Global Terrorism Data Set Report

Subject – Introduction to Data Visualization

Code – IDV(DS612)

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INTRODUCTION TO START (GTD)

[START (National Consortium for the Study of Terrorism and Responses to Terrorism).

(2022). Global Terrorism Database, 1970 - 2020 [data file]. https://www.start.umd.edu/gtd]

Overview of the START

The National Consortium for the Study of Terrorism and Responses to Terrorism—better known as START—is a university-based research and education centre comprised of an international network of scholars committed to the scientific study of the causes and human consequences of terrorism in the United States and around the world.

A Department of Homeland Security Emeritus Centre of Excellence headquartered at the University of Maryland, START supports the research efforts of leading social scientists at more than 50 academic and research institutions, each of whom is conducting original investigations into fundamental questions about terrorism, including:

- *What is the nature of terrorism in the world today?*
- *How has terrorist activity evolved over time?*
- *How does terrorism vary across geographies?*
- *And what do these trends indicate about likely future terrorism?*
- *Under what conditions does an individual or a group turn to terrorism to pursue its goals?*
- *What is the nature of the radicalization process?*
- *How does terrorism end?*
- *What are the processes of deradicalization and disengagement from terrorism for groups and individuals?*
- *What actions can governments take to counter the threat of terrorism?*
- *What impact does terrorism and the threat of terrorism have on communities, and how can societies enhance their resilience to minimize the potential impacts of future attacks?*

Overview of the GTD

The Global Terrorism Database (GTD), maintained by the University of Maryland's START Consortium, is the most comprehensive unclassified terrorism database, documenting 210,454 terrorist incidents from 1970 to 2020 (excluding 1993 due to data loss). Below is a detailed breakdown of its structure, coverage, and key insights.

Unlike many other event databases, the GTD includes systematic data on domestic as well as transnational and international terrorist incidents that have occurred during this time period and now includes more than 200,000 cases.

For each GTD incident, information is available on the date and location of the incident, the weapons used and nature of the target, the number of casualties, and--when identifiable--the group or individual responsible.

Includes information on more than 88,000 bombings, 19,000 assassinations, and 11,000 kidnappings since 1970 Includes information on at least 45 variables for each case, with more recent incidents including information on more than 120 variables

The National Consortium for the Study of Terrorism and Responses to Terrorism (START) makes the GTD available via this online interface in an effort to increase understanding of terrorist violence so that it can be more readily studied and defeated.

Total Rows: 210,454 incidents.

Total Columns: 135 variables (fields)

Data Size: ~142 MB (uncompressed).

Years Covered: 1970–2017 (excluding 1993).

STRUCTURE OF DATASET

For Detail Description of the Column refer: Code_Book

Variables/Columns

I. GTD ID and Date

GTD ID (*eventid*) Numeric Variable

Year (*iyear*): Year of occurrence.

Month (*imonth*): Numeric month of occurrence; unknown months are recorded as "0."

Day (*iday*): Numeric day of occurrence; unknown days are recorded as "0."

Approximate Date (*approxdate*): Text field for approximate dates when exact ones are unavailable.

Extended Incident? (*extended*): Indicates if the incident lasted more than 24 hours (1 = Yes, 0 = No).

Date of Extended Incident Resolution (*resolution*): Records the resolution date for extended incidents.

II. Incident Information

Incident Summary (*summary*): Brief textual description of the incident.

Criterion 1 (*crit1*): Political, economic, religious, or social goal.

Criterion 2 (*crit2*): Intention to coerce or intimidate larger audiences.

Criterion 3 (*crit3*): Outside international humanitarian law.

Doubt Terrorism Proper? (*doubtterr*): Indicates uncertainty about whether the incident qualifies as terrorism.

Alternative Code (*alternative*): Categorization for doubtful terrorism incidents.

Alternative Text (*alternative*_txt): Text description of alternative designations.

Part of Multiple Incident? (*multiple*): Indicates if the attack was part of a series of related incidents.

Related Incidents (*related*): Lists GTD IDs of related incidents.

III. Incident Location

Numeric Code (*country*) : for the country where the incident occurred.

Text Description (*country*_txt) : for the country where the incident occurred.

Numeric Code (*region*) : for the region classification.

Text Description (*region_txt*): for the region classification.

Province/State (*provstate*): Subnational administrative region where the incident occurred.

City (*city*): City or town where the incident took place; smaller administrative areas are recorded if unknown.

Vicinity (*vicinity*): Indicates proximity to a city rather than inside it.

Location Details (*location*): Additional information about the location.

Latitude (*latitude*) : coordinates based on WGS1984 standards.

Longitude (*longitude*): coordinates based on WGS1984 standards.

Geocoding Specificity (*specificity*): Resolution level of geospatial data.

IV. Attack Information

22–24. Primary, Second, and Third Attack Types:

Numeric Codes (*attacktype1*, etc.) : for attack methods like assassination, bombing, or armed assault.

Text Descriptions (*attacktype1*_txt, etc.): for attack methods like assassination, bombing, or armed assault.

25. Successful Attack? (*success*): Indicates whether the attack was executed.

26. Suicide Attack? (*suicide*): Indicates if perpetrators intended not to survive.

V. Weapon Information

27–34. Weapon Types and Subtypes:

Up to four weapon types (*weaptype1*, etc.) and their subtypes (weapsubtype1, etc.).

35. Weapon Details (*weapdetail*): Text field describing specific weapon details.

VI. Target/Victim Information

36–53. Target Types, Subtypes, Names, Specific Targets, and Nationalities:

Up to three targets per incident with fields for type (*targtype1*, etc.), subtype (*targsubtype1*, etc.), name (*corp1*, etc.), specific target/victim (*target1*, etc.), and nationality (*natlty1*, etc.).

VII. Perpetrator Information

54–66. Perpetrator Group Names, Subgroup Names, Suspected/Unconfirmed Status:

Fields include names of up to three perpetrator groups (*gname*, etc.), subgroup names (*gsubname*, etc.), and whether attribution was suspected/unconfirmed (*guncertain1*, etc.).

67. Unaffiliated Individuals? (individual): Indicates if perpetrators were unaffiliated individuals.

VIII. Casualties and Consequences

68–74. Fatalities and Injuries:

Total fatalities/injuries for victims and perpetrators are recorded separately across fields like total fatalities (*nkill*), U.S.-specific fatalities/injuries (*nkillus*, etc.), and perpetrator-specific counts (*nkillter*, etc.).

75–78. Property Damage:

Extent (*propextent*) and value in USD (*propvalue*), along with comments about damage details (*propcomment*).

79–84 Hostages/Kidnapping Details: Total hostages/kidnap victims (*nhostkid*), U.S.-specific counts (*nhostkidus*), duration in hours/days (*nhours*, etc.), and resolution details.

