variable | Parent category for General Population. | |
| intended\_victim\_lvl1\_mi | | Binary Variable | Parent category for individuals who are actively serving in a country’s military. | |
| intended\_victim\_lvl1\_ot | | Binary Variable | Parent category for Other victim types. | |
| intended\_victim\_lvl1\_po | | Binary Variable | Parent category for individuals who are involved in a country’s political system, including those who do not hold positions in government. | |
| intended\_victim\_lvl1\_pr | | Binary Variable | Parent category for civilians who are identified and targeted based on their profession. | |
| intended\_victim\_lvl1\_nn | | Binary Variable | Parent category denoting that there were no victims. | |
| intended\_victim\_lvl2\_ci\_02 | | Binary variable | Attacks on women’s schools or other incidents in which a large majority of the victims belong to the same gender. | |
| intended\_victim\_lvl2\_ci\_03 | | Binary variable | A large majority of the victims belong to a specific racial or ethnic group and may have been targeted for that reason. | |
| intended\_victim\_lvl2\_ci\_05 | | Binary variable | Victims identified as LGBTQIA, were targeted or likely to be present in large numbers (e.g., incidents involving gay bars or parades). | |
| intended\_victim\_lvl2\_ci\_07 | | Binary variable | Refugees or internally displaced persons (IDPs) were among the targets. | |
| intended\_victim\_lvl2\_ci\_08 | | Binary variable | Students or children were targeted, or an attack occurred at a site where students or children normally congregate (e.g., school, university building, dormitory, playground). | |
| intended\_victim\_lvl2\_ci\_09 | | Binary variable | Followers of Islam or members of a Muslim minority group formed a large majority of the victims and may have been targeted for that reason. | |
| intended\_victim\_lvl2\_ci\_10 | | Binary variable | Followers of Christianity or members of a Christian minority group formed a large majority of the victims and may have been targeted for that reason. | |
| intended\_victim\_lvl2\_ci\_11 | | Binary variable | Followers of Judaism or members of a Jewish minority group formed a large majority of the victims and may have been targeted for that reason. | |
| intended\_victim\_lvl2\_ci\_12 | | Binary variable | Followers of Hinduism or members of a Hindu minority group formed a large majority of the victims and may have been targeted for that reason. | |
| intended\_victim\_lvl2\_ci\_13 | | Binary variable | Followers of Buddhism or members of a Buddhist minority group formed a large majority of the victims and may have been targeted for that reason. | |
| intended\_victim\_lvl2\_ci\_14 | | Binary variable | Followers of another specific religion or members of another religious minority group formed a large majority of the victims and may have been targeted for that reason. | |
| intended\_victim\_lvl2\_go\_01 | | Binary variable | Government employees and lowlevel officials unless they fall into any of the categories below. Includes local dignitaries who are not employed by the government (e.g., tribal leaders, social leaders) and others who occupy honorary posts in the community. | |
| intended\_victim\_lvl2\_go\_02 | | Binary variable | All foreign diplomatic personnel, including employees of international organizations with diplomatic status such as the UN and World Bank. Includes military attachés who are attached to embassies. | |
| intended\_victim\_lvl2\_go\_04 | | Binary variable | High-level officials (e.g., the president, prime minister, royalty, other heads of state); and high-level officials below the rank of head of state (e.g., governors, senators, ministers, chief Justices). Some individuals are classified under two categories. For example, a senator is classified under 1) High Level Officials and 2) Legislators, and a chief justice is under 1) High Level Officials and 2) Judiciary & Legal Personnel. | |
| intended\_victim\_lvl2\_go\_05 | | Binary variable | Only members of the official intelligence services of the government. Does not include members of military intelligence, who are classified under Military - National or alleged informants, who are under Other - Informants (real/alleged). | |
| intended\_victim\_lvl2\_go\_06 | | Binary variable | All individuals who are involved in the judiciary and legal profession, whether or not they are government officials. | |
| intended\_victim\_lvl2\_go\_07 | | Binary variable | All individuals who work for the country’s law enforcement. Does not include military police, who are classified under Military - National, or individuals who are working for private security companies, who are under Professions - Private Security. When a recognized government is not in control of the area, individuals from armed groups can be classified under Law Enforcement if they were acting as de facto law enforcement and were targeted for that reason. | |
| intended\_victim\_lvl2\_go\_08 | | Binary variable | Anyone who works in the government’s legislative branch (e.g., staffers, advisors). A senator or parliamentarian is classified under both Government - Legislators and Government - High Level Officials. | |
| intended\_victim\_lvl2\_gp\_01 | | Binary variable | Insufficient information is available about the victims, or they appear to have been victimized solely because they were at the site of the incident. Applies to most “random” shootings and bombings in public places or along major transportation routes. Also applies when there appear to have been casualties, but the number is unknown. | |
| intended\_victim\_lvl2\_mi\_01 | | Binary variable | Third-country militaries that are present in the country, whether or not they are there at the invitation of the government. Does not include U.S. or NATO forces, or third-country militaries that are present as part of an internationally sanctioned peacekeeping operation. | |
| intended\_victim\_lvl2\_mi\_03 | | Binary variable | All members of internationally sanctioned multinational peacekeeping units in a country (e.g., NATO, the African Union Transition Mission in Somalia [ATMIS]), except U.S. forces. | |
| intended\_victim\_lvl2\_mi\_04 | | Binary variable | All members of the national military, whether or not they are engaged in military operations. Includes military contractors. | |
| intended\_victim\_lvl2\_mi\_05 | | Binary variable | Only members of the U.S. military and U.S. military contractors. | |
| intended\_victim\_lvl2\_ot\_01 | | Binary variable | Known informants or individuals believed to have been informants for the authorities or for a terrorist group or militia, who were targeted for that reason. | |
| intended\_victim\_lvl2\_ot\_04 | | Binary variable | Processions whose main impetus is social, religious, or cultural rather than political. Such processions can often take on a strong political tone during periods of conflict or political strife, but they can still be classified in this category. | |
| intended\_victim\_lvl2\_ot\_02 | | Binary variable | Officials or members of labor unions, whether pro- or anti-government. | |
| intended\_victim\_lvl2\_ot\_03 | | Binary variable | Perpetrators of an attack who are killed or wounded in the incident. | |
| intended\_victim\_lvl2\_ot\_06 | | Binary variable | Pro-government forces that are present in a country, whether or not they receive funding from the government, as long as they are not the official forces of a national government. | |
| intended\_victim\_lvl2\_ot\_05 | | Binary variable | Members of other groups, members of factions, and individuals in the perpetrator’s group who targeted because they were deemed disloyal or who were accidental victims of the attack. | |
| intended\_victim\_lvl2\_po\_01 | | Binary variable | All individuals who are running for office, either as incumbents or as opposition candidates. Includes defeated opposition candidates if they were targeted as part of election or post-election violence. | |
| intended\_victim\_lvl2\_po\_02 | | Binary variable | All election workers, including election observers and individuals who work at election sites, register voters, or canvass for candidates (other than themselves). | |
| intended\_victim\_lvl2\_po\_03 | | Binary variable | Members of political parties who were targeted because of their membership. Includes legal, illegal and government parties. | |
| intended\_victim\_lvl2\_po\_04 | | Binary variable | Victims of assaults on demonstrators are made by terrorist groups or individuals. Does not cover actions by government forces to break up peaceful demonstrations. | |
| intended\_victim\_lvl2\_pr\_01 | | Binary variable | Anyone involved in agriculture, including peasants, laborers, and landowners | |
| intended\_victim\_lvl2\_pr\_03 | | Binary variable | Anyone involved in business, whether foreign or domestic (e.g., small and large businesses, street sellers, hairdressers). | |
| intended\_victim\_lvl2\_pr\_04 | | Binary variable | Musicians and all other kinds of performers, film crew, and athletes. | |
| intended\_victim\_lvl2\_pr\_05 | | Binary variable | Everyone who works in schools, from cleaners to directors. Schools include all levels, from daycare to university. | |
| intended\_victim\_lvl2\_pr\_06 | | Binary variable | Everyone who works on any kind of infrastructure (e.g., roads, bridges, all utilities, pipelines, mines, oil fields). | |
| intended\_victim\_lvl2\_pr\_07 | | Binary variable | All persons who work in any form of media in any capacity, including radio and TV news personnel and online journalists. | |
| intended\_victim\_lvl2\_pr\_08 | | Binary variable | All individuals involved in maritime trade and fisheries, but not ferries. | |
| intended\_victim\_lvl2\_pr\_10 | | Binary variable | All civilians who work, or volunteer for, any type of domestic or international aid organization that is not beholden to a state’s government. | |
| intended\_victim\_lvl2\_pr\_11 | | Binary variable | All individuals involved in security who are not paid by a state, local government, military group, or terrorist organization. | |
| intended\_victim\_lvl2\_pr\_12 | | Binary variable | Religious leaders, such as priests, imams, preachers, prominent religious scholars, and others who hold authority or are in positions of prominence. | |
| intended\_victim\_lvl2\_pr\_13 | | Binary variable | Tourists and all individuals involved in the tourism industry. | |
| intended\_victim\_lvl2\_pr\_14 | | Binary variable | All individuals involved in public and private transport (e.g., buses, taxis, rickshaws, ferries). Includes airport staff and all aviation workers except the military. | |
| intended\_victim\_lvl2\_pr\_15 | | Binary variable | All individuals involved in gas, oil, electricity, water, hydroelectric power, coal, telecommunication, and mining. | |
| Intended\_victim\_lvl2\_pr\_16 | | Binary variable | All individuals involved in the provision of abortion services, whether or not they are medical personnel | |
| intended\_victim\_lvl2\_pr\_17 | | Binary variable | All medical personnel who are responding to emergency situations outside a hospital facility. Includes other first responders (e.g., emergency medical technicians, firefighters, detonation experts) and military medics when they are responding to an emergency. | |
| intended\_victim\_lvl2\_pr\_18 | | Binary variable | All medical personnel who are working in medical settings (e.g., hospitals, clinics, doctor’s offices); all public health workers and officials (e.g., midwives, vaccination workers); and all staff working in the emergency departments of hospitals and other medical facilities. Does not include emergency medical technicians and other medical personnel who are responding to emergencies outside a hospital facility. | |
| intended\_victim\_lvl2\_nn\_01 | | Binary variable | Denotes that there were no victims and no intended or targeted victims. | |
| facility\_lvl1\_co | | Binary Variable | Parent category for any facilities used for commercial purposes. | |
| facility\_lvl1\_cu | | Binary Variable | Parent category for any facilities that are used for cultural purposes or have cultural significance. | |
| facility\_lvl1\_go | | Binary Variable | Parent category for any government-owned or operated facilities. | |
| facility\_lvl1\_in | | Binary Variable | Parent category for any facilities related to infrastructure and development. | |
| facility\_lvl1\_mi | | Binary Variable | Parent category for any military-owned or operated facilities. | |
| facility\_lvl1\_ms | | Binary Variable | Parent category for any miscellaneous facility types. | |
| facility\_lvl1\_nn | | Binary Variable | Parent category for if there was no specific facility type. | |
| facility\_lvl1\_un | | Binary Variable | Parent category for unknown or unclear facility types. | |
| facility\_lvl2\_co\_01 | | Binary variable | Retail stores, department stores, and indoor malls. | |
| facility\_lvl2\_co\_02 | | Binary variable | All offices and office buildings. | |
| facility\_lvl2\_co\_03 | | Binary variable | Hotels and other destinations that are primarily frequented by foreigners and tourists. | |
| facility\_lvl2\_cu\_01 | | Binary variable | All theaters, movie theaters, night clubs, bars, concert halls, arenas, sports facilities, and similar venues, both indoor and outdoor. | |
| facility\_lvl2\_cu\_02 | | Binary variable | All media offices (e.g., newspaper headquarters or field offices, radio stations), printing plants and other facilities, and any vehicle (e.g., boat, jeep, helicopter) that transports media personnel. | |
| facility\_lvl2\_cu\_03 | | Binary variable | All buildings of all religious faiths and groups, including houses of worship, schools, and any other buildings or compounds that they own or occupy. Includes religious shrines, cemeteries, and other monuments. | |
| facility\_lvl2\_cu\_04 | | Binary variable | Museums, historical buildings, secular cemeteries, monuments, castles, archeological sites, ruins, and other settings that are of cultural importance to the local, national, and/or international community. | |
| facility\_lvl2\_go\_01 | | Binary variable | All buildings and facilities known to belong to any level of government. Examples: local government buildings, courthouses and judicial buildings, buildings used by the governing party, all election facilities, buildings temporarily used as polling places during an election. Includes government buses, limousines, and other vehicles. | |
| facility\_lvl2\_go\_02 | | Binary variable | Buildings with diplomatic status (e.g., embassies, consulates, cultural centers) and offices of international entities with diplomatic status such as the World Bank and UN organizations. | |
| facility\_lvl2\_go\_03 | | Binary variable | All police buildings and vehicles, checkpoints, check posts, patrols, prisons, and jails attached to the national, state, or local government; and buildings and facilities associated with government intelligence services. Does not include any checkpoints or other installations associated with military, paramilitary, or militia forces. | |
| facility\_lvl2\_in\_01 | | Binary variable | All farms, farm equipment, and farm produce and food storage and distribution networks. | |
| facility\_lvl2\_in\_02 | | Binary variable | All civilian aircraft, airfields, airports, offices of commercial aviation companies, and other infrastructure. Does not include any kind of military aircraft. | |
| facility\_lvl2\_in\_03 | | Binary variable | All television and radio broadcast infrastructure (e.g., broadcasting equipment, studios, offices) and telephone infrastructure, cell towers, and computer servers. | |
| facility\_lvl2\_in\_04 | | Binary variable | All construction sites, working and abandoned factories, warehouses, and other industrial infrastructure. | |
| facility\_lvl2\_in\_05 | | Binary variable | All buildings, buses, and facilities of schools, universities, and other educational facilities (e.g., libraries, language schools, computing schools, training centers, daycare centers). However, certain specialized or affiliated schools are classified under other categories because they are often targeted because of their affiliations. Examples: Police academies are entered under Government - Law Enforcement & Intelligence. Military academies are under Military Facility - National or Military Facility - Multi-National. Religious schools are under Culture - Religious Sites. When the incident involves a school classified under a category other than education, mention is made in the summary that the facility is a school. | |
| facility\_lvl2\_in\_06 | | Binary variable | All medical offices, hospitals, clinics, and abortion-related facilities; all ambulances, fire engines, and other first-responder vehicles; and all military medical facilities. | |
| facility\_lvl2\_in\_07 | | Binary variable | All kinds of land vehicles (e.g., cars, trains, buses, subways) and the infrastructure that supports them (e.g., railroad tracks, railroad stations, bus stations, roads). Does not include special-purpose vehicles (e.g., police cars, military vehicles, ambulances, government vehicles). | |
| facility\_lvl2\_in\_08 | | Binary variable | All water vehicles used in transport, trade, commerce, fishing, or leisure; the infrastructure supporting them (e.g., docks, ferry stations, warehouses); and all vessels used in the transport of natural resources and fuel (e.g., oil tankers). | |
| facility\_lvl2\_in\_09 | | Binary variable | Privately owned land, apartment buildings, and individual homes. | |
| facility\_lvl2\_in\_10 | | Binary variable | All outdoor public spaces (e.g., marketplaces, city streets, plazas, parks, parking lots, garages, beaches). | |
| facility\_lvl2\_in\_11 | | Binary variable | Offices of domestic and international NGOs and their vehicles, refugee camps, internally displaced person (IDP) camps and informal refugee settlements, relief shipments and their distribution network, de-militarized zones, and any areas or facilities established to protect civilian populations in conflict zones. However, emergency medical technicians’ vehicles, ambulances, and Red Cross vehicles are classified as Infrastructure - Healthcare Facilities, not Infrastructure - Relief. | |
| facility\_lvl2\_in\_12 | | Binary variable | All energy infrastructure (e.g., coal, charcoal, oil, gas, hydroelectric power, nuclear power, solar, wind); other domestic utilities (e.g., water, sewage); and extraction, transport, and distribution networks for all minerals and energy sources, including commercial and artisanal mining. | |
| facility\_lvl2\_mi\_01 | | Binary variable | Third-country military facilities that are present in the country, whether or not they are there by invitation of the government, and all installations, checkpoints, weapons, and vehicles. Does not include U.S. or NATO forces, nor third-country militaries that are present as part of an internationally sanctioned peacekeeping operation. | |
| facility\_lvl2\_mi\_04 | | Binary variable | All facilities of members of internationally sanctioned multinational peacekeeping units in a country (e.g., NATO, the African Union Transition Mission in Somalia [ATMIS]), except U.S. forces. | |
| facility\_lvl2\_mi\_05 | | Binary variable | All facilities, installations, weapons, and vehicles of the national military (whether or not they are engaged in military operations) and military contractors. | |
| facility\_lvl2\_mi\_06 | | Binary variable | Only facilities of the U.S. military and U.S. military contractors. Includes all installations, checkpoints, weapons, and vehicles. | |
| facility\_lvl2\_ms\_01 | | Binary variable | Facilities of labor unions, other organized social groups, and any political parties except the governing party, which is classified under Government - Buildings or Vehicles. | |
| facility\_lvl2\_ms\_02 | | Binary variable | Property that is targeted because the owners are Politically Exposed Persons (PEPs) [persons who are susceptible to involvement in corruption or bribery] or who are believed to be involved in corruption, bribery, money laundering, or similar practices. | |
| facility\_lvl2\_ms\_04 | | Binary variable | Facilities owned and operated by a perpetrator group. | |
| facility\_lvl2\_ms\_03 | | Binary variable | All facilities, installations, checkpoints, weapons, and vehicles of pro-government forces that are not part of the official military, whether or not the progovernment forces receive funding from the government. | |
| facility\_lvl2\_ms\_05 | | Binary variable | Facilities owned and operated by a violent non-state actor. | |
| facility\_lvl2\_un\_01 | | Binary variable | The site is unknown, impossible to determine, or not important to the incident. Examples: attacks targeting specific individuals or groups of people, random rocket and mortar attacks, incidents resulting from interactions with police. In such cases, there is no need to try to track down the facility category. | |