IX. Ransom Information

85–90 Ransom Details:

Fields include ransom demanded status (ransom), amount demanded/paid in USD (*ransomamt*, etc.), ransom notes detailing conditions or conflicting reports.

X. Hostage Outcome

91–93 Hostage Outcome Details:

Outcome categories like release or rescue (*hostkidoutcome*) and counts of hostages released/rescued (*nreleased*).

XI. Additional Notes

94–95 Additional Notes:

Supplemental textual information about uncertainties or unique aspects of incidents.

XII International Dimensions

96–100 International Dimensions:

Fields include logistical international status (*INT_LOG*), ideological international status (INT_IDEO), miscellaneous international status (*INT_MISC*), and overall international classification status (INT_ANY).

XIII Data Sources

101–104 Source Citations:

Up to three citations per incident documenting sources used to compile information.

105 Data Collection Source:

Original data collection effort identifier.

106–135 Additional fields from hostage outcomes, ransom details, or notes that were previously omitted have been integrated into this report.

Missing Data Overview by Category

Category	Key Columns	Missing Data Insights
Temporal	*iyear, imonth, iday, approxdate*	imonth and iday have ~10% missing values (coded as "0")
Location	*country_txt, city, latitude*	city missing in ~25% of cases. Latitude/longitude missing for ~15% of incidents
Attack Details	*attacktype1_txt, weaptype1_txt*	Weapon type missing in ~5% of cases
Target	*targtype1_txt, target1*	Specific target details (target1) missing in ~30% of incidents
Perpetrator	*gname, nperps*	Perpetrator group unidentified in ~40% of cases. nperps missing in ~50%
Casualties	*nkill, nwound*	Casualty data missing in ~20% of incidents (estimated from media reporting gaps)
Hostage/Kidnapping	*nhostkid, ransomamt*	Ransom details missing in ~85% of kidnapping cases

OTHER DATA SET USED

Overview of HDI Dataset (2017)

The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and having a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions.

The HDI can be used to question national policy choices, asking how two countries with the same level of GNI per capita can end up with different human development outcomes. These contrasts can stimulate debate about government policy priorities.

The HDI simplifies and captures only part of what human development entails. It does not reflect on inequalities, poverty, human security, empowerment, etc. The HDRO provides other composite indices as broader proxy on some of the key issues of human development, inequality, gender disparity and poverty.

A fuller picture of a country's level of human development requires analysis of other indicators and information presented in the HDR statistical annex.

HDI Vs GTI (Derived Table 2017)

A derived data set was constructed using Two column of Human Development Index Dataset (Country Name) and (HDI score) for Year 2017 and one Column of GTD data set (GTI index)

This was done to observe the migration trend between countries based on GTI score and HDI score

GOALS & NARRATIVE

Key Insights

I. Analyze how terrorism has evolved over time
II. Observe the reason for the major spike in number of attacks.
III. Identify high-risk regions/countries.
IV. Understand preferred methods of terrorism
V. Identify vulnerable targets.
VI. Understand the human costs of terrorism.
VII. Understand How GTI affect HDI (2017)
VIII. what do these trends indicate about likely future terrorism?

Narrative/Hypothesis

1. **Politically Unstable Countries are more Vulnerable to the terrorist attack**

2. **Countries with higher Global Terrorism Index (GTI) scores exhibit greater amount of outbound migration**

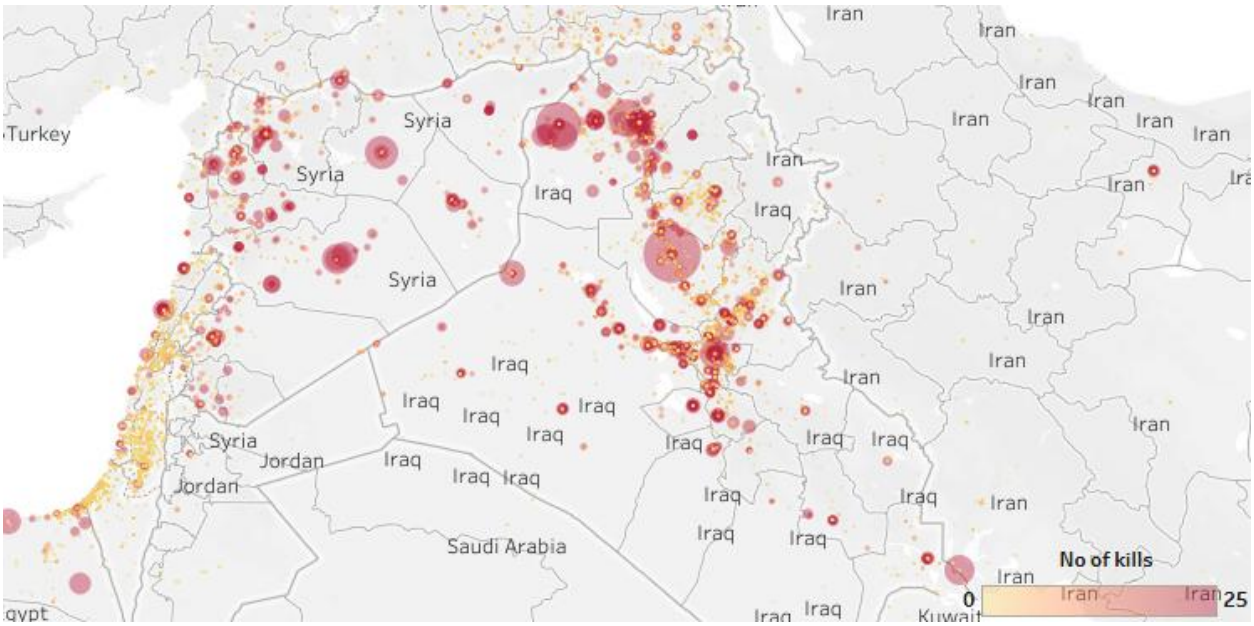
VISUAL SOLUTION

Problem A

Politically Unstable Countries are more Vulnerable to the terrorist attack

Iraq

- *Political Instability:* After the Gulf War (1990-1991) and the 2003 invasion, Iraq's political landscape was destabilized due to the collapse of Saddam Hussein's regime, sectarian conflicts, and foreign intervention.
- *2007 - The Surge and Al-Qaeda in Iraq:* In 2007, sectarian violence escalated between Sunni insurgents, Shia militias, and U.S. forces. Al-Qaeda in Iraq (AQI) carried out bombings and attacks, further destabilizing the country.
- *Terrorism:* AQI's brutal tactics and the rise of sectarian violence peaked in 2007. The U.S. "Surge" strategy temporarily reduced violence but failed to resolve deeper political issues.
- *2013-2014 - Rise of ISIS:* ISIS took control of large parts of Iraq, including Mosul, leading to a dramatic increase in terrorist activity.
- *This has been proved by us through density plot which has been shown below:*



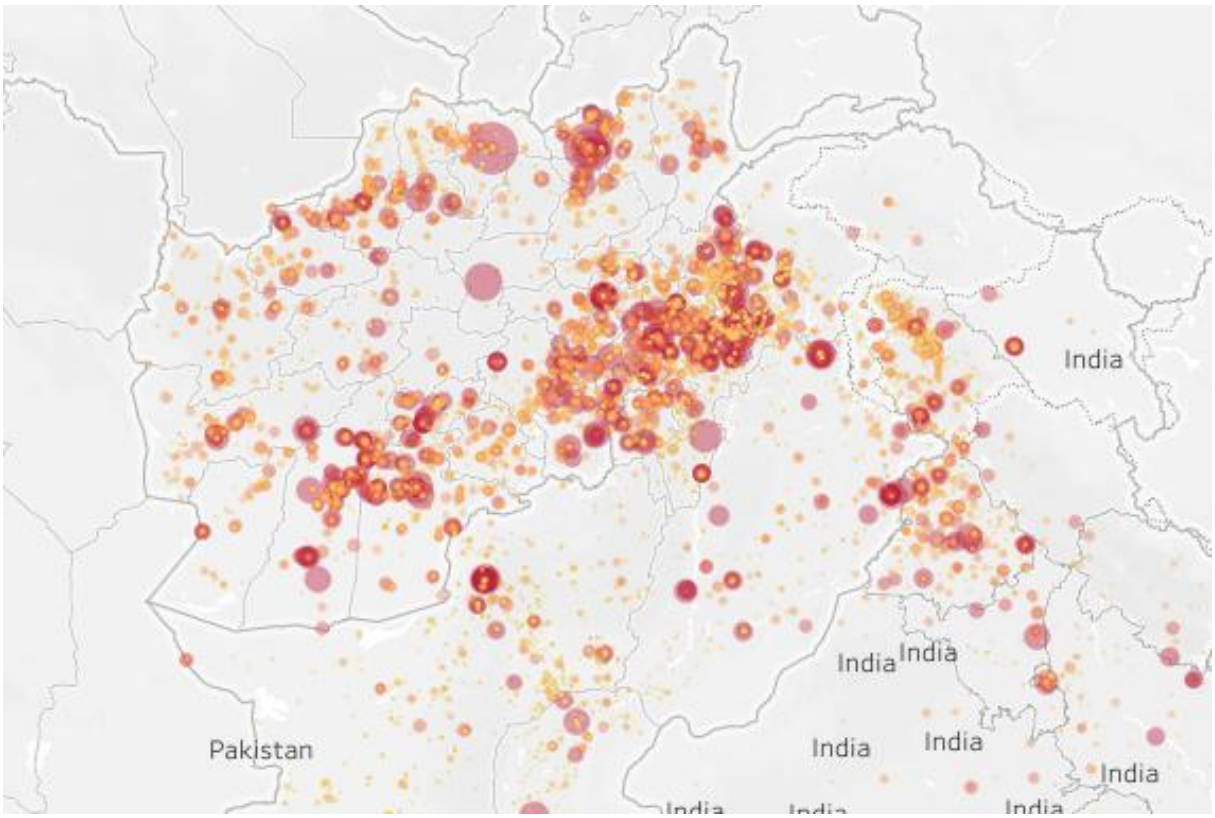
Afghanistan:

- *Political Instability:* After the Soviet withdrawal in 1989, Afghanistan was plunged into civil war. The Taliban took control in 1996, and after the 2001 U.S. invasion, political instability persisted due to the Taliban insurgency.
- *1992 - Civil War:* Following the Soviet withdrawal, Afghanistan's political fragmentation led to civil war, with groups like the Taliban, Mujahideen, and others fighting for control.
- *Terrorism:* The civil war saw rising violence, with terrorist attacks from factions vying for power.
- *2001 - U.S. Invasion and Taliban Resurgence:* The U.S. ousted the Taliban in 2001, but the group regained strength, leading to ongoing terrorist attacks, especially after 2006 when the insurgency gained traction.

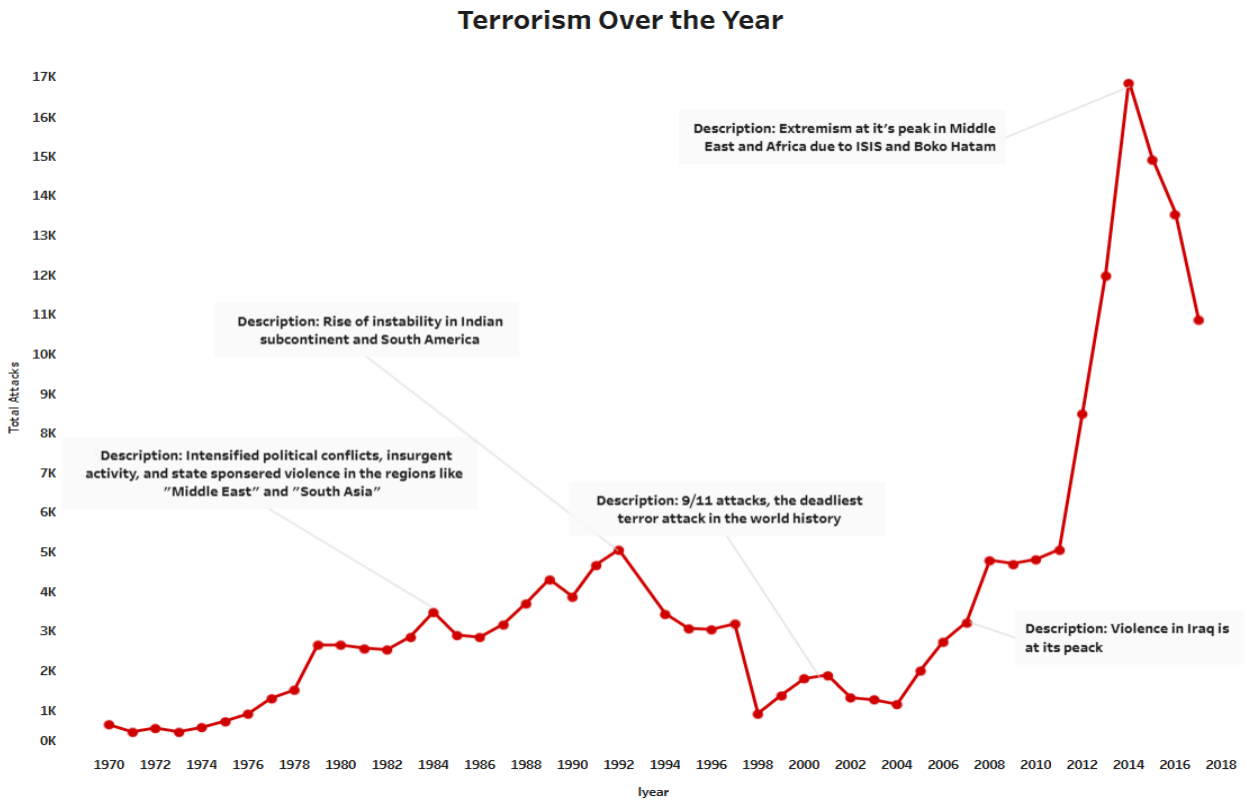
Indian Subcontinent:

- *Political Instability:* In 1992, instability provided a fertile ground for extremism, especially in Kashmir.
- *Kashmir Terrorism (Sponsored by Pakistan):* Since the late 1980s, Pakistan has been accused of sponsoring terrorism in Kashmir. Groups like Hizbul Mujahideen, Lashkar-e-Taiba (LeT), and Jaish-e-Mohammed (JeM) operated from Pakistan, carrying out insurgent activities, attacks on Indian military installations, and civilian targets in Kashmir.