Table 3: Attribute name, data type and description for Dataset Source

| Column Name | Data Type | Description |
| --- | --- | --- |
| unique\_incident\_id | Numeric | A unique nine-digit incident ID number assigned to each incident record. |
| incident\_id | Numeric | A seven-digit incident\_id used to identify a multi-incident event, with "00" for single incidents. |
| incident\_seq | Numeric | Sequence number to identify related incidents within an event, starting with "01" for the first one. |
| publication\_date | Date | The date when the source material containing incident information was published (formatted as dd/mm/yyyy). |
| headline | String | The name of the article contains incident information. |
| publication\_source | String | The name of the media outlet that published the article with information about the incident. |

## Data Context

According to GRID (GTTAC Record of Incident Database) data context refers to the wide range of circumstances and underlying information surrounding a dataset. Effective data analysis necessitates a thorough comprehension and interpretation of the context. It is possible to disregard contextual factors, which can lead to misinterpretations and errors in a variety of fields, including counterterrorism research, policy decisions, and security measures.

The significance of capturing and interpreting context could not be emphasized more in the unique context of counterterrorism analysis and the GRID dataset. This section includes the dataset's objective, data collection methodology, definitions of terrorist events, and measures taken to ensure the data's veracity and completeness. If this context is misunderstood, users may misinterpret or inaccurately apply the facts, leading to incorrect conclusions or judgments. Therefore, acknowledging and utilizing the contextual information provided in the GRID Codebook is crucial for accurate and insightful analysis of terrorism-related incidents that will enable prudent actions and policies to improve global security.

For our analysis in the dataset, we consider the perpetrators with incident count more than 10. With this, we will have around 15 subgroups from the list mentioned in the Statistical Annex report 2021. For these subgroups we will have around 10,000 records for the dataset and even with that we will have a good amount of data for the analysis.

## Data Conditioning

Data conditioning is a crucial step in Data analysis, typically beginning with data cleaning. In our specific dataset we initiated this process by addressing the Null Values. In the dataset Null Values are present only in the state\_province\_genc\_txt, state\_province\_nongenc\_txt and city attributes.

A screenshot of a computer

Description automatically generated

Figure 3: Describing the Null values for Incident dataset

A screenshot of a computer

Description automatically generated

Figure 4: Describing Null Values for Perpetration dataset

As our project focuses on only country and region level analysis, we removed those columns as they will not be useful and would not affect dataset quality. As our dataset is from the media source reports the perpetrator name in the perpetrator dataset was derived from summary of the incident. For the UNKNOWN perpetrator there is no mention of any name related to perpetrator. As we could not retrieve any current information from that variable, we thought of removing it as it does not have much impact on our analysis and would categorize it separately in the form of data-frames to carry out any analysis.

Some of the variables like is\_multi\_source\_corr, country\_genc and region are useful during the dataset creation as they indicate whether the incident was reported by multiple media sources and the codes of the respective countries or regions. For our analysis we have the text fields for their respective codes, and we removed those variables as we have the replacement for those variables, and it does not impact our dataset or data analysis of our project. As part of our project goal, we need to find out how the organizations are attacking, their tactics, victims and where they are attacking.

In our dataset the variables representing them were categorized into two levels: level 1 and level 2 representing the parent category and specific attributes. The level 2 category variables provide the detailed information about the incident but for our analysis to know the operational capacity of the subgroup we thought that the parent category would be sufficient as it provides us with the sufficient information about the incident but with the level 2 category variables from the tactics, victims, weapons, intented\_victim, logistic and facility variables we can get a better insights of all the category variables.

Data conditioning is the foundation upon which our analysis rests. It ensures that the dataset is free from inconsistencies, missing values, and outliers, paving the way for meaningful insights and a clearer understanding of the alliances within the groups under scrutiny. This meticulous process of data preparation is fundamental in driving accurate and reliable results in line with the project's objectives.

## Data Quality Assessment

**GRID\_INCIDENTS:**

|  |  |
| --- | --- |
| **QUALITY** | **ASSESMENT** |
| **COMPLETENESS** | Verify that there are no missing values or null entries in critical columns such as "incident\_date," "country\_genc\_txt" |
| **CONSISTENCY** | Ensure that data entry formats and definitions are consistent throughout the dataset, including standardized codes for attributes like "claimed" and "is\_multi\_location.“ |
| **UNIQUENESS** | Confirm the uniqueness of identifiers like "unique\_incident\_id" to avoid duplicates or inconsistencies in incident records. |
| **INTEGRITY** | Validate the accuracy of relationships and connections within the dataset, especially between attributes such as "incident\_id" and "perp\_incident\_id.“ |
| **CONFIRMITY** | Check that the data adheres to established conventions and standards, particularly in fields like "tactic\_lvl1\_as" and "weapon\_lvl1\_ex.“ |
| **ACCURACY** | Verify the correctness of data values, including precise details in columns like "num\_killed," "num\_wounded" eliminating any inaccuracies or errors. |

Table : Grid Incidents quality assessment

**GRID\_PREPS:**

|  |  |
| --- | --- |
| **QUALITY** | **ASSESMENT** |
| **COMPLETENESS** | Identify missing values in columns (e.g., perp\_incident\_id, perp\_cd, perp\_name). Calculate the percentage of missing values for each column. A lower percentage indicates higher completeness. |
| **CONSISTENCY** | Ensure data adheres to consistent formats and domain constraints. Check for consistent date formats in the incident\_date column. Verify categorical values match predefined categories. |
| **UNIQUENESS** | Count duplicate records based on unique identifiers (e.g., unique\_incident\_id or incident\_id). |
| **INTEGRITY** | Validate data relationships, e.g., perp\_incident\_id in perpetrator records matches unique\_incident\_id in incident records. Detect and resolve any violations of these relationships. |
| **CONFIRMITY** | Verify if data complies with predefined standards or business rules. Check numeric ranges (eg. num\_killed, num\_wounded), date ranges, and categorical values (eg. tactic\_lvl1\_as, weapon\_lvl1\_ex) against criteria. |
| **ACCURACY** | Cross-reference data with trusted external sources or benchmarks. Validate reported data accuracy, eg. casualty numbers (num\_killed, num\_wounded) against official government reports |

Table : Grid Perpetrators Quality assessment

**GRID\_SOURCES:**

|  |  |
| --- | --- |
| **QUALITY** | **ASSESMENT** |
| **COMPLETENESS** | Check for missing values in each column, including unique\_incident\_id, incident\_id, incident\_seq, publication\_date, headline, and publication. Calculate the percentage of missing values for each column to assess overall completeness. |
| **CONSISTENCY** | Ensure that publication\_date follows a consistent date format across all records. Check if the headline and publication columns have consistent text formatting and do not contain unexpected characters. |
| **UNIQUENESS** | Identify and count duplicate records based on unique identifiers such as unique\_incident\_id or incident\_id to determine the extent of duplicate data in the dataset. |
| **INTEGRITY** | Verify data integrity by confirming that incident\_id or unique\_incident\_id values in the dataset correspond correctly and do not have any mismatched or invalid references. |
| **CONFIRMITY** | Validate conformity by checking if publication\_date adheres to standard date formats. Ensure that the headline and publication columns follow established text format standards without significant deviations. |
| **ACCURACY** | Validate data accuracy by cross-referencing publication dates with external sources or benchmarks to confirm their correctness. Additionally, verify the accuracy of headlines and publications by checking if they match the actual content or sources they represent. |

Table : Grid Sources Quality Assessment

## Other Data Sources

Data from the Global Terrorism Trends and Analysis Center (GTTAC), which was developed by Development Services Group, Inc. and George Mason University's TraCCC, is the only source that we utilized in our project. We gather data gathered by top open-source multimedia aggregators through GTTAC to find probable terrorist situations around the world. To categorize incidents, offenders, tactics, weapons, and targets, we use cutting-edge Python-based technology tools and ontologies. A complete global terrorism incidence database is created by our diverse, well-trained workforce after data has been finalized. This dataset serves as the exclusive and primary source for our project, eliminating the need for additional data sources and enabling the development of crucial tools like the Annex of Statistical Information for the Department of State's annual Country Reports on Terrorism.

## Storage Medium

In our project, we use the strong combination of a Microsoft SQL Server, Power Query Editor and Python to handle our data. SQL server is a reliable and secure relational database management system that helps us store and organize our data in an organized way. Using Python with RDBMS makes it easier to extract, transform, and load (ETL) data. With this mix, we can easily pull data from database, change it as needed, and load it quickly into the SQL database. This ETL method makes sure that data is correct, consistent, and easy to find.

The Power Query Editor and the datasets in the csv format imported on Microsoft Excel initially established an effective combination for the data cleaning and EDA phase. The data phase is successfully completed when the appropriate extracted and cleaned data is loaded to the SQL server with a relational structure, database tables, and querying.

With Microsoft SQL server and Python at the center of our data strategy, we find useful insights, make good choices, and make reports that are useful. This collaborative method lets us get the most out of the data from our project, whether we're keeping track of project milestones, keeping an eye on key performance indicators, or making suggestions based on the data. By using MySQL and Python, we equipped to handle the complex data needs of our project and make sure it works well from a data point of view. We also used, Jupyter Notebook’s space to load the datasets and import into the Py notebooks to generate visualizations

## Storage Security

At the Global Terrorism Trends and Analysis Center (GTTAC) database, the files for the project study are provided as an open source. As we work on the study, we make sure all the storage protection needs are met.

Ensuring storage is secure as a particularly important part of data management, especially for projects that deal with foreign issues. We plan to use a tool to make sure the database is safe on the platforms.

Employing security methods to ensure only people allowed can get into server. Most of the time, this is done with a login and password.

Making sure that ways of storing and managing data are in line with important industry standards and rules. By taking care of these storage security concerns, we reduce the risk of data breaches to our RDBMS (Relational Database Management System). This will make sure that the project's data is private, correct, and available.

The efficient security and cross-platform compatibility of Microsoft Excel, Microsoft Power Query Editor, and Microsoft SQL Server also pays off by providing chances to choose from a variety of data visualization platforms like Power BI or Tableau or other.

## Storage Costs

Considering it is an open-source and free relational database management system, the Microsoft SQL Server relational database management system is one that we utilize to store project data without having to pay any additional money for the database software.

# Algorithms & Analysis / ML Model Exploration & Selection

## Solution Approach

### Systems Architecture

To effectively analyze and extract insights from the dataset, a comprehensive systems architecture is essential. The architecture encompasses data storage, data processing & analysis, and visualization components, ensuring a seamless flow of information from raw data to actionable insights.

3.1.1.1 Data Base and Design

Relational Database System (RDBMS): Because the information is organized, it works best when stored in a relational database like MySQL or PostgreSQL. This method of keeping makes it easy to access, join, and analyze the data.

Tables: They can be set up based on different things in the information, like "incidents," "perpetrators," "victims," and so on.