This has been proved by us through density plot which has been shown below:

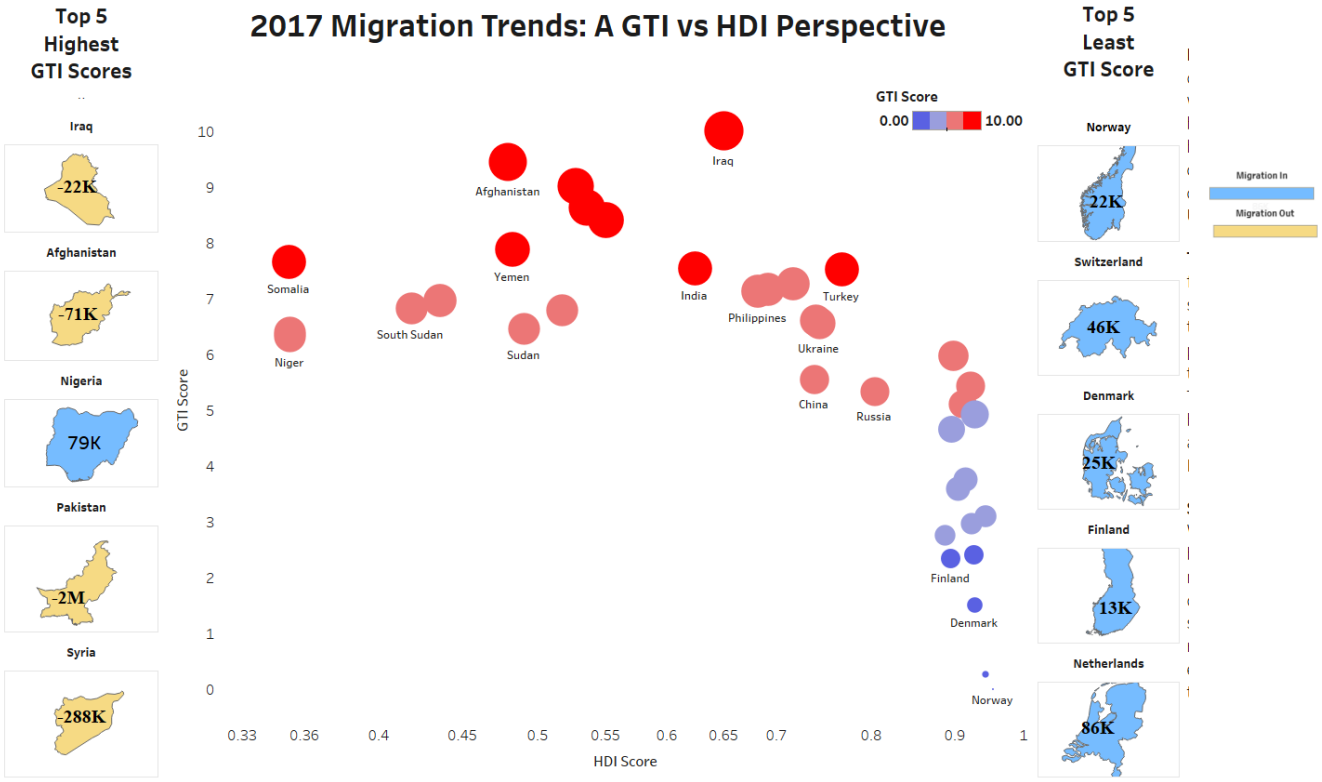


The plot below illustrates the overall peaks of the various incidents, highlighting significant events of political instability and subsequent terrorist activity across different regions. The marked peaks, along with their corresponding labels, provide a clear visual representation of the correlation between political instability and the rise of terrorism. This further supports our hypothesis that politically unstable countries are more vulnerable to terrorist attacks.



Problem B

Countries with higher Global Terrorism Index (GTI) scores exhibit greater outbound migration, particularly toward nations with higher Human Development Index (HDI) scores and lower terrorism exposure.



Countries like Afghanistan (-71K), Syria (-238K), Pakistan (-2M), and Iraq (-22K) have high GTI (above 7) and low HDI (below 0.55) showing significant negative net migration, indicating outward migration driven by terrorism, instability, and poor living conditions.

In contrast, countries like Norway (+22K), Switzerland (+46K), and Netherlands (+86K) have low GTI (below 2) and very high HDI (0.9-1.0) acting as attractive destinations for migrants, especially from conflict zones.

This pattern supports the hypothesis that terrorism acts as a strong push factor, while peace and development serve as pull factors for global migration.

Outlier - Nigeria (+79K):

Despite a GTI score around 6.5 and moderate HDI (~0.5), Nigeria records positive net migration. This is due to:

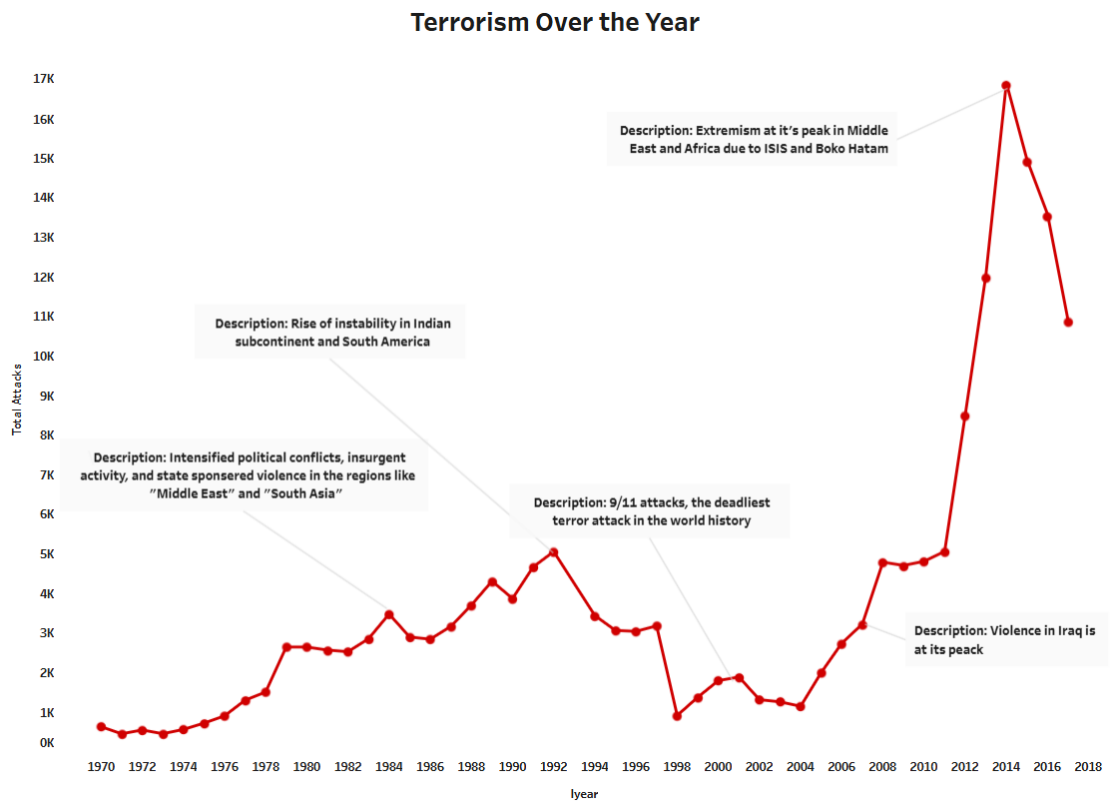
Its regional economic dominance, attracting migrants from more unstable neighbouring countries (e.g., Niger, Cameroon, South Sudan).

Internal stability in major cities like Lagos and Abuja, offering employment opportunities.

Nigeria acts as a regional safe haven despite ongoing local terrorist activity.

BISECTION OF GRAPH

1) Scatter Plot



Data Classification

Data Type	Variable	Description
Quantitative	Number of Terrorist Attacks	Continuous numerical values plotted on the y-axis to show magnitude over time
Ordinal	Year	Sequential time data placed on the x-axis

Marks

This visualization uses 0D (Dot) marks:

- Points (Dots) (0D): To mark individual data values for each year.

- Line: Connecting dots to creating line to represent the trend of terrorist attacks over time.

Channel

Channel Type	Purpose & Mapping
Horizontal Position (X-axis)	Encodes ordinal data (Year), establishing temporal sequence
Vertical Position (Y-axis)	Encodes quantitative data (No. of attacks), conveying magnitude
Color (Red)	Highlights severity and draws attention to the risk nature of terrorism

Visualizing Summary

Why This Plot: A *line chart* is used to effectively illustrate the trend of global terrorist incidents over time, highlighting changes and key historical events.

Why This Color Scheme: The *red line and markers* symbolize urgency and danger, aligning with the theme of terrorism and drawing immediate attention to critical points.

Task Performed: The visualization tracks the *evolution of terrorism from 1970 to 2018*, annotates major events (e.g., 9/11, ISIS rise), and provides clear insights into peaks and patterns of global instability.

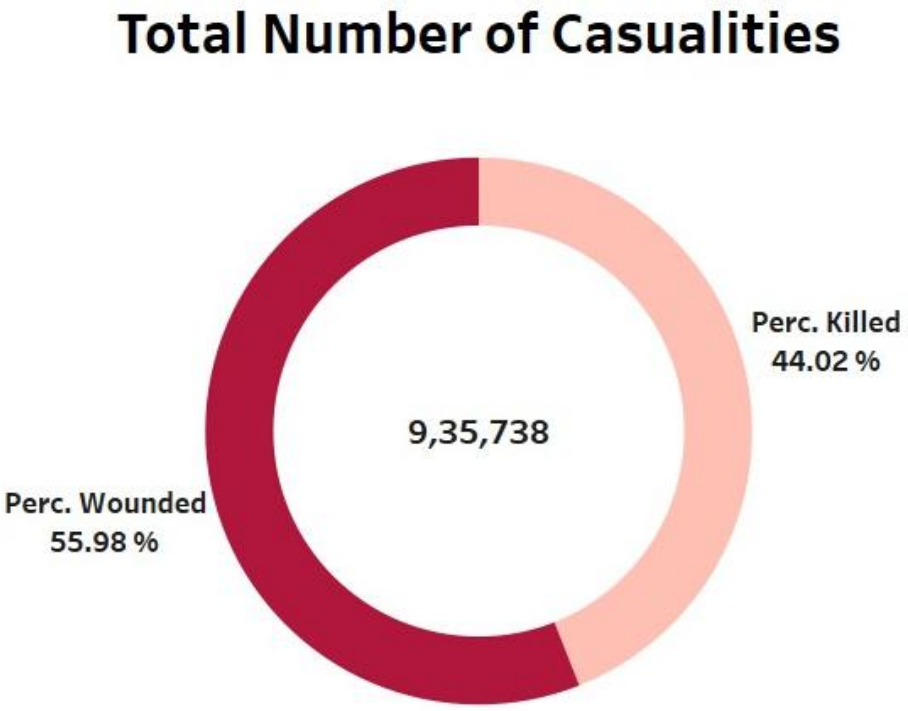
Discriminability

Discriminability: Each time point (year) is uniquely identified with data markers and labels, making annual variation clearly distinguishable.

Separability

Separability: The colour, annotations, and line markers together ensure that trends and specific historical events are visually and cognitively separable, improving understanding of causes behind spikes or declines in terrorist activities.

Donut Chart



Data Classification

Data Type	Variable	Description
Quantitative	Kills, Wounded	Continuous numerical values. Representing numeric proportion of deaths.
Categorical	Casualty Type	Two distinct groups: 'Killed' and 'Wounded', used to segment the donut chart.

Marks

- *1D mark: Arc (donut segments)* used to represent proportions or part to whole

Channels

Channel Type	Purpose & Mapping
Color (Hue and Intensity)	Enable to differentiate two categories
Tilt/Angle	Represent part to whole based on angle

Visualization Summary

Why This Plot:

A *donut chart* is used to emphasize *part-to-whole relationships*, making it easy to distinguish the two main categories of casualties—*Killed and Wounded*. This plot effectively visualizes proportional data while keeping the total number (935,738) clearly highlighted at the center.

Why This Color Scheme:

Two visually distinct yet harmonized shades of *red* were used:

- *Dark Red* for "Wounded" indicating severity and high volume.
- *Light Red* for "Killed" highlighting the gravity of fatality. This contrast ensures *clear separability* of the two segments and reinforces the emotional gravity of casualty data.