Keys: Define the primary and foreign keys to make sure that the data is correct and to make joining tables easier.

Normalization: Normalization methods can be used to make sure that storage is efficient, and that duplicate data is removed. This makes sure that all the data in the database is correct and consistent.

3.1.1.2 Data Processing & Analysis

Python, when combined with libraries such as Pandas and NumPy, is an appropriate choice for data manipulation and analysis due to the nature of the dataset. This combination provides powerful ways for undertaking exploratory data analysis (EDA), as well as cleaning and manipulating data. Handling missing values, outliers, and probable discrepancies are the first tasks that must be accomplished. An examination of the dataset's primary features carried out with the use of statistical visualizations, charts, and information tables as part of the preliminary analysis.

3.1.1.3 Visualizations

When it comes to analyzing trends, patterns, and anomalies within the data, visualization is an extremely important factor. It does this by transforming complicated data patterns into graphics that are easy to understand and instructive. Tableau and Power BI are two fantastic examples of tools that are great for building interactive dashboards and visualizations for a project on Terrorism Research. They make it possible to conduct an interactive investigation of the dataset and provide the capability to hone down on features of the data.

A variety of visual kinds can be used, depending on the questions that are being asked of the data that is being collected. For example, line charts represent trends over time, bar charts allow category comparisons, and heat maps provide geographical insights. All three types of charts can be seen on this website.

During the first stage of our investigation, we investigated "Trends Over Time" by making use of the dataset that was made available to us:

Total Number of Incidents According to the statistics, there will be a decline in the number of occurrences from 2020 to 2022.

The severity of the events, measured in terms of the number of casualties, demonstrated a pattern that was distinct from that of the overall number of occurrences, which displayed variability. In the year 2022 there was a notable increase in the number of people who were killed or injured, which suggests that fewer incidences might still have substantial repercussions.

### Systems Security

We put data accuracy and security as a good priority as we hold all of the research tools and databases on our own systems, so there is no risk of data breaches from third-party providers or exposure to the outside world. For example, we've set up a Single Sign-On (SSO) login system for our relational database management system (RDBMS). SSO makes security better because users only have to identify once. This makes it less likely that someone else will get in without permission. We can better watch and control user access by centralizing the authentication process. This way, we can be sure that only allowed people can access and change the data. Our data is safe with this all-around method, which also makes things easier for our analysts and other parties who use our data.

### Systems Data Flows

As mentioned earlier, we received the data in CSV from the GTTAC. This raw data is kept safely in our relational database management system (RDBMS), which is protected by Single Sign-On (SSO) security. The data is cleaned, standardized, or changed in a preprocessing step before it is analyzed in more detail to make sure it is correct and useful. Once the data is clean, we use tools like Python and Pandas to do in-depth analysis and find trends and connections. The analysis results can then be shown using tools like Tableau or Power BI, which turn complicated patterns into easy-to-understand images. As the data journey comes to an end, the visual insights are put together to help stakeholders make choices based on our study results.

**Data Ingestion:**

Identifying every source of raw data is the first stage. These sources include databases, logs, external APIs, and different file formats. ETL (Extract, Transform, Load) techniques are used with tools to speed up the data intake procedure. Relevant data is carefully chosen during the extraction process with a concentration on data integrity and quality. The information is subsequently cleaned up and organized utilizing data transformation operations. Handling missing data, standardizing data types, and implementing appropriate business rules are a few examples of these processes. Following proper preparation, the data is imported directly into the database. To provide accountability and traceability, a written record of the information that was gathered must be kept.

**Data Processing:**

In this stage, a clear processing logic was established, including operations like calculations, joins between various datasets, and aggregations. To ensure data accuracy and system dependability, error-handling procedures like checking the data for any missing or null values, missing data types or incorrect data.

**Data Storage:**

The selection of a suitable Relational Database Management System (RDBMS. Among database options, MySQL and Microsoft SQL Server are popular. The database schema is methodically constructed, including tables, indexes, and relationships that correspond to the structure of the processed data. Normalization techniques are frequently applied to reduce data redundancy and ensure data consistency. Data security methods, such as restriction of access and encryption, are required to protect stored data while according to security standards, rules, and regulations.

**Data Access & Analysis:**

Customers participate with the system through a user-friendly online application that serves as an interface to data access and analysis. The application includes a query interface that allows users to conduct searches, apply filters, and get data from the database based on their individual requirements like a Jupiter IDE. Users can draw insights from the data using integrated analysis tools or algorithms, such as statistical tests or machine learning models. Based on user queries and analysis requests, results are delivered quickly, facilitating data-driven decision-making.

**Data Visualization:**

Transforming data into visual representations is critical for effectively communicating findings. Data visualization tools and packages such as Matplotlib, and Tableau are utilized to create meaningful charts, graphs, and visualizations. The nature of the data and the insights to be expressed influence the choice of chart formats. Interactivity is included in, allowing users to explore visualizations interactively, dive down into details, and customize their views. Dashboards allow users to arrange and modify visuals to meet their analytical needs, while options to export or share visualizations and reports in multiple formats encourage collaboration and communication.

**Report Generation:**

The system incorporates automatic reporting functions that facilitate decision-making and record-keeping. Users can generate standardized reports based on selected data and analysis results. Report designs with substitutes for dynamic data and illustrations offer consistency and convenience of development. Users can utilize the scheduling tools to schedule periodic report deployments by a source like a web-site or report from git-hub source. Reports go beyond simply displaying raw numbers; they provide useful insights, context, and interpretations of the data, enabling users to make informed decisions and track important indicators effectively.

### Algorithms & Analysis

Algorithms and analysis are of paramount importance in the extraction of important insights from data, facilitating informed decision-making, and augmenting our comprehension of intricate phenomena. Within the confines of this particular context, we shall delve into a multitude of facets pertaining to the analysis of data. These facets encompass a wide array of techniques, commencing with descriptive statistics and culminating in predictive modelling. Furthermore, our exploration will encompass an assortment of algorithms, ensuring a comprehensive examination of the subject matter at hand.

Regarding our project goals and their objectives, we have framed a few research questions, which will build up an insight into the sub-groups and their activities. These are framed as below: -

1.**Trends Over Time:**

1. How has the number of incidents changed over the years?

2. How has the number of ISIS and Al Qaeda incidents changed over the years?

3. How has the number of casualty (killed, wounded, and kidnapped) by ISIS or Al Qaeda over the years?

The report incorporates time-series analytical approaches to look at patterns and changes in terrorism incidents in the section on trend analysis. This analysis relies heavily on the incident\_date, incident\_day, incident\_month, and incident\_year columns of the dataset. The report's time-series analysis demonstrates both long-term and short-term trends in terrorism, providing information on historical peaks, troughs, and strategy changes.

2. **Geographical Analysis:**

1. In which regions or countries do the highest number of incidents occur?

2. Can we identify any geographical hotspots for certain types of incidents, like assassinations, kidnapping, ambush, bombing, car-ramming, suicide bombings, or IED attacks?

The geographical analysis section investigates how often terrorism occurs around the world. The report offers visualizations that highlight areas and nations with high occurrence frequencies through the use of geospatial mapping. This analysis attempts to identify regions that are "hotspots" for terrorism and identify any changes in geographic trends over time.

3. **Perpetrator Analysis:**

1. Who are the most frequent perpetrators based on the number of incidents?

2. Which perpetrators are involved in the deadliest attacks?

3. Which perpetrators are more involved in the killing of American citizens?

4. How has the activity of major perpetrators changed over time?

5. What groups (ISIS or Al Qaeda) are the perpetrators of more claimed attacks?

Assessing the personalities and traits of persons responsible for terrorist activities is explored in the section devoted to perpetrator analysis. The study uses clustering and profiling approaches to classify perpetrators based on shared traits and affiliations by looking at the columns relevant to perpetrator identification and affiliations. This study aids in discovering common strategies and patterns of conduct among various perpetrator groups.

4. **Type of Attacks:**

1. What are the most common types of incidents (assassinations, attacks, etc.)?

2. Which perpetrators are more involved in extortion?

According to attack categories including assassination, IED attacks, multi-day events, multi-location incidents, and suicide strikes, terrorism incidents are categorized in the report. To study these types of prevalence and trends and reveal variations in the use of various attack tactics over time, classification algorithms are used.

5. **Weapon Type**

1. What are the most common types of weapons?

2. Are there specific types of weapons which ISIS or Al Qaeda groups prefer to use?

The report describes the distinct kinds of weapons and logistical techniques used in terrorism incidents in the section devoted to weapons and logistics analysis. It uses computers to find patterns and trends in the logistics and weaponry choices made across attacks, thereby assisting us understand the operational facets of terrorism better.

6. **Logistics Type**

1. What are the most common types of logistics?

2. Are there specific types of logistics in which ISIS or Al Qaeda groups prefer to use?

7. **Victim Analysis:**

1. Who are the most common targets of these incidents (e.g., civilians, military personnel, etc.)?

2. Which facilities are most frequently targeted (e.g., commercial facilities, government offices, etc.)?

The victim analysis section looks at the many kinds of victims impacted by acts of terrorism. The report identifies patterns in the categories of victims targeted in terrorism incidences by profiling victims based on traits such whether they are civilian, government, or military. The intended victims of acts of terrorism are examined in this section. The report profiles those who were the intended targets, examines targeting patterns, and assesses if intended victim profiles have changed throughout the years by looking at the columns relating to intended victim characteristics.

In this section, terrorism-related facilities are examined. The paper classifies the many facility types that were targeted using classifying algorithms. These facilities may include public spaces, infrastructure, government buildings, and more. The analysis aids the identification of patterns and trends in terrorists' targeting of types of establishments.

8. **Frequency Analysis**:

1. What is the frequency of group’s incidents based on Ambush, Body Attacks, Bombings, Car ramming, Executions, Kidnapping, Suicide Attack?

2. How frequent are the group's attacks for Tactics and Actual Victims?

3. How frequent are the group's attacks for Tactics and Facilities?

To find out the frequency of the group’s incidents based on various tactics, it requires the all the incidents data from 2018-2022, for ISIS and Al-Qaeda, where each perpetrator is listed in the visualization with the number of incidents that occurred based on the particular tactic.

In the following question on Tactics vs Actual Victims i.e. Ambush, Body Attacks, Bombings, Car ramming, Executions, Kidnapping, Suicide Attack vs Government, Gen-Population, Military, Others, Politicians, Professional, None, we represent the data in form of Stacked bars and heatmaps to compare the affiliated groups.

The Tactics vs Facilities i.e. Ambush, Body Attacks, Bombings, Car ramming, Executions, Kidnapping, Suicide Attack vs Law & Enforcement, Education, Land transport, Public places, National, Foreign ,Buildings considers the data for ISIS and Al-Qaeda groups, we represent the data in form of Stacked bars and heatmaps to compare the affiliated groups.

9. **Multiday and Multilocation Incidents:**

1. How frequent are multi-day incidents?

2. Are there specific perpetrators who are more likely to engage in multi-day incidents?

3. Are there specific perpetrators who are more likely to engage in multi-location incidents?

For the above, questions we have developed queries by grouping them by affiliated group and sorting the groups with highest to lowest.

10. **Regression Analysis / Multiple Linear Regression**

1. Are terrorist tactics useful in predicting the violence (num of victims killed and wounded) of the perpetrators?

* Using the Regression model to determine if the criminals' strategies impacted the violence in any way.
* We discovered that the model's r-squared score is too low to make a decision on the connection.

2.Can you predict a group’s claiming responsibility based on terrorist tactics?

precision recall f1-score support

0 0.79 0.97 0.87 1368

1 0.54 0.13 0.21 396

Performed the logistic regression to predict the claiming ability of the perpetrators by considering the level 1 tactics and few other tactics of level 2 like Ambush, Body Attacks, Bombings, Car ramming, Executions, Kidnapping, Suicide Attack. The scores were average and limited to predict 1’s

3. Do weapon types and victim types influence the decision of group tactics?

Yes, Performed the logistic regression to predict the tactics of the perpetrators by considering weapon types and victim types .The scores were good for Assault, covert and Unknown tactics with around 85% accuracy in predicting outcomes. The Recall and F1-scores for few of the tactics like Co-ordinated, Exploitative and Trauma are relative limited, whereas the other tactics like Assault, covert and Unknown derive consistent prediction models and perform well.

Descriptive analysis is a fundamental component of data exploration. As a first step in the process, basic statistical formulas are used to get a sense of the dataset's traits. When someone is looking into situations involving improvised explosive devices (IEDs), they might use statistics to find the average number of IED events per group or per year. This measure gives a short but important description of how often those events happen. Many measures, like the median, mode, and standard deviation, are part of descriptive statistics. They give you more information about how the data is spread out and if there are any unusual numbers.

Time Series Analysis is used to work with data that has a time component. It is very important to understand and predict time trends in the area of security and conflict studies because they are very important. For the study and guessing of data that changes over time, methods like ARIMA (Autoregressive Integrated Moving Average) and Prophet are used. For instance, the autoregressive integrated moving average (ARIMA) model can be used to guess how many attacks will happen in the future by looking at past data about incidents involving improvised explosive devices (IEDs). This practice not only makes it easier to plan and assign resources, but it also makes it easier to put proactive security measures into place.

The primary objective we had in conducting this thorough research of a terrorism incident dataset was to use regression analysis to forecast the number of casualties, specifically the count of people killed (num\_killed) and injured (num\_wounded), based on the names of the offenders. The collection included information for instances linked to 16 different perpetrator groups, each with its own distinctive traits and operating procedures.

The one-hot encoding of the categorical "perp\_name" column, which represents the attackers behind each attack, marked the beginning of our analytical adventure. We prepared the dataset for regression modeling by one-hot encoding this qualitative data into a numerical representation. The data was then split into two subsets: a training set with 6,663 samples and a test set with 2,856 samples. The immediately encoded perpetrator names were then used as predictive variables in linear regression models that were trained to predict casualties. This strategy sought to identify any connections that might exist between the names of the offenders and the seriousness of the incidents. We used the mean squared error (MSE) statistic to determine the effectiveness of the model. The obtained MSE values—which indicated the average squared discrepancies between anticipated and actual values—were 88.18 for num\_killed and 61.20 for num\_wounded.

The analysis's capacity to investigate the coefficients linked to each perpetrator group in connection to the number of casualties is an intriguing feature. These coefficients could provide useful information for understanding the dynamics of terrorism by revealing whether certain groups were generally associated with greater casualty numbers.