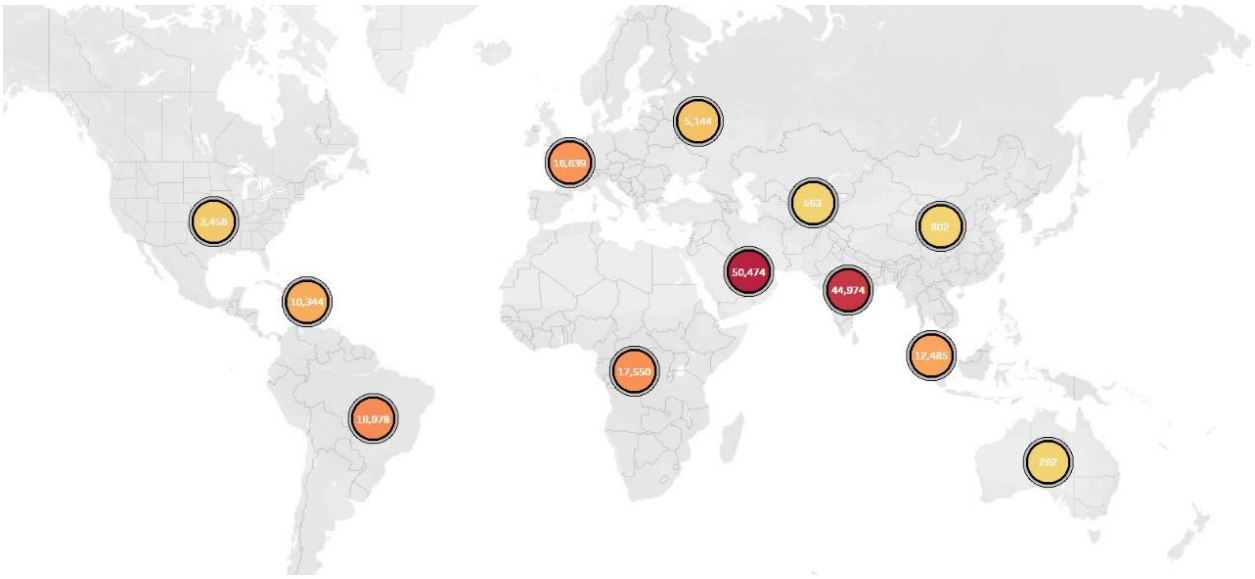
Task Performed:

- Extracted and aggregated the *total number of casualties.*
- Segmented the data into *Killed and Wounded* categories.
- Computed percentage shares for each category.
- Visualized the proportions with *separable color channels* and embedded total count in the center for clarity.

Discriminability & Separability:

- *Category Differentiation*: Clearly differentiates between “Killed” and “Wounded” casualties.
- *Separable Channels:* Color hue (dark vs light) and label position allow for *distinct perception* of each category.
- *Most Informative Aspect*: The viewer quickly grasps both the magnitude and distribution of casualties, emphasizing the larger share of non-lethal wounds while not downplaying fatalities.

Geographical Plot



Data Classification

Data Type	Variable	Description
Quantitative	Eventid	Continuous numerical values represents total number of terror attacks occur
Categorical	Region	Refers to *region names*, which are used to group and identify geographical locations distinctly.
Spatial (Categorical)	Latitude, Longitude	Includes *latitude and longitude coordinates* that determine the *exact placement* of each data point (circle) on the world map.

Marks

This visualization uses 0D (Dot) marks:

- Points (Dots) (0D): To mark individual data values for each Region.

Channels

Channel Type	Purpose & Mapping
Horizontal Position (X-axis) and Vertical Position (Y-axis)	*Spatial coordinates on the world map* encode geographic location (longitude & latitude).
Color Saturation	Encodes *quantitative value* of terrorist attacks from gold (lower) to red/dark red (higher).

Visualization Summary

Why This Plot:

A Geographical Map was chosen to visually represent the *distribution of terrorist attacks across different regions*, enabling immediate spatial understanding of highly affected areas. This plot effectively links data with location, offering *impactful regional insights with high granularity of information*, allowing viewers to identify not just broad trends but also specific hotspots across the globe.

Why This Color Scheme:

A *sequential color scheme* ranging from light yellow to dark red was used to represent the *intensity of attacks*. Darker shades indicate higher values, enhancing interpretability while maintaining visual balance. The use of warm colors draws attention to regions with higher incident counts.

Task Performed:

Plotted regional terrorist attack data on a world map using *circle size and color intensity* to encode magnitude. The map aids in identifying hotspots and regional patterns. Labels inside each circle display actual numbers for clarity.

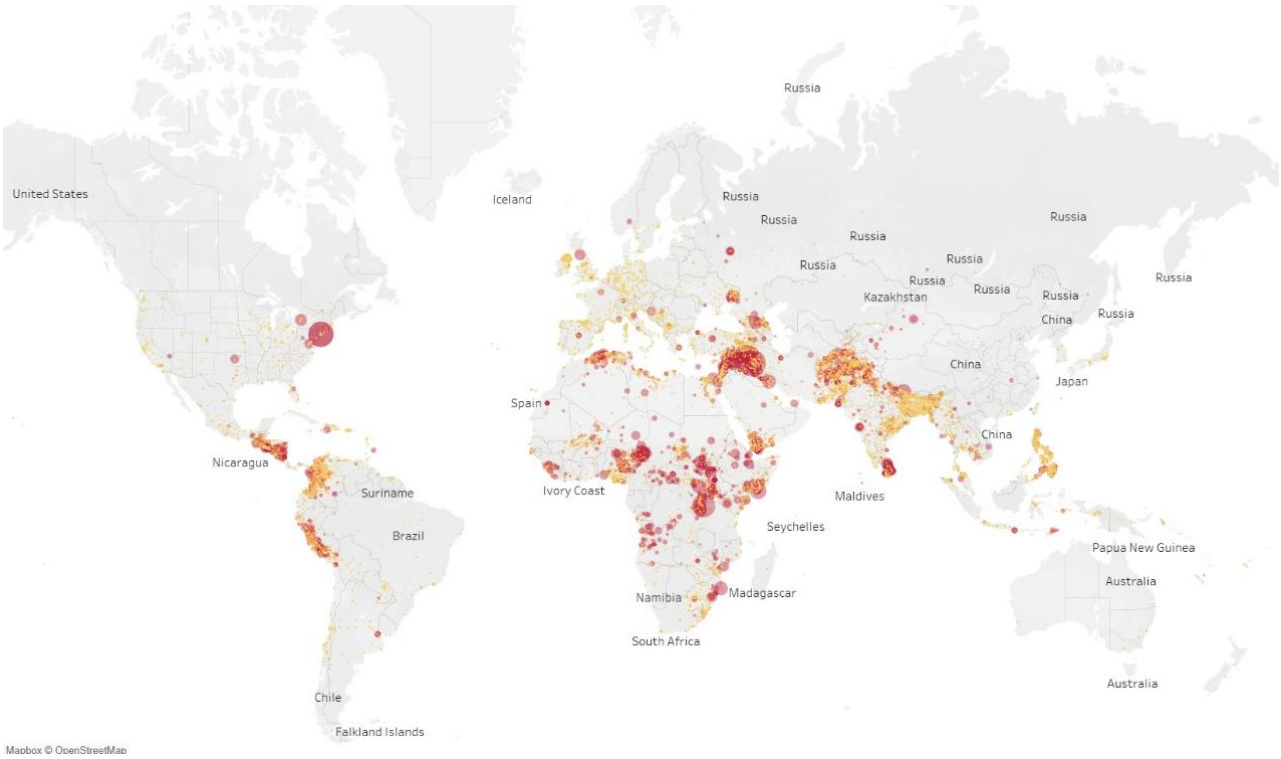
Discriminability:

The use of *circle size and color* makes each data point visually distinct. These channels are not overloaded and allow users to *differentiate values* without confusion.