In summary, Algorithms & Analysis play a crucial role in facilitating data-driven decision-making across many domains, such as security and conflict analysis. The utilization of Descriptive Analysis offers a first comprehensive examination of the dataset, whilst Correlation Analysis aids in the identification and exploration of associations among variables. Time series analysis is a valuable tool for predicting temporal trends. Clustering techniques can be used to uncover latent patterns that may not be immediately apparent. Predictive analysis, on the other hand, allows for proactive planning and the mitigation of potential threats. When employed in the examination of occurrences involving improvised explosive devices, these methodologies enable security professionals to gain a deeper comprehension, make adequate preparations, and effectively address potential dangers, hence augmenting safety and security measures.

# Visualizations / ML Model Training, Evaluation, & Validation

## Overview

In order to deliver insights into the research questions, we explored the field of data visualization in this section. With the use of visualization, we effectively convey detailed insights and patterns found in our data. To make our findings clear and interesting, we use a range of visualization tools, such as heat maps, bar graphs, line graphs, and more. We choose Python, which has a robust ecosystem of libraries for data visualization

Bar graphs are a major component of our visuals. These makes it simpler to identify patterns and variances by enabling us to compare various groups or categories and express categorical data. By giving us a dynamic perspective of our data, line graphs will assist us in illustrating patterns over time or across a continuous variable. Geospatial analysis is improved by geographic maps, which allows us to see trends and distributions depending on place. In contrast, heat maps provides us a visual depiction of data density, which makes it easier to find hotspots or clusters in our dataset. Graphs and maps that are aesthetically pleasing and educational are produced with Python libraries such as Matplotlib, Seaborn, Plotly, and others, which improves our research and support data-driven decision making

## Visualizations

A graph with blue squares

Description automatically generated

The plot provides insights into the total number of incidents involving Al-Qaeda affiliates in 2018. Al-Shabaab emerges as the primary perpetrator, registering the highest incident count, followed by Hay’at Tahrir al-Sham with 128 incidents, and then Lashkar-e Tayyiba. The x-axis denotes the number of incidents, while the y-axis represents the involved perpetrators. This visualization highlights the prominence of certain groups within the Al-Qaeda network during the specified period. Analyzing the distribution of incidents and their associated perpetrators contributes to a comprehensive understanding of the landscape, aiding in the identification of significant actors and patterns within the context of Al-Qaeda-affiliated activities in 2018.

A graph with numbers and a bar

Description automatically generated with medium confidence

Figure 5: Incident Counts of each groups in ISIS and Al-Qaeda for 2018

Based on the visualization, in 2018, the highest number of incidents attributed to perpetrators affiliated with ISIS occurred. The visualization uses an X-axis to represent the number of incidents and a Y-axis to indicate the perpetrators involved. In 2018, ISIS Core was responsible for the majority of these incidents, with a count of 613. This was significantly higher than the number of incidents involving other groups. Following ISIS Core, ISIS Khorasan was responsible for 105 incidents. Additionally, the Bangsamoro Islamic Freedom Movement was involved in 61 incidents. This data clearly illustrates the varying levels of activity among these groups, with ISIS Core being the most active in terms of the number of incidents in 2018.

A graph with numbers and squares

Description automatically generated with medium confidence

The plot provides insights into the total number of incidents involving Al-Qaeda affiliates in 2019. Al-Shabaab emerges as the primary perpetrator, registering the highest incident count 484, followed by Hay’at Tahrir al-Sham with 140 incidents, and then Jama’at Nusrat al-Islam wal-Mulimin with 55. The x-axis denotes the number of incidents, while the y-axis represents the involved perpetrators. This visualization highlights the prominence of certain groups within the Al-Qaeda network during the specified period. Analyzing the distribution of incidents and their associated perpetrators contributes to a comprehensive understanding of the landscape, aiding in the identification of significant actors and patterns within the context of Al-Qaeda-affiliated activities in 2019.

A graph with numbers and a black background

Description automatically generated

Figure 6 : Incident Counts of each groups in ISIS and Al-Qaeda for 2019

Based on the visualization, in 2019, the highest number of incidents attributed to perpetrators affiliated with ISIS occurred. The visualization uses an X-axis to represent the number of incidents and a Y-axis to indicate the perpetrators involved. In 2019, ISIS Core was responsible for the majority of these incidents, with a count of 585. This was significantly higher than the number of incidents involving other groups. Following ISIS Core, ISIS DRC was responsible for 97 incidents. Additionally, the ISIS West Africa was involved in 89 incidents. This data clearly illustrates the varying levels of activity among these groups, with ISIS Core being the most active in terms of the number of incidents in 2019. The significant difference in the incident counts between these groups highlights the predominant role of ISIS Core in that year's activities, as compared to the lesser, yet notable, involvement of ISIS Khorasan and the Bangsamoro Islamic Freedom Movement.

A graph with blue squares

Description automatically generated

The plot provides insights into the total number of incidents involving Al-Qaeda affiliates in 2020. Al-Shabaab emerges as the primary perpetrator, registering the highest incident count 477, followed by Hay’at Tahrir al-Sham with 139 incidents, and then Lashkar-e Tayyiba with 44. The x-axis denotes the number of incidents, while the y-axis represents the involved perpetrators. This visualization highlights the prominence of certain groups within the Al-Qaeda network during the specified period. Analyzing the distribution of incidents and their associated perpetrators contributes to a comprehensive understanding of the landscape, aiding in the identification of significant actors and patterns within the context of Al-Qaeda-affiliated activities in 2020.

A graph with numbers and a black background

Description automatically generated

Figure 7: Incident Counts of each groups in ISIS and Al-Qaeda for 2020

Based on the visualization, in 2020, the highest number of incidents attributed to perpetrators affiliated with ISIS occurred. The visualization uses an X-axis to represent the number of incidents and a Y-axis to indicate the perpetrators involved. In 2020, ISIS Core was responsible for most of these incidents, with a count of 506. This was significantly higher than the number of incidents involving other groups. Following ISIS Core, ISIS DRC was responsible for 275 incidents. Additionally, ISIS West Africa was involved in 98 incidents. This data clearly illustrates the varying levels of activity among these groups, with ISIS Core being the most active in terms of the number of incidents in 2020. The significant difference in the incident counts between these groups highlights the predominant role of ISIS Core in that year's activities, as compared to the lesser, yet notable, involvement of ISIS Khorasan and the Bangsamoro Islamic Freedom Movement.

A graph with blue squares

Description automatically generated

The plot provides insights into the total number of incidents involving Al-Qaeda affiliates in 2021. Al-Shabaab emerges as the primary perpetrator with 290 incident count, registering the highest incident count, followed by Hay’at Tahrir al-Sham with 51 incidents, and then Lashkar-e Tayyiba with 50 incident counts. The x-axis denotes the number of incidents, while the y-axis represents the involved perpetrators. This visualization highlights the prominence of certain groups within the Al-Qaeda network during the specified period. Analyzing the distribution of incidents and their associated perpetrators contributes to a comprehensive understanding of the landscape, aiding in the identification of significant actors and patterns within the context of Al-Qaeda-affiliated activities in 2021.

A graph with orange bars

Description automatically generated

Figure 8 : Incident Counts of each groups in ISIS and Al-Qaeda for 2021

Based on the visualization, in 2021, the highest number of incidents attributed to perpetrators affiliated with ISIS occurred. The visualization uses an X-axis to represent the number of incidents and a Y-axis to indicate the perpetrators involved. In 2021, ISIS Core was responsible for most of these incidents, with a count of 645. This was significantly higher than the number of incidents involving other groups. Following ISIS Core, ISIS DRC was responsible for 325 incidents. Additionally, ISIS West Africa was involved in 102 incidents. This data clearly illustrates the varying levels of activity among these groups, with ISIS Core being the most active in terms of the number of incidents in 2021.

A graph with blue squares

Description automatically generated

The plot provides insights into the total number of incidents involving Al-Qaeda affiliates in 2022. Al-Shabaab emerges as the primary perpetrator, registering the highest incident count 248, followed by Hay’at Tahrir al-Sham with 76 incidents, and then Jama’at Nusrat al-Islam wal-Mulimin with 72. The x-axis denotes the number of incidents, while the y-axis represents the involved perpetrators. This visualization highlights the prominence of certain groups within the Al-Qaeda network during the specified period. Analyzing the distribution of incidents and their associated perpetrators contributes to a comprehensive understanding of the landscape, aiding in the identification of significant actors and patterns within the context of Al-Qaeda-affiliated activities in 2022.

A graph with numbers and a black background

Description automatically generated

Figure 9: Incident Counts of each groups in ISIS and Al-Qaeda for 2022

Based on the visualization, in 2022, the highest number of incidents attributed to perpetrators affiliated with ISIS occurred. The visualization uses an X-axis to represent the number of incidents and a Y-axis to indicate the perpetrators involved. In 2022, ISIS Core was responsible for most of these incidents, with a count of 536. This was significantly higher than the number of incidents involving other groups. Following ISIS Core, ISIS DRC was responsible for 298 incidents. Additionally, ISIS Mozambique was involved in 187 incidents. This data clearly illustrates the varying levels of activity among these groups, with ISIS Core being the most active in terms of the number of incidents in 2022.

A graph of different colored bars

Description automatically generated

Figure 10: ISIS and Al-Qaeda incidents changed over the years (2018-2022)

The analysis of incident counts from 2018 to 2022 for organizations affiliated with ISIS and Al-Qaeda reveals distinct trends. In 2018, Al-Qaeda was involved in 792 incidents, but this number showed a consistent decline over the following years. In 2019, the incidents attributed to Al-Qaeda dropped to 731, followed by a slight increase to 741 in 2020. However, there was a significant decrease in 2021, with the count falling to 489. This trend indicates a consistent reduction in Al-Qaeda's activities over these years.

Conversely, the incident count for ISIS shows an upward trajectory. In 2018, ISIS was responsible for 934 incidents. This number increased to 969 in 2019, followed by a further rise to 1088 in 2020. This pattern suggests a growing level of activity by ISIS during this period, contrasting with the declining trend observed in Al-Qaeda's activities. These contrasting trends between the two organizations over the five-year period highlight a shift in the landscape of incidents attributed to these groups. While Al-Qaeda's involvement in such incidents has been decreasing, ISIS has been showing an increase in its activities. This data provides valuable insight into the operational dynamics and changes in the level of activity of these two prominent groups over the years.

A graph of different colored bars

Description automatically generated

The visualization presents a detailed analysis of the casualties caused by organizations affiliated with Al-Qaeda, encompassing the number of incidents involving killings, woundings, and kidnappings from 2018 to 2022. In 2018, the number of killings was alarmingly high, reaching 2,835. This count was the highest for the period under review, although there were significant numbers of killings in the subsequent years of 2019, 2020, and 2021. Notably, there was a resurgence in the number of killings in 2022. In contrast to the pattern observed with killings, the number of wounded cases demonstrated a different trend. After a period of decline from 2018 through 2020, there was an increase in the number of wounded in both 2021 and 2022. This fluctuation indicates variability in the nature and impact of the incidents over these years.

Kidnapping incidents, while generally lower in frequency compared to killings and woundings, showed a distinct peak in 2020, with 271 cases recorded. This spike represents the highest count of kidnappings within the five-year period and is a notable aspect of the overall trend. Overall, the visualization underscores the changing dynamics of the incidents caused by Al-Qaeda affiliates, with varying degrees of fatalities, injuries, and kidnappings over the five-year span. The data highlights the ebb and flow of these incidents, providing insights into the evolving nature of the organization's activities and their impact in terms of human casualties.

A graph of different colored bars

Description automatically generated

Figure11: Casualty count for ISIS and Al-Qaeda from 2018 - 2022

The above visualization provides an overview of casualties caused by a particular organization, detailing the number of individuals killed, wounded, and kidnapped over a span of years. The green bars represent individuals killed, the orange bars indicate those wounded, and the grey bars denote kidnapping victims. Notably, the number of killings is significantly high, with a peak in the first year shown on the chart at 6,008. The following years show a decrease but still maintain high numbers, with counts of 3,734, 3,443, 2,437, and a subsequent rise to 5,545 in the final year displayed.

Wounded counts, represented by orange bars, also represent a significant portion of the casualties, though they show a fluctuating trend. The count decreases from the first year to the next, then slightly increases in the third year, followed by a sharp decline in the fourth year, and finally, there is an increase in the last year

The grey bars, representing kidnapping cases, are the least frequent of the three categories yet still notable. The highest count of kidnappings occurs in the third year with 676 cases. The other years show lesser counts of 437, 410, and 732, with the fourth year having the lowest number of kidnappings at 676.

This chart thus succinctly encapsulates the scale and variation of the impact caused by the organization's activities, indicating a high number of killings and woundings, with kidnappings being relatively less frequent but still present.

A graph with numbers and a black background

Description automatically generated

Figure 12: Top 10 perpetrators based on the number of incidents from 2018 – 2022

The visualization indicates that between 2018 and 2022, the organization with the highest number of incidents is ISIS-Core, responsible for 2,885 incidents. Al-Shabaab, an Al-Qaeda affiliate, follows with 2,034 incidents. The third highest is ISIS-DRC with 1,050 incidents. This data illustrates a distinct pattern within the top 10 perpetrators of these incidents, a majority, specifically 6, are affiliated with ISIS. This suggests that during this period, ISIS affiliates were more active or effective in carrying out incidents than those affiliated with Al-Qaeda. The dataset underscores the scale of operations by these groups and helps in understanding the distribution of their activities over the analyzed timeframe. This kind of analysis is crucial for security and counterterrorism efforts, offering insights into the operational reach and impact of these groups globally.

A graph with orange and blue bars

Description automatically generated

Figure 13: Deadliest attacks of ISIS and Al-Qaeda for 2018-2022

A graph with numbers and a bar

Description automatically generated with medium confidence

A graph with different colored squares

Description automatically generated with medium confidence

Figure 14: Perpetrators are involved in killing the American Citizens

A graph with different colored bars

Description automatically generated

Figure 15: Perpetrators who engage in multi-day incidents

A graph with numbers and a black border

Description automatically generated with medium confidence

Figure 16: Frequent multi-day incidents of ISIS and Al-Qaeda

A graph with numbers and a black background

Description automatically generated

Figure 17: Perpetrators who engage in multi-location incidents

A graph of a number of people

Description automatically generated

Figure 18: Frequent multi-location incidents of ISIS and Al-Qaeda

The chart illustrates the number of incidents attributed to top perpetrators affiliated with ISIS and Al-Qaeda from 2018 to 2022. In the first year on the chart, the incident count for Al-Qaeda is marginally higher than for ISIS. However, in the subsequent year, the incidents associated with ISIS increased, surpassing those of Al-Qaeda. In the year 2020, Al-Qaeda’s incident count experiences a slight rise, while ISIS sees a modest decrease.

A notable change occurs in the 2021 year, where ISIS-affiliated incidents surge dramatically, significantly outnumbering those linked to Al-Qaeda. By the final year depicted, there is a decline in incidents for both groups, though ISIS continues to have a higher count than Al-Qaeda. Throughout the five-year span, there are evident fluctuations in the number of incidents for both groups. ISIS demonstrates a peak in activity in the 2021 year, indicating a temporary escalation in their operations. Overall, the chart presents a comparative view of the operational dynamics of these groups, with ISIS generally showing higher activity levels than Al-Qaeda in the later years of the period analyzed.

A graph of a number of people

Description automatically generated with medium confidence

Figure 19: Casualties of groups ISIS and Al-Qaeda for 2018-2022

On a yearly analysis of Casualties (2018-2022)" is a clustered bar chart that presents a quantitative depiction of casualties, broken down into three distinct categories: killed (blue), wounded (orange), and kidnapped (gray). The horizontal axis lists the years in question, and the vertical axis shows the number of casualties. Three bars are clustered together to symbolize each year, making comparisons between categories as well as throughout time possible. An overview indicates that the 'Killed' category frequently has the highest numbers, peaking at almost 4000 casualties in 2018. The 'Kidnapped' category constantly displays the fewest incidences, while the 'Wounded' data peak in 2021, indicating different patterns and maybe different underlying reasons or responses to the events recorded. The graph also demonstrates variations in the number of casualties, showing a general decrease from 2018 to 2020, a rise in 2021, and a significant decrease in 2022, which may be due to shifts in the geopolitical environment or the efficacy of interventions. As stated in the chart's subtitle, this visualization is an effective means of comprehending the human cost of conflict-related events over a five-year period by emphasizing the annual and category fluctuations in the number of victims ascribed to ISIS and Al-Qaeda.

A graph with different colored squares

Description automatically generated

Figure 20: Incident Count by region for 2018-2022

A five-year period's worth of incident occurrences in different geographical regions are visually summarized in the image, which shows a bar chart named "Incident count by Region (2018-2022)". The number of incidences is shown on the chart as vertical bars, each bar representing a distinct region. Sub-Saharan Africa has the highest number of events, followed by Western Asia, as seen by the tallest bar. With noticeably smaller counts, other regions like South-Eastern Asia, South Asia, Northern Africa, Central Asia, Western Europe, and Eastern Europe are also represented. Considering there is no legend given, the colors of the bars seem to be standard without any coding. It is easy to see that there is a huge difference between the regions, with Western Asia and Sub-Saharan Africa suffering the most. The distribution and comparative scale of occurrences throughout these various geographic regions are depicted in the graph, which most likely reflects the various levels of political stability, conflict, or other factors impacting the incidence rates. There may be regional differences in the underlying causes or reporting of these instances, as demonstrated by the striking disparity between the low number of incidents in Western and Eastern Europe and the large numbers in Africa and Asia.

A graph of a number of people

Description automatically generated

Figure 21: Targeted Facility counts by affiliated organization for 2018-2022

The illustration shows a bar chart with the headline "Targeted Facility Counts by Affiliated Organizations (2018-2022)" that shows how many facilities were targeted over a five-year period by Al-Qaeda and ISIS. The various facility types—commercial, government, cultural, infrastructure, and military—are represented by color-coded bars. The rightmost and leftmost bars represent Al-Qaeda's operations; they show a comparatively low number of facilities targeted, with a slightly higher number of cultural targets. The other bars, which stand for ISIS, show a priority on this kind of target as their counts across all facility types are noticeably higher than those of the other categories, especially for military institutions. The graphic includes a comparative analysis of the operational priorities of these groups, exposing ISIS's much wider targeting of facilities, particularly military ones in contrast to Al-Qaeda. This could be due to disparities in the two parties' geographical presence within the given timeframe, operational capabilities, or strategic priorities.

A screenshot of a logistic chart

Description automatically generated

The graphic displays a simple bar chart with the headline "Logistics Counts by Affiliated Organization (2018-2022)," comparing over a five-year period the logistics-related operations of two different organizations: Al-Qaeda and ISIS. Two bars are displayed in the chart, one for Al-Qaeda and one for ISIS. The heights of the bars indicate the number of logistics-related events or operations. The blue line on the chart of Al-Qaeda represents the overall number of logistics operations or incidents associated with the group, and it reaches a tally of 282. ISIS, on the other hand, has a brown bar that is significantly higher—440—and indicates that it was involved in more logistics-related tasks during the same time.

The graph, which shows ISIS with a 56% larger count than Al-Qaeda, clearly illustrates the disparity in the two groups' logistical operations. This could suggest variations in the resources, operational breadth, or strategic emphasis. Understanding the operational capabilities and priorities of these businesses from 2018 to 2022 may depend heavily on the data that is displayed here.

A graph with multiple colored bars

Description automatically generated

Figure 22: Logistics counts of affiliated organizations for 2018-2022.

A vertically stacked bar chart with the heading "Logistics Counts by Affiliated Organization (2018-2022)" is seen in the image. It contrasts the logistical activities of two groups, most likely ISIS and Al-Qaeda, using a variety of vehicle types. The bar of each organization is segmented into colored sections that correspond to several vehicle kinds, including military, civilian, armored, improvised, drone, and public transportation vehicles.  
  
The diagram illustrates that Al-Qaeda is involved in more vehicle categories, whereas ISIS is more prevalent in fewer categories. ISIS places a great deal of importance on military vehicles, as evidenced by this segment's significance. Al-Qaeda, on the other hand, engages in more varied operations, albeit with fewer instances falling into each category.

A graph showing a number of people

Description automatically generated

Figure 23: Victim Counts by affiliated organizations for 2018-2022

In accordance with the color coding in the legend, the image displays a horizontal stacked bar chart with the overall "Victim Counts by Affiliated Organizations," which breaks down the different victim kinds for two organizations, most likely ISIS and Al-Qaeda. Groups, Government, General Population, Military, Political, and Professionals are among the victim groups.  
The top bar illustrates the impact of Al-Qaeda, with the general population and military victims making up the greatest parts. The General Population and Military are also the most important segments for ISIS, which is shown by the bottom bar. However, the General Population group has a significantly bigger count than the other groups.

A map of the world with colored circles

Description automatically generated

Figure 24: Country wise incident counts for 2018-2022

The graphic seems to be a representation of a world map from a report with the subtitle, "Country wise incident counts for 2018-2022." The map probably shows the geographic distribution of specific incidences, maybe scaled and colored to indicate the impact or frequency associated with those episodes in different nations. The map includes bubbles combined in various colors and sizes, each of which represents a distinct nation. The 'incident-bin' scale, a categorical depiction of the quantity of incidents, dictates the color and dimensions of every circle. The smallest circles on this scale correspond to '0-10' incidences, while the largest circles correspond to '150-300' attacks. A map resembling this is an effective way to quickly communicate spatial trends in data. Viewers can quickly determine which areas have the highest number of occurrences by utilizing it. Based on the aggregated data from the designated period, the larger and more strongly colored circles probably represent areas of more concern, bringing attention to locations that might require additional study or intervention.

A graph of different colored squares

Description automatically generated

Figure 25: Top 10 countries with the highest total incidents (2018-2022)

The stacked bar chart vividly illustrates that bombings and improvised explosive device (IED) attacks are the most predominant forms of incidents among the top ten countries with the highest total incidents, signaling ongoing conflicts or political instability, especially in Somalia, Syria, and Iraq. These three countries show a significantly higher incidence rate, suggesting a concentration of violent activities. Notably, Somalia leads with an alarming number of incidents, nearly four times than those in Congo (Kinshasa), which occupies the fourth position primarily due to kidnappings. The prevalence of suicide bombings in Somalia and Afghanistan indicates the possible presence of extremist groups that employ these tactics. Car-ramming’s appear to be a rare occurrence, suggesting either situational specificity or a lack of preference among militant groups. This data is crucial for informing policy and prioritizing international aid and intervention, as countries with higher incidents might require more focused conflict resolution and humanitarian efforts. Overall, the chart underscores the complexities of regional conflicts and the multifaceted nature of violence, requiring nuanced understanding and responses from global actors.

A graph with orange bars

Description automatically generated

Figure 26: Tactic employed by ISIS

A graph with a number of text

Description automatically generated with medium confidence

Figure 27: Tactic employed by Al-Qaeda

The bar charts comparing incident types affiliated with ISIS and Al-Qaeda reveal distinct operational profiles for the two groups. ISIS appears to favor certain tactics more heavily, which may indicate a strategic focus or a particular modus operandi in their activities. Al-Qaeda’s distribution of incident types is less concentrated, suggesting a more varied approach or a wider range of tactics employed in their operations. The exact counts annotated on the bars provide an understanding of the scale at which each tactic is utilized, underlining the intensity of specific types of violence. These visualizations are crucial for security analysis, as they help in identifying the most frequent and potentially impactful types of attacks carried out by these organizations, thereby aiding in the development of focused counterterrorism strategies and policies. The discernible differences in the operational patterns of ISIS and Al-Qaeda underscore the need for tailored approaches to address the unique threats each group presents.

A graph with orange and blue squares

Description automatically generated

Figure 28: Top Perpetrators Involved in Extortions in Africa

The horizontal bar chart highlights the top five perpetrators of extortion, distinguishing between those linked to ISIS and Al-Qaeda through color coding. The chart reveals that extortion is a tactic heavily leveraged by a few key players, with the top perpetrator responsible for a notably higher number of incidents compared to the others. This concentration of activity suggests that extortion is a strategic choice for these groups, potentially serving as a significant source of revenue and a tool for exerting control. The annotations provide a clear breakdown of both the number of incidents and the affiliation of each perpetrator, offering insights into their operational scope and alliances. The visual differentiation between ISIS and Al-Qaeda affinities underscores the need for tailored counter-extortion strategies that address the specific methods and structures of each group. This data is essential for understanding the landscape of extortion within the broader context of terrorist and insurgent operations, guiding targeted interventions by security forces and policymakers.

A graph with different colored squares

Description automatically generated

Figure 29: Top 3 weapon counts for ISIS (2018-2022)

From the above bar graph, we can say that 'FIREARMS' was the most common sort of weapon in most of the years, suggesting a predominant dependence on direct confrontations or engagements. The term 'IMPROVISED EXPLOSIVE DEVICE (IED)' was used a lot in 2019, which indicates a major change in strategy or increased activity in that year. “UNKNOWN" weaponry also had an impact, particularly in the later years, which would point to a change in strategy or possibly unclassified weapon types.

A graph with different colored squares

Description automatically generated

Figure 30: Top 3 weapon counts for Al-Qaeda (2018-2023)

"FIREARMS" continued to be the weapon of choice throughout time, underscoring Al-Qaeda's direct-engagement-based operating strategy. There's also a noticeable presence of 'EXPLOSIVES' in certain years, which signifies the occasional use of broader impact weapons for their operations.

In summary, both ISIS and ALQAIDA have demonstrated a persistent dependence on the use of firearms. On the other hand, Islamic State displayed a considerable increase in the use of improvised explosive devices (IEDs) in 2019, whilst ALQAIDA's weaponry profile has been more consistent, with a preference for firearms and the occasional use of explosives.

A graph of different colored bars

Description automatically generated with medium confidence

Figure 31: Top ISIS and Al-Qaeda Weapons preferences

The bar charts provide a visual comparison of the weapon preferences between ISIS and Al Qaeda. For both groups, firearms are the most frequently used weapons, indicating a preference for conventional small arms that are likely easier to obtain and use. ISIS shows a significant reliance on firearms, followed by improvised explosive devices (IEDs) suggesting a strategic emphasis on both conventional engagements and asymmetrical tactics. Meanwhile, Al Qaeda also heavily utilizes explosives, ranking second after firearms, with a notable number of incidents involving Unmanned aerial vehicles (UAV).

The differences in the counts and types of weapons used by ISIS and Al Qaeda may reflect their operational environments, resource availability, and strategic goals. For instance, the higher frequency of firearms in ISIS-related incidents could point to their control of territories with access to such weapons, while Al Qaeda's broader use of explosives may reflect a more dispersed, guerrilla-style approach. These insights could be valuable for security forces and policymakers in tailoring their counterterrorism strategies to the unique profiles of these organizations.

A screenshot of a graph

Description automatically generated

Figure 32: Top ISIS and Al-Qaeda Firearms preferences

The bar charts comparing the firearms preferences of ISIS and Al-Qaeda from 2018 to 2022 offer valuable insights into their operational tactics and logistical capabilities. The predominance of certain weapon types, such as small arms or heavy weaponry, reveals each group's access to resources and preferred combat strategies. For instance, a higher count of small arms like AK-47s might indicate a reliance on easily accessible weapons suitable for guerrilla warfare, while an abundance of heavy weaponry could suggest more direct, confrontational engagements. The comparison between the two groups also provides clues about their potential supply networks, with similarities hinting at shared sources. This analysis, though general, highlights the importance of understanding weapon choices in assessing terrorist organizations' operational patterns and capabilities.

A screenshot of a graph

Description automatically generated

Figure 33: ISIS and Al-Qaeda IED(Improvised Explosive Device) preferences

The data reveals a distinct preference for Magnetic Vehicle-Borne IEDs over Suicide Vest IEDs by both ISIS and Al-Qaeda, with ISIS using them nearly 8 times more frequently (858 instances) and Al-Qaeda about 7.4 times more (626 instances) than Suicide Vest IEDs. This pronounced preference suggests a strategic shift towards utilizing more sophisticated and potentially more impactful explosive devices that allow for targeted attacks while minimizing risk to operatives. The high usage of Magnetic Vehicle-Borne IEDs might indicate a focus on large-scale, high-impact attacks, possibly targeting infrastructure, military, or civilian targets. In contrast, the relatively lower use of Suicide Vest IEDs, though still significant, might imply a more selective approach to martyrdom operations, perhaps reserved for high-profile or symbolically important attacks. The parallel trends in both organizations hint at a broader tactical evolution in terrorist operations, adapting to changing security environments and maximizing operational impact.