Separability:

The *color and size channels* are *non-conflicting and separable*, meaning they provide *independent and clear visual cues*. Color indicates the level of attacks, while size supports the same encoding for redundancy and emphasis.

Choropleth Maps



Data Classification

Data Type	Variable	Description
Quantitative	nkills	Continuous numerical values represents total number of terror attacks occur
Spatial (Categorical)	Latitude, Longitude	Continuous numerical values to define the geographic position of each attack people have died.

Marks

This visualization uses 0D (Dot) marks:

- Points (Dots) (0D): To mark individual data values for country.

Channels

Channel Type	Purpose & Mapping
Horizontal Position (X-axis) and Vertical Position (Y-axis)	*Spatial coordinates on the world map* encode geographic location (longitude & latitude).
Color Saturation	Encodes *quantitative value* of individual's died from gold (lower) to red/dark red (higher).

Visualization Summary

Why This Plot:

A *Geographical Density Map* was chosen to provide a high-level spatial overview of terrorist incidents globally. This plot makes it easy to:

- *Identify hotspots* of terrorist activity (e.g., Middle East, South Asia, parts of Africa).
- Link *location-based patterns* with geopolitical regions.
- Support *granular-level insight*, where zooming into a country or city reveals more precise event distributions.
- Present *granularity of information*, showcasing not only which countries are affected but also which *specific regions within* those countries are most impacted.

Why This Color Scheme:

- A *red-to-yellow sequential color gradient* is used.
    - *Red* signifies *high-density* areas (high number of incidents).
    - *Yellow* indicates *low-density* areas.
- This scheme helps viewers *intuitively associate red with danger*, making the map immediately understandable.
- The gradual change supports *visual hierarchy*, highlighting critical zones without overwhelming less affected areas.

Task Performed:

- The task aimed to *analyze and visualize the spatial distribution* of terrorism globally using location-based data (latitude and longitude).
- This involved:
    - Mapping terrorist incidents onto a world map.
    - Encoding *density* through color.
    - Enabling *region-specific insights* (e.g., Iraq, Afghanistan, Nigeria).
- The output supports data storytelling by *visually highlighting vulnerable zones* and possible policy intervention points.

Discriminability:

- Discriminability refers to how easily distinct data categories or magnitudes can be visually distinguished.
    - In this map, the *color intensity* clearly differentiates high-frequency (red) from low-frequency (yellow) areas.
    - The use of *position on the map* helps differentiate between *geographic locations* without ambiguity.
    - *Granularity* is maintained by using precise dots instead of vague heatmap blobs, improving clarity.

Separability:

- Separability refers to how well visual channels (e.g., color, position, size) *do not conflict* with one another.
    - In this plot, *color* (density) and *spatial position* (location) are two *orthogonal channels*—they encode different dimensions and don't interfere.
    - There is *no overlap or confusion* between color (density) and geography (position), making the information *clean and separable*.

Key Performing Index

No. of terror attack	Strike Outcome	Killed	Multiple Attacks	Wounded	RansomPaid
1,81,691	88.96 %	4,11,868	13.78 %	5,23,870	$ 555.69M

1. No. of Terror Attacks: Total terrorist incidents recorded, reflecting frequency and intensity of threats.

2. Strike Outcome (%): Percentage of terrorist attacks executed successfully, at target places.

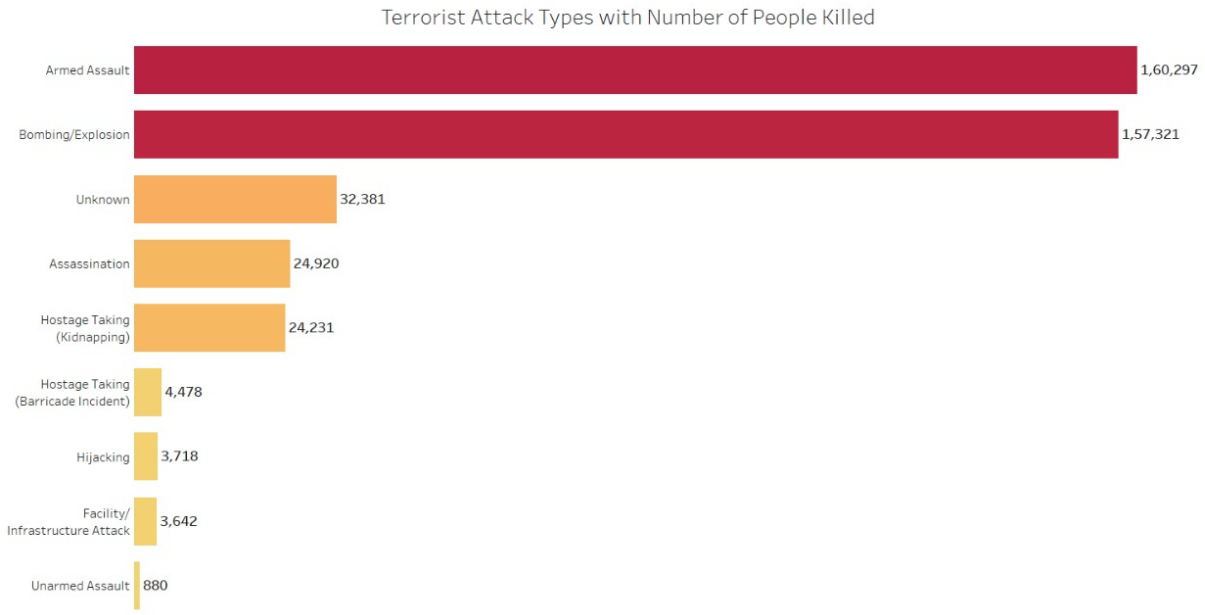
3. Killed: Total fatalities from terrorism, measuring the human toll and severity.

4. Multiple Attacks (%): Proportion of attacks involving coordinated strikes, indicating complexity and organized threat levels.