A graph of a bar graph

Description automatically generated with medium confidence

Figure 34: ISIS and Al-Qaeda Explosives preferences

The data reveals distinct preferences in explosive weaponry between ISIS and Al-Qaeda from 2018 to 2022. ISIS shows a higher inclination towards using Grenades (119 instances) and Mines (135 instances), suggesting a tactical focus on ground-level engagements, possibly in urban or close-combat scenarios. In contrast, Al-Qaeda exhibits a significant preference for Mortars/Non-rocket artillery (243 instances), indicating a strategy that favors long-range attacks, potentially targeting fortified positions or large gatherings. The use of Rocket Artillery is more pronounced in Al-Qaeda (66 instances) compared to ISIS (32 instances), pointing to Al-Qaeda's capacity for longer-range engagements. The absence of Conventional Explosives/Munitions in Al-Qaeda's arsenal contrasts with their limited use by ISIS, hinting at differing operational tactics or resource accessibility. These insights, drawn from the usage patterns of explosives, reflect the strategic and tactical nuances differentiating the operational methodologies of these two groups.

A screenshot of a graph

Description automatically generated

Figure 35: ISIS and Al-Qaeda Incendiary preferences

The data reveals a pronounced preference for the use of Gasoline/Diesel/Oil as weapons by both ISIS (420 instances) and Al-Qaeda (50 instances), compared to Manufactured Incendiary Devices. This trend suggests a tactical choice favoring easily accessible and improvised incendiary methods, likely due to their simplicity, availability, and the potential for widespread damage. The relatively lower use of more sophisticated Manufactured Incendiary Devices, particularly by Al-Qaeda, might reflect logistical constraints or operational priorities focusing on low-tech but high-impact methods. The disparity in the counts between the two groups, especially in the use of Gasoline/Diesel/Oil, also indicates a significant difference in the scale or frequency of their operations involving incendiary weapons, with ISIS showing a much higher inclination towards these tactics. This data underscores the adaptability and resourcefulness of these groups in utilizing readily available materials for incendiary attacks.

A screenshot of a graph

Description automatically generated

Figure 36: ISIS and Al-Qaeda Melee preferences

The data reveals contrasting preferences in melee and unconventional weaponry between ISIS and Al-Qaeda from 2018 to 2022. ISIS shows a higher tendency to use blunt objects, such as stones and fists (47 instances), and a moderate use of knives, machetes, or swords (8 instances). This suggests a propensity for more immediate, possibly unplanned, or opportunistic, forms of violence. In stark contrast, Al-Qaeda exhibits a significant reliance on vehicles used as weapons (26 instances), indicating a preference for premeditated, high-impact attacks that can cause substantial damage or casualties. The use of a Chemical, Biological, Radiological, Nuclear (CBRN/WMD) weapon by Al-Qaeda, although minimal (1 instance), points to an inclination towards unconventional warfare tactics. The absence of such weapons in ISIS's arsenal and their lower use of vehicles suggest different operational strategies and resource availabilities between the two groups. These insights underscore the varied tactical approaches and resource allocations within these organizations.

A graph with colorful squares

Description automatically generated with medium confidence

A graph of a group of people

Description automatically generated with medium confidence

Figure 37: Comparison of two groups incidents based on tactics [2018-2022]

A screenshot of a graph

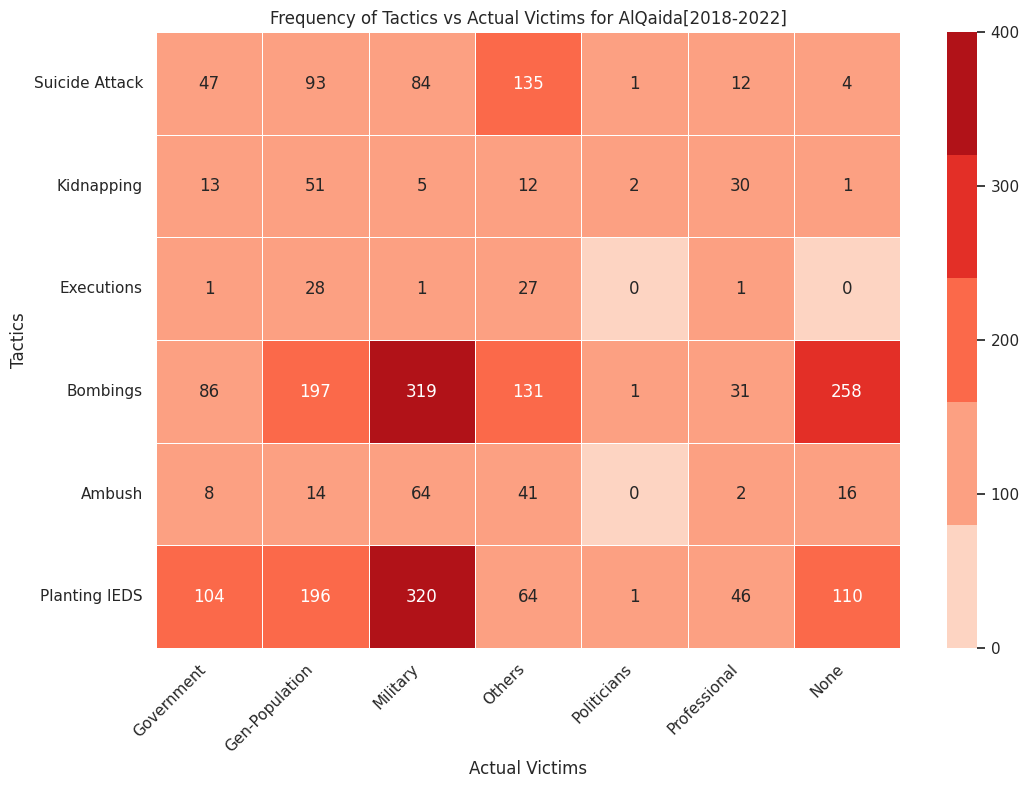
Description automatically generated

A screenshot of a computer

Description automatically generated

Figure 38: Comparison of two group’s perpetrators activity based on various tactics

The stacked bars represent the various tactics for ISIS and Al-Qaeda, the findings highlight that the highest number of attacks for Al-Qaeda belonging to the affiliated organization of al-Shabaab and ISIS-core from ISIS. The lowest incidents being from ISIS’s Maute Group and Ahrar al-Sharqiya.

A blue squares with white text

Description automatically generated

Figure 39: Frequency heatmaps for two groups based on Tactics and Actual Victims

A graph of a bar chart

Description automatically generated with medium confidence

Figure 40: Frequency Stacked bars for two groups based on Tactics and Actual Victims

We see that there is around 320 kidnappings of Gen-Population by ISIS and the 320 planting IEDs by Al-Qaeda on Military targeted victims, Suicide Attack on victims like the Labor unions, processions, informants and other are highest in both the groups with around 179 for ISIS and 135 for Al-Qaeda.

A screenshot of a graph

Description automatically generated

A blue squares with white text

Description automatically generated

Figure 41: Frequency comparisons for two groups of Tactics and Facilities

A graph of a number of people

Description automatically generated with medium confidence

Figure 42: Frequency Stacked bars for two groups based on Tactics and Facilities

Here, the analysis shows that ISIS is targeting the Foreign facilities and Al-Qaeda targets Land transport more frequently with around 312,217 respectively, whereas, the least being buildings with 38 and 27 respectively.

A blue squares with black numbers

Description automatically generated

Figure 43: Prediction Matrix for Assault Tactic

Yes, the regression analysis model in Logistic Regression analysis, has produced good outputs in group tactics predictions with the accuracy scores of around Coordinated tactic - 0.96, Assault - 0.86, Covert - 0.83, Exploitative - 0.93,Trauma - 0.85, Unknown - 0.94. Below is the score of Assault,

**precision recall f1-score support**

0 0.97 0.95 0.96 1581

1 0.63 0.77 0.69 183

A blue squares with white text

Description automatically generated

Figure 44: Prediction Matrix for Assault Tactic

The logistic regression analysis model has produced good outputs in group tactics predictions with the accuracy scores of around Covert tactic - 0.87. Below is the scores of Covert,

**precision recall f1-score support**

0 0.89 0.95 0.92 1336

1 0.81 0.62 0.70 428

accuracy 0.87 1764

A blue squares with white text

Description automatically generated

Figure 45: Prediction Matrix for Unknown Predictions

The logistic regression analysis model has produced good outputs in group tactics predictions with the accuracy scores of around Unknown tactic 93%. Below is the scores of Covert,

**precision recall f1-score support**

0 0.97 0.95 0.96 1581

1 0.63 0.77 0.70 183

accuracy 0.93 1764

# Findings

On solving various research questions, we developed valuable insights and few of these findings are below,

**Causality Analysis**

The overview of casualty categories spanning five years indicates that 'Killed' consistently has the highest numbers, peaking in 2018 at almost 4000, while 'Kidnapped' consistently has the fewest incidents. 'Wounded' peaks in 2021, suggesting distinct patterns in responses to events. The graph shows overall decreases from 2018 to 2020, a spike in 2021, and a significant drop in 2022, possibly due to geopolitical shifts or intervention efficacy. The analysis effectively portrays the human cost of conflict involving ISIS and Al-Qaeda, emphasizing annual and category fluctuations.

**Incident Count Analysis**

The analysis summarizes five years of incident occurrences across different geographical regions in a bar chart titled "Incident count by Region (2018-2022)." Sub-Saharan Africa stands out with the highest number of events, followed by Western Asia, represented by the tallest bar. Other regions like South-Eastern Asia, South Asia, Northern Africa, Central Asia, Western Europe, and Eastern Europe have noticeably smaller counts. Without a legend, the standard colors of the bars suggest no specific coding.

The graph starkly highlights the significant differences between regions, with Western Asia and Sub-Saharan Africa experiencing the highest incidence rates. The distribution underscores potential variations in political stability, conflict levels, or other contributing factors. The disparity between low incident numbers in Western and Eastern Europe compared to the high numbers in Africa and Asia suggests regional differences in causes or reporting practices for these instances.

**Targeted Facility Analysis**The analysis is color-coded bars to represent various facility types—commercial, government, cultural, infrastructure, and military. Al-Qaeda's operations, target a relatively low number of facilities, with a slightly higher focus on cultural targets. In contrast, ISIS prioritizes targeting facilities, especially military ones, with significantly higher counts across all categories. This difference may arise from variations in geographical presence, operational capabilities, or strategic priorities between the two groups.

**Logistics Analysis**

Each organization's bar is divided into colored segments representing vehicle types, including military, civilian, armored, improvised, drone, and public transportation vehicles.

Key Points:

1. Al-Qaeda's Involvement: Al-Qaeda is associated with a broader range of vehicle categories.

2. ISIS Focus: ISIS is more prevalent in fewer categories, with a notable emphasis on military vehicles.

3. Operational Variance: Al-Qaeda engages in more varied operations, though with fewer instances in each category.

This analysis provides insights into the contrasting logistical strategies of the two groups, showcasing their preferences for specific vehicle types.

**Victims Analysis**

The analysis, titled "Victim Counts by Affiliated Organizations," features a horizontal stacked bar chart showcasing victim breakdowns for likely ISIS and Al-Qaeda. Victim groups include Groups, Government, General Population, Military, Political, and Professionals.

Key Points:

1. Al-Qaeda's Impact: Al-Qaeda's impact, emphasizing the General Population and Military victim groups.
2. ISIS Priorities: ISIS prioritizes the General Population and Military victim groups, with a significantly higher count in the General Population segment.

**Geo-Map Incident Analysis**

The analysis, titled "Country-wise Incident Counts for 2018-2022," likely presents a world map depicting the geographic distribution of specific incidents. The map uses colored and sized bubbles to represent different nations, with the 'incident-bin' scale determining their dimensions and colors based on the quantity of incidents. The smallest circles denote '0-10' incidents, while the largest represent '150-300' attacks. This visual tool effectively communicates spatial trends, allowing viewers to quickly identify areas with the highest occurrences.

Analysis procedure:

1. Geographic Distribution: The map displays incident counts across countries, using colored and sized bubbles for visual representation.
2. Incident-Bin Scale: The 'incident-bin' scale categorizes circles based on the quantity of incidents, influencing their dimensions and colors.

**Top 10 countries with highest total incidents**

The analysis highlights a stacked bar chart revealing that bombings and improvised explosive device (IED) attacks dominate among the top ten countries with the highest total incidents, indicating ongoing conflicts or political instability, especially in Somalia, Syria, and Iraq. Somalia stands out with an alarming number of incidents, nearly four times more than Congo (Kinshasa), which ranks fourth due to kidnappings. The prevalence of suicide bombings in Somalia and Afghanistan suggests the presence of extremist groups. Car-rammings are rare, indicating situational specificity or a lack of preference among militant groups.

Key Points:

1. Dominant Incident Types: Bombings and IED attacks prevail in the top ten countries with the highest total incidents.
2. Regional Concentration: Somalia, Syria, and Iraq show significantly higher incidence rates, signaling ongoing conflicts or political instability.
3. Extreme Incidence Disparity: Somalia leads with nearly four times more incidents than Congo (Kinshasa), which ranks fourth primarily due to kidnappings.
4. Prevalence of Suicide Bombings: Somalia and Afghanistan exhibit a high prevalence of suicide bombings, indicating the possible presence of extremist groups.
5. Rare Car-Rammings: Car-rammings are infrequent, suggesting situational specificity or a lack of preference among militant groups.

**Top Perpetrators in Extortion**

The analysis uses a horizontal bar chart to highlight the top five extortion perpetrators, distinguishing between those associated with ISIS and Al-Qaeda through color coding. The chart reveals a concentration of extortion activity, with the leading perpetrator significantly surpassing others. This suggests that extortion serves as a strategic choice for these groups, potentially acting as a major revenue source and a tool for control. Annotations provide a clear breakdown of incidents and perpetrator affiliations, offering insights into operational scope and alliances..

Key Points:

1. Extortion Concentration: A few key players heavily leverage extortion, with a leading perpetrator responsible for a significantly higher number of incidents.
2. Strategic Choice: Extortion appears to be a strategic choice for these groups, serving as a significant revenue source and a tool for control.
3. Clear Breakdown: Annotations provide a clear breakdown of incidents and perpetrator affiliations, offering insights into operational scope and alliances.
4. Crucial Insights: The data is essential for understanding the landscape of extortion in the broader context of terrorist operations, guiding targeted interventions by security forces and policymakers.

**Top Weapons of the groups**

Few of the key insights of the analysis are as below,

* Both ISIS and Al Qaeda favor firearms as their primary weapons.
* ISIS heavily relies on firearms, emphasizing tactics with improvised explosive devices (IEDs).
* Al Qaeda ranks second in firearm use and extensively employs explosives, including Unmanned Aerial Vehicles (UAVs) in notable incidents.
* Differences in weapon types may stem from operational environments, resource availability, and strategic goals.
* Higher firearm frequency in ISIS suggests territorial control, while Al Qaeda's broader use of explosives may indicate a dispersed, guerrilla-style approach.

**Frequency of Incidents based on Tactics vs Actual Victims**

Few of the key insights of the analysis are as below,

* ISIS is associated with approximately 320 kidnappings of the general population.
* Al-Qaeda is linked to 320 incidents of planting Improvised Explosive Devices (IEDs) targeting military victims.
* Both groups exhibit a high frequency of suicide attacks, with around 179 attributed to ISIS and 135 to Al-Qaeda.
* Suicide attacks primarily target victims such as labor unions, processions, informants, and others in both organizations.

**Frequency of Incidents based on Tactics vs Facilities**

* ISIS demonstrates a focus on targeting foreign facilities, with an incidence count of 312.
* Al-Qaeda, in contrast, exhibits a higher frequency of targeting land transport, with 217 incidents.
* Both groups target buildings less frequently, with ISIS at 38 incidents and Al-Qaeda at 27.

**Regression Analysis for Assault / Covert / Unknown**

*Assault -* The logistic regression analysis model has proven effective in predicting group tactics, with high accuracy scores across various categories. The accuracy scores for each tactic are as follows:

For the specific case of Assault, the precision, recall, and f1-score metrics are provided:

Precision: 0.97 - This indicates the accuracy of positive predictions, with 97% of predicted Assault incidents being correct.

Recall: 0.77 - This signifies the model's ability to capture actual Assault incidents, with a recall rate of 77%.

F1-score: 0.69 - The harmonic mean of precision and recall, providing a balanced measure of the model's overall performance for Assault incidents.

Support: The number of instances in the dataset, with 1581 instances classified as 0 (not Assault) and 183 instances classified as 1 (Assault).

*Covert -* The logistic regression analysis model has demonstrated good performance in predicting the Covert group tactic, achieving an overall accuracy score of 0.87.

Precision for class 0 (not Covert): 0.89, indicating that 89% of instances predicted as not Covert were correct. Precision for class 1 (Covert): 0.81, with 81% of instances predicted as Covert being correct.

Recall for class 0 (not Covert): 0.95, capturing 95% of actual instances of not being Covert. Recall for class 1 (Covert): 0.62, correctly identifying 62% of actual Covert instances.

F1-score for class 0 (not Covert): 0.92, representing the harmonic mean of precision and recall for instances not Covert. F1-score for class 1 (Covert): 0.70, indicating the harmonic mean of precision and recall for instances classified as Covert.

Support includes 1336 instances classified as not Covert (class 0) and 428 instances classified as Covert (class 1). The overall accuracy is 0.87, representing the proportion of correctly classified instances out of the total.

*Unknown -* The logistic regression analysis model has yielded favorable results in predicting group tactics, specifically achieving an accuracy score of 93% for the Unknown tactic.

For the Unknown tactic, the following metrics are provided:

Precision:

Precision for class 0 (not Unknown): 0.97

This indicates that 97% of instances predicted as not Unknown were correctly classified.

Precision for class 1 (Unknown): 0.63

63% of instances predicted as Unknown were correct.

Recall:

Recall for class 0 (not Unknown): 0.95

The model captured 95% of actual instances of not being Unknown.

Recall for class 1 (Unknown): 0.77

77% of actual Unknown instances were correctly identified by the model.

F1-score:

F1-score for class 0 (not Unknown): 0.96

The harmonic mean of precision and recall for instances not Unknown.

F1-score for class 1 (Unknown):0.70

The harmonic mean of precision and recall for instances classified as Unknown.

Support:

The number of instances in the dataset:

1581 instances classified as not Unknown (class 0).

183 instances classified as Unknown (class 1).

Overall Accuracy:

The model achieved an overall accuracy of 0.93, representing the proportion of correctly classified instances out of the total.

# Summary

The comparative analysis of ISIS and Al-Qaeda from 2018 to 2022 elucidates divergent trends and impacts in their operations. Al-Qaeda exhibited a decreasing trend in incident involvement, with a notable drop from 792 incidents in 2018 to 489 in 2021, suggesting a decline in operational activities. Conversely, ISIS demonstrated an increasing trajectory, with incidents escalating from 934 in 2018 to 1088 in 2020, indicating an expansion in their operations. The casualty data adds depth to this narrative. Al-Qaeda's activities peaked in terms of killings in 2018, with 2,835 fatalities, and experienced fluctuations in woundings and kidnappings, peaking in 2020. Another organization analyzed showed a high initial count of killings, followed by consistent high numbers with a resurgence in the final year, alongside varied trends in woundings and kidnappings.

Further insight is gained from the analysis of targeted facilities and victim profiles. Al-Qaeda's focus was relatively lower on facility targeting, with a slightly higher inclination towards cultural targets. In stark contrast, ISIS's operations were more extensive, particularly targeting military facilities, reflecting a broader operational reach and potentially different strategic priorities. Victim profiles indicate Al-Qaeda's primary impact on the military and general population, whereas ISIS had a more pronounced effect on the general population.

Geographical distribution data highlights the frequency and scale of incidents across different nations, with larger, more vividly colored circles denoting areas of higher activity. This suggests regions that might require more concentrated analysis or intervention. Additionally, top ten countries with the highest incident rates revealed bombings and IED attacks as the most prevalent forms of violence, particularly in Somalia, Syria, and Iraq. These countries exhibit concentrated violent activities, with the high incidence of suicide bombings in Somalia and Afghanistan indicating the presence of extremist groups. The infrequency of car-ramming incidents suggests either situational specificity or a lack of preference among these groups.

Overall, this analysis provides a nuanced understanding of the operational patterns, impacts, and geographical focuses of Al-Qaeda and ISIS. It underscores the evolving nature of their activities and the necessity for informed and responsive strategies by global actors to address these threats.

# Future Work

**1. Analysis of Unknown Perpetrators**

**Objective:** Identify and characterize unknown perpetrators in terrorist incidents.

Methods:

**Profiling Techniques:** Utilize machine learning methods for the purpose of constructing profiles through the analysis of established situations. This study aims to conduct an analysis of prevalent attributes in attack methodologies, targets, and locations with the objective of extrapolating prospective profiles of perpetrators.

**Network Analysis:** Utilize network analysis techniques to elucidate potential associations between identified and unidentified offenders. The process entails analyzing several associations, such as common methodologies, targets, or geographic locations, in order to propose potential unidentified perpetrator identities.

**Text Mining and Sentiment Analysis:** Utilize text mining techniques to find trends or keywords from incident descriptions. The utilization of sentiment analysis can also serve as a means to assess the tone and context of descriptions, potentially providing insights into the identities of the individuals responsible.

**2. Publication Date Analysis**

**Objective:** Understand the dynamics between incident occurrences and their reporting in media.

Methods:

**Time Lag Analysis:** Examine the temporal discrepancy between the date of the incident and the date of publishing. This analysis can unveil patterns in the occurrence of reporting delays and shed light on their probable underlying reasons, such as the severity of the incident or its geographical location.

**Correlation with Media Coverage:** Examine the manner in which various situations are reported by the media. Examine the scope and characteristics of media coverage in connection to specific incident details, such as the nature of the attack, the identity of the perpetrator group, or the profile of the victims.

**3.** In-Depth Analysis of Perpetrator Characteristics (ICat)

**Objective:** Acquire a thorough comprehension of the attributes and trends correlated with diverse terrorist organizations and people.

Methods:

**Characteristic Profiling:** Conduct an analysis of the ICat columns in order to create profiles of distinct perpetrator groups or people, utilizing their respective characteristics. This may encompass the analysis of several aspects such as the identification of recurring strategies, preferences for certain targets, geographical trends, and affiliations.

**Comparative Analysis:** This analysis aims to examine and contrast the distinguishing features of various perpetrator groups, such as ISIS and Al-Qaeda, in order to discern both shared and distinct attributes. This can offer valuable insights into the operational and evolutionary dynamics of these groupings.

**Trend Analysis:** Examine the patterns in perpetrator traits throughout different time periods. This can provide insights into the manner in which terrorist organizations modify their strategies, select objectives, and make adjustments to various operational elements.

**4. Enhanced Machine Learning Applications**

**Objective:** Utilize sophisticated machine learning methodologies to obtain predictive and analytical insights.

Methods:

**Predictive Analytics:** This study aims to use machine learning models for the purpose of forecasting prospective targets, assault techniques, and offender behavior by using past data.

**Anomaly Detection:** Anomaly detection techniques are employed to identify atypical patterns or outlier occurrences that vary from established norms. This methodology can facilitate the identification of novel patterns or nascent risks within the realm of terrorism.

Appendix

Appendix A: Glossary

|  |  |
| --- | --- |
| Term | Definition |
| TraCCC | Terrorism, Transnational Crime and Corruption Center |
| GTTAC | Global Terrorism Trends and Analysis Center |
| ISIS | Islamic State of Iraq and The Levant |
| EDA | Exploratory Data Analysis |
| GUERRILLA | Referring To Actions or Activities Performed In [Impromptu](https://www.google.com/search?sca_esv=562426022&rlz=1C1AYYF_enUS1064US1064&sxsrf=AB5stBgLBJuB3FGxD9VzQgGEDdWv6MUliw:1693797166591&q=impromptu&si=ACFMAn8hzZSJQsgXIYlkGc-z1vmp0VrHQCREEt6yU5coka7UAWdml9gBc6pLvtdl-qOZELYkSMevjo8CspDgIEf4MXBrFbGG5w%3D%3D&expnd=1) Way |

Table : Glossary Table

Appendix B: GitHub Repository

Overview

Welcome to the "Data Analysis of Al-Qaeda- and ISIS-affiliated Terrorist Organizations" project folder. This project, carried out by a team of devoted graduates from the Data Analytics Engineering department of George Mason University's Data Analytics Engineering department, seeks to provide valuable insights into the complex world of terrorism through data analytics.

GitHub Repository Link

The URL for the repository

<https://github.com/akhiltodecode/Top-Gun-Patriots>

GitHub Repository Contents

The repository contents are

1. Showcase Presentation
2. Final Project Report
3. Final Weekly Interim Slides
4. Python Notebook Code file for the visualizations

Appendix C: Risks

Sprint 1 Risks

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Risk | Description | Probability | Impact | | Mitigation |
| Inadequate Domain Knowledge | During the first part of defining the problem and writing the report, the team had to look more into the domain area. In general, if team members don't know enough about the subject, they might not be able to identify or readily have accurate information or can write reports that effectively. | Medium | | Medium | Continued Learning more and more from articles/SME's to deep dive the domain |
| Swift Knowledge Bridge | Acquiring sufficient domain knowledge within the sprint timeframe was a potential risk due to the extensive research required in the project's domain of Terrorism | Medium | | Medium | Use organization or network documentation, reports, and subject matter experts to expedite learning. Structured learning programs should contain daily and weekly targets by allocating time for reading, research, and learning |

Table : Sprint 1 Risks

On analyzing the nature of the project and its data we put together a list of the project's risks, which include concerns about Inadequate Domain Knowledge, Swift Knowledge Bridge. It's good to know about the risks that come with research. Reading the articles written by experts in the field helped us understand the problem statement, all its details, and how it fits into the bigger picture. It helped us understand the complicated world of terrorism analysis better.

Considering the subject matter covered such a broad area, the knowledge needed to carry out the study was inadequate but implementing the risk management strategy of reading articles written by subject matter experts (SME) enabled further investigation of the matter while laying a strong groundwork for it.

Due to the considerable study that needed to be done in the Terrorism area for the project, acquiring sufficient domain expertise within the sprint period was a possible risk, but by implementing the mitigation plan of Reading, research, and study time allotted a certain amount of time within structured learning programs so that daily and weekly goals were met effectively.

Sprint 2 Risks

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Risk | Description | Probability | Impact | Mitigation |
| Perpetrator Claims | False claims of responsibility | Moderate | Moderate | Recording claims without assuming responsibility, without any co-relation between perp\_names & claims |
| Bias and Stereotyping | The dataset might inadvertently reinforce biases and stereotypes, which could lead to unfair profiling and discrimination. | High | Medium | Check for biases often and take steps to reduce them. To be fair, use a variety of sources and think about working with experts in the field. |
| Data Attributes and Cleansing | Inaccurate / Incomplete data collection and cleaning process can introduce errors into the analysis, with around 100’s of data attributes. | Moderate | High | Removal of unnecessary variables which are not primary for the analysis can make analysis better. |
| Excessive or Redundant Resource Allocation | Choosing a heavyweight database server with a lot of features and powers could add complexity and cost to a medium-sized dataset. | Moderate | High | Thinking about using a normal database or one that runs in memory and works best with files that are around 65MB. RDBMS systems like Microsoft SQL Server, MySQL Server, and a few others work well for small to medium-sized data sets. |

Table : Sprint 2 Risks

In a few cases, we have seen that organizations have claimed responsibility for perpetrations that have been committed, even if it is unclear whether or not these crimes are in any way connected to the organizations in question or whether they are just making the claim to gain fame, popularity, or financial gain. As a result, in order to prevent the occurrence of such an incident, we would check to see if it is claimed without responsibility.

If any of the information is unreliable, there is a risk of unfair bias developing in favor of or against a certain individual or group as compared to another. The information may inadvertently reinforce prejudices and stereotypes, which may result in unjust profiling and discrimination. To counterfeit such instances, we would check for biases to avoid the appearance of bias, it's important to look at all the data instances to resolve them.

Integration of data carries with it some dangers due to the fact that the data in question are collected from a variety of media sources in a timely fashion; nevertheless, in order to avoid these dangers, we may adopt data integration techniques that consist of data cleaning and normalization procedures. Moving further we removed the data integration challenge as the data referenced by the GTTAC uses Python scripts that are reliable. Also these datasets are made readily available for our analysis.

In the Data transformation phase, we observed for our analysis, we have taken out all level 2 groups from tactic types, logistic types, target kinds, facility, and intended victim. Level 2 categories are subcategories of level 1 parent categories. They are made up of specific characteristics. We think that these particular traits give detailed information, but for our study, only level 1 will be enough, and removing them won't change how complete the dataset is.

Finally, after consolidating the datasets, of around 45 MB data size, using a big database server like Google’s or Azure’s and few other with a lot of features and powers could make a medium-sized collection more complicated and cost more, hence mitigating this with selecting a Rdbms from RDBMS systems like Microsoft SQL Server, MySQL Server, and a few others that work well with small to medium-sized data sets.

Sprint 3 Risks

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Risk | Description | Probability | Impact | Mitigation |
| Data Accuracy | Inaccuracies in historical data could mislead analysis. | Medium | high | Implement rigorous data validation and correction. |
| Attribution Difficulties | Identifying responsible groups can be challenging. | Medium | High | Differentiate between confirmed attributions and claims. |
| Ambiguity in Incident Types | Subjective incident classifications could lead to misclassification. | Medium | Medium | Establish clear criteria for classifications. |
| Data modifications | Addition of research questions which includes addition of already removed variables is a risk,  as it requires redoing ETL | Medium | Medium | Re-assuring on the project requirements |
| Model Accuracy Risk | Model accuracy is the risk associated with the analytical models not accurately predicting outcomes or overfitting the data, leading to misleading conclusions. | Moderate | Moderate | Continuous Monitoring: Continuously monitor model performance and make necessary adjustments for improved accuracy. Domain Expert Collaboration: Collaborate with domain experts for insights and maintain transparency in reporting results. |

Table : Sprint 3 Risks

As we looked at records, we found mistakes and gaps in the data that made us question our findings. We thought this risk was medium to high because wrong data could make our study very difficult and cause us to come to the wrong conclusions. We put a high priority on careful data validation and correction methods to get accurate data for our work.

We found cases of subjective categorization, which shows that there was doubt about the incident group. Some events might be misclassified by people on the team. This risk was medium because our research could be jumbled and irregular. To lower this risk, we set clear and unbiased standards for classifying events so that they would be interpreted the same way every time.

While in Week-2, after contacting the partner, we had to include more data variables which were cleaned already according to the project objectives for additional research questions, where we had to perform ETL , to assure we meet the project goals.

Predictions model for predicting the relationship between the tactics and violence like num of killed people was not fitting, the accuracy score was low, which came as a risk in final week. To mitigate we have monitored the model, by tuning with different training and testing data set quantities, and derived that the model is not the right fit for the research question.

Sprint 4 Risks

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Risk | Descriptions | Probability | Impact | Mitigation |
| Risk of Omitted Relevant Information | This risk pertains to the potential omission of important variables or features in the regression model selection process. It occurs when only "suiting variables" are considered for inclusion, which may lead to the exclusion of critical factors that could impact the model's ability to identify true positive cases, especially in situations involving low Risk of Omitted Relevant Information recall. | Medium | Medium | **Domain Expertise:** Ensuring that the team collaborates with subject matter experts who have a deep understanding of the problem domain **Comprehensive Feature Selection:** Utilize robust feature selection by considering feature effectiveness. These methods help ensure that all relevant variables are considered for inclusion in the model. |
| Labelling more coveyingly | While labelling for few visualizations the correct representation is crucial | Medium | Medium | Consider the requirements, internal reviews among team and name the fields |

Table : Sprint 4 Risks

While performing the regression analysis on one of the research questions we observed that the recall and f1-score for a model was too low, although the accuracy and precision scores were top and this came as a risk to us, to resolve this conflict we received some guidance from the expertise that the inclusion of selective variables will better the model as a mitigation, there is a good improvement in the model for predicting 0’s that is an incident not claimed by an organization, whereas, there was minimal improvement in predicting 1’s and model has some limitations.

Labelling the graphs and visualizations was well performed, for few of them the visualizations required clarity in naming the columns or axes labels and titles, which came as a risk in missing out to deliver insightful information to the audience, to mitigate such an issue we performed internal reviews among teams and taking suggestion from the domain experts to represent the data more accurately.

Sprint 5 Risks

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Risk | Description | Probability | Impact | Mitigation |
| Overlooking or Missing a Visualization | There is a risk of overlooking or failing to document a problem that has been successfully solved during the findings phase | **Medium** | **Medium** | **Documentation Protocol:** Establish a documentation protocol that ensures all identified problems, and their solutions are systematically recorded.  **Knowledge Sharing Sessions:**  Conduct regular knowledge sharing sessions where team members discuss and document the challenges they encounter and how they were addressed |
|  |  |  |  |  |

Table : Sprint 5 Risks

While documenting our solutions, we identified a few instances where visualizations were overlooked and not updated to reflect newer versions. In response to this, we implemented a documentation protocol to address and prevent such occurrences in the future. The protocol involves clear communication among team members to ensure that all identified problems and their corresponding solutions are thoroughly documented. This proactive approach aims to enhance the accuracy and completeness of our documentation, minimizing the likelihood of missing updates or revisions to visualizations in the future.

Appendix D: Agile Development

Scrum Methodology

Our team adapted the collaboration and flexibility of Scrum. This allows us to effectively comprehend and develop project definitions and statements. We participate in daily Scrum meetings and provide daily status updates for three weeks. These meetings help us identify obstacles and resolve issues such as report data refinement, paragraph order and structure, among others.

In Sprint - 1, we plan to acquire the domain knowledge by reading and researching the articles, journals, and visualizations which will leverage the project production in a better way, the guides provided by the instructor/ SME's are so useful to us in understanding every aspect of the tool. Moving forward, we compose the report's problem definition and statement using the information gathered from a variety of sources, presenting the data in the form of figures or tables, and meticulously crafting the references that we consult. After composing the report in weeks 1 and 2 in conjunction with weekly project status presentations, week 3 will be used to review, refine, and finalize section 1 - Problem Definition. You note is our project management application where we will note each task related to Sprint-1, thereby organizing, and monitoring the project's progress.

During Sprint - 2 of our project, we focus on working with datasets, which is an important step on the way to doing project research. Our team does many different things with data to make the most of its power. First, we carefully organize and clean the files to make sure the data is correct and consistent. This step sets the stage for the rest of our studies. This strategy plan will not only make it easier to integrate data, but it also let us quickly change to changing data needs. We do experimental data analysis to find useful information that helps us make decisions in the next sprints. The team's dedication to this part gives us the information based on data that we need to move our project forward and make sure it works out in the end.

In Sprint - 3, an organized methodology centered around research questions has been pivotal in achieving project goals. By establishing specific objectives through these questions, we've created a roadmap that guides us through data challenges, facilitating progress throughout the sprint. Using pandas in Python, we conducted frequency analysis in Week-2, addressing prioritized questions. The upcoming weeks we focus on regression analysis. The process of answering these questions has not only underscored the project's significance but has also unveiled critical information and hidden patterns beneficial to stakeholders. During Week-3, we successfully addressed all framed questions, drawing valuable insights from the data. Partner meetings have proven instrumental in identifying any gaps and optimizing project deliverables. While implementing regression analysis for predicting violence based on terrorist tactics, we encountered challenges with low accuracy scores, signaling limitations in predictability. Sprint-3 enhanced our understanding of selecting appropriate analysis methods. Looking ahead to Sprint-4, we aim to further develop visualizations for comprehensive project insights.

In Sprint-4, our primary objective is to create insightful visualizations, including bar graphs, line graphs, heatmaps, geomaps, and more, building upon the research questions addressed in Sprint-3. Leveraging Python packages such as seaborn and matplotlib, we have generated visualizations labeled by data variables and organized year-wise. Multiple research questions have been successfully tackled using these tools. Valuable input from our partners during the analysis prompted adjustments, including the incorporation of frequency matrices for various tactics and focusing on specific data variables for visualizations. In the final week, we meticulously updated all visualizations based on partner suggestions, ensuring alignment with project objectives and enhancing overall data representation.

In Sprint 5, our primary emphasis was on perfecting the formatting of the Final Report and crafting slides for the Showcase Presentation. Following the professor's guidelines from Blackboard, we ensured that our approach aligned seamlessly with the project's key research questions and objectives. The strategy of emphasizing critical elements within the slides significantly improved the clarity of our presentation to the audience. Our slide creation process began with the design of the title slide, followed by sections addressing involved partners and the problem statement. We then proceeded to present detailed information on the Database, Analytics, and Visualizations. Each section, such as Section 5 covering findings, Section 6 summarizing key points, and Section 7 outlining future work, was meticulously developed to effectively communicate the project's essence, core components, and potential directions for future exploration.

Throughout the project, we systematically progressed through multiple sprints. In Sprint-1, we focused on acquiring domain knowledge through extensive research, aided by guides from instructor and SME. Sprint-2 involved working with datasets, organizing, cleaning, and conducting experimental data analysis. Sprint-3 saw the establishment of research questions and the use of pandas for frequency analysis, leading to insights and addressing challenges. Sprint-4 centered on developing insightful visualizations using Python packages like seaborn and matplotlib. Sprint-5 concentrated on refining the Final Report and crafting Showcase Presentation slides, aligning with project objectives. The strategic approach, partner collaboration, and a dedication to addressing research questions and challenges have been pivotal throughout the project, ensuring continuous improvement and effective communication of key findings and future directions.

Sprint 1 Analysis

During Sprint 1, our main goal was to learn a lot about how the problem was described and do a lot of study on terrorists. At first, it was hard to come up with short user stories. To get around this problem, we took an organized approach by putting them into important user stories. This helped us keep track of the project and keep it running smoothly.

We were able to get specific requirements and clear user stories by doing a lot of study and sorting them into groups. This method gave our project a good start and made sure that everyone on the team knew what the project's goals were.

While in the sprint, our dedication to daily Scrum meetings was one of the most important things that led to our success. These meetings gave the team a chance to talk about success, talk about problems, and solve any problems that came up. This attitude of openness helped us respond quickly to changing goals and solve problems quickly, which helped us finish tasks quickly. Keeping track of all the Sprint events was both challenging and rewarding. Due to Scrum structure, our team change the goals in Section 1 as we learned more and got more information. We were able to respond well to changing situations because we were able to be flexible.

We learned important lessons from Sprint 1 that,

It is important to take enough time to understand the problem. It helps put together a complete list of needs, which makes it easier to write user stories with clear goals.

For sprint goals to be met, it is important to give out tasks and make sure they are done by the deadline.

Sprint 2 Analysis

Sprint-2's objective is to focus on the various datasets that contain data pertinent to the project's research. The accumulation of data sets was one of our essential user stories that was completed during the preliminary research phase; we now have three distinct data sets containing information about recent incidents.

We were able to obtain specific information regarding ISIS and Al-Qaida, as both datasets contain approximately 49,000 data instances and more than 50 data variables, providing us with the 4 V's: Volume, Variety, Veracity, and Velocity.

We organize the data by analyzing the datasets and cleaning, enriching, transforming the data based on the type of analysis and strategy we intend to implement. By executing the data quality evaluation, we ensure that the datasets are trustworthy for analysis. At the very least, ensuring that the data sets possess the characteristics of Completeness, Uniqueness, Accuracy, Atomicity, Conformity, and Overall Quality.

We intend to perform ETL with the MySQL server for the project's Data Management. In the process of Data handling we found out that the missing values for a few of the data variables are more than 50 percent, which leads to data insufficiency and incorrect analysis, In such instances removing them makes the data more reliable. After, discussing on the standards of the project, we came up to a consideration of

Filling up the missing values in other columns with a unified word such as "GT23”, using python fill\_na() method,

* When the data variable has less than 90 percent of missing values, Unknown Values will be substituted.
* If the data variable contains more than 90 percent absent values, the column can be removed.

While contemplating a data variable, the least case if like around 90% of values are missing then using the project's standard measure, around 10% of the data set makes at least 4,000 data points, which is a wonderful amount for research. In our project, we removed the rows that have perp-name as ‘Unknown’, also the data variables of State and City having null values are not considered as part of analysis due to the reasons like

Finally, we were able to categorise the sub-groups selection based on the criteria that

* For the perpetrator subgroup we considered only those having incident count >= 10.
* With this we have a total of only 16 subgroups for both ISIS and Al-Qaida for analysis.

YouTrack is useful for tracking the development of Sprint -2. As a result of the Scrum methodology, we have the flexibility to modify or revise the project's research objectives and deliverables as necessary.

Sprint 3 Analysis

A key component of reaching project goals is your project's organized method, which consists of asking research questions. We establish specific objectives for your research and study by creating questions. The questions serve as a road map, guiding us through the difficulties of our data and making it simpler to progress as the sprint progresses.

Then, after answering the questions depending on their priority, we used pandas python to do correlation analysis, and we aim to undertake regression analysis on a few questions in the future.

The research questions have helped us to understand the project’s importance, and by solving these the crucial information and hidden patterns are dervied so well, that could be helpful for any concerned party.

In Week – 1 of the Sprint we analysed few research questions, followed by Week-2, where we implementd correlation analysis and plan to implement regression analysis techniques in coming week of work

While performing the 3rd week work in sprint, we have solved all of the questions that we framed and drawn out outputs that give insights and trends of the two groups. The partner meetings have helped us to cover any missing questions that leverage the project’s deliverables.

Implementing the regression analysis to predict the violence caused by the groups based on the terrorits tactics showed that the accuracy score was too low, which shows that there wasn’t a possibility of predicting the violence. The other predictions showed good accuracy score.

Overall, in sprint – 3 we had good understanding in using the right kind of analysis types of the questions that we framed. Moving forward to Sprint -4, we look forward to develop the visualizations.

Sprint 4 Analysis

In this sprint – 4, our primary focus is on developing insightful visualizations like the bar-graphs, line-graphs, heatmaps, geomaps and other. We will work on the research question that we solved earlier in sprint – 3. Using python’s packages like seaborn, matplotlib and other the visualizations are drawn out.

Multiple research questions have been solved using the python’s mattplotlib, seaborn. We have labeled the visualizations according to the data variables and year-wise.

While performing analysis, we received suggestions from the partner regarding the research questions and modifications like the frequency matrices for various tactics and adjustments like considering only particular data variables for visualizations.

In the final week, we have updated all the visualizations according to the partner suggestions.

Sprint 5 Analysis

During Sprint 5, our focus was on refining the Final Report formatting and creating Showcase Presentation slides. We adopted an approach based on the professor's instructions from Blackboard, ensuring alignment with key research questions and objectives. The strategy of highlighting crucial elements in the slides enhanced the clarity of our project presentation to the audience.

Our slide preparation began with the design of the title slide, followed by sections addressing partners involved and the problem statement. Subsequently, we delved into the specifics of the project by presenting information on the Database, Analytics, and Visualizations.

In our work, we dedicated attention to developing various sections, such as Section 5, which covers findings, Section 6, focusing on the summary, and Section 7, outlining future work for the project. This systematic approach aimed to communicate the project's essence, key aspects, and potential avenues for future exploration effectively to our audience.

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