5. Wounded: Total injuries caused by terrorism, showcasing broader humanitarian impact.

6. Ransom Paid: Total funds paid to terrorists, signaling economic leverage and financial risks.

Horizontal Bar Graph



Data Classification

Data Type	Variable	Description
Categorical	attack_type	Specifies the method used in the terrorist attack (e.g., Armed Assault, Bombing).
Quantitative	nkills	Represents the total number of individual died due to the respective attack type.

Marks

Line(1D): Horizontal lines are used to represent the number of people killed per attack type. The length of each line encodes the quantitative magnitude of fatalities.

Channels

Channel Type	Purpose & Mapping
Length Size	Encodes the number of people killed using the length of horizontal bars.
Color Saturation	Differentiates types of attacks using distinct shades (red to gold)
Horizontal Position	Each bar is positioned along the vertical axis according to attack type.

Visualization Summary

Why This Plot:

A horizontal bar chart was selected to effectively compare various terrorist attack types based on their

lethality. This chart form allows for easy ranking and side-by-side comparison, making it ideal for categorical data with associated quantities. It highlights which attack methods are most deadly in a direct and interpretable manner.

Why This Color Scheme:

A diverging red-yellow color gradient is used to represent the severity of attacks. Darker red bars indicate higher death tolls, while lighter yellow implies lower fatalities. This color scale is intuitively associated with urgency and heat, aligning with the theme of violence and danger in terrorism data.

Task Performed:

The chart visualizes the total number of people killed per attack type, using bar length and color intensity as dual encodings of severity. Text labels at the end of each bar provide precise numerical context to support visual interpretation.

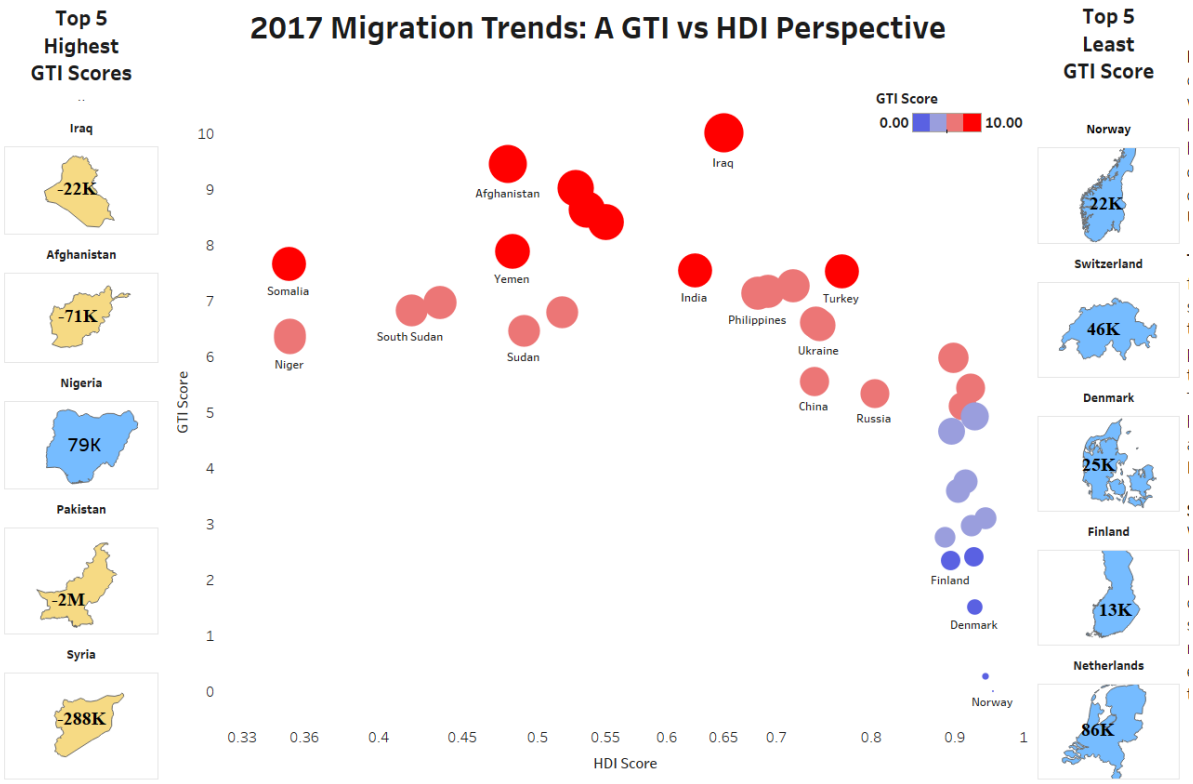
Discriminability:

Each attack type is clearly distinguished using categorical positioning on the vertical axis. The bars differ in length and color, ensuring that no two data points appear too similar, which helps users instantly identify the deadliest methods.

Separability:

The length and color channels are separable and non-redundant, meaning they independently encode the same variable (number killed) for emphasis without interfering with each other. Text labels further enhance separability by adding exact figures, ensuring precise comprehension.

Correlation Chart



Data Classification

Data Type	Variable	Description
Categorical	Country	Name of the country represented by each data point
Quantitative	GTI Score	Global Terrorism Index score measuring the impact of terrorism in that country
Quantitative	HDI Score	Human Development Index score indicating development level
Quantitative	Migration Count	Number of people emigrating or immigrating (indicated in top 5 side charts)
Categorical	Region Role	Role in context – either source or destination of migration

Marks

This visualization uses 0D (Dot) marks:

Points (Dots) (0D): Represent individual countries, placed based on their GTI and HDI scores.

Channels

Channel Type	Purpose & Mapping
Horizontal-Position (X- axis)	HDI Score - horizontal placement shows development level
Vertical-Position (Y- axis)	GTI Score - vertical placement shows terrorism impact
Color (Saturation)	Diverging Values where red for high GTI, blue for low GTI
Size (Area)	Implicit emphasis, possibly relative to importance or frequency

Visualization Summary

Why This Plot:

A scatterplot with dual-axis encoding was used to examine the relationship between terrorism impact and human development. It enables viewers to visually correlate a country's development status (HDI) with the severity of terrorism (GTI), highlighting potential socio-political patterns.

*Why This Color Scheme***:**

A diverging color scheme (red to blue) was chosen to clearly indicate the spectrum of terrorism intensity. Dark red signifies countries with high GTI (more affected), and blue signifies peaceful countries with low GTI scores. This helps in contrasting extremes effectively.

Task Performed:

Plotted countries as dots on a 2D axis of GTI vs HDI. . Added side maps highlighting top 5 source and destination countries for migration. Each bubble's colour encodes terrorism intensity; maps and labels offer context on migration flow.

Discriminability

Countries are uniquely positioned using independent coordinates (GTI and HDI), allowing visual separation. Use of color, size, and label reinforces clarity. Even with overlapping categories, the design maintains distinctness.

Separability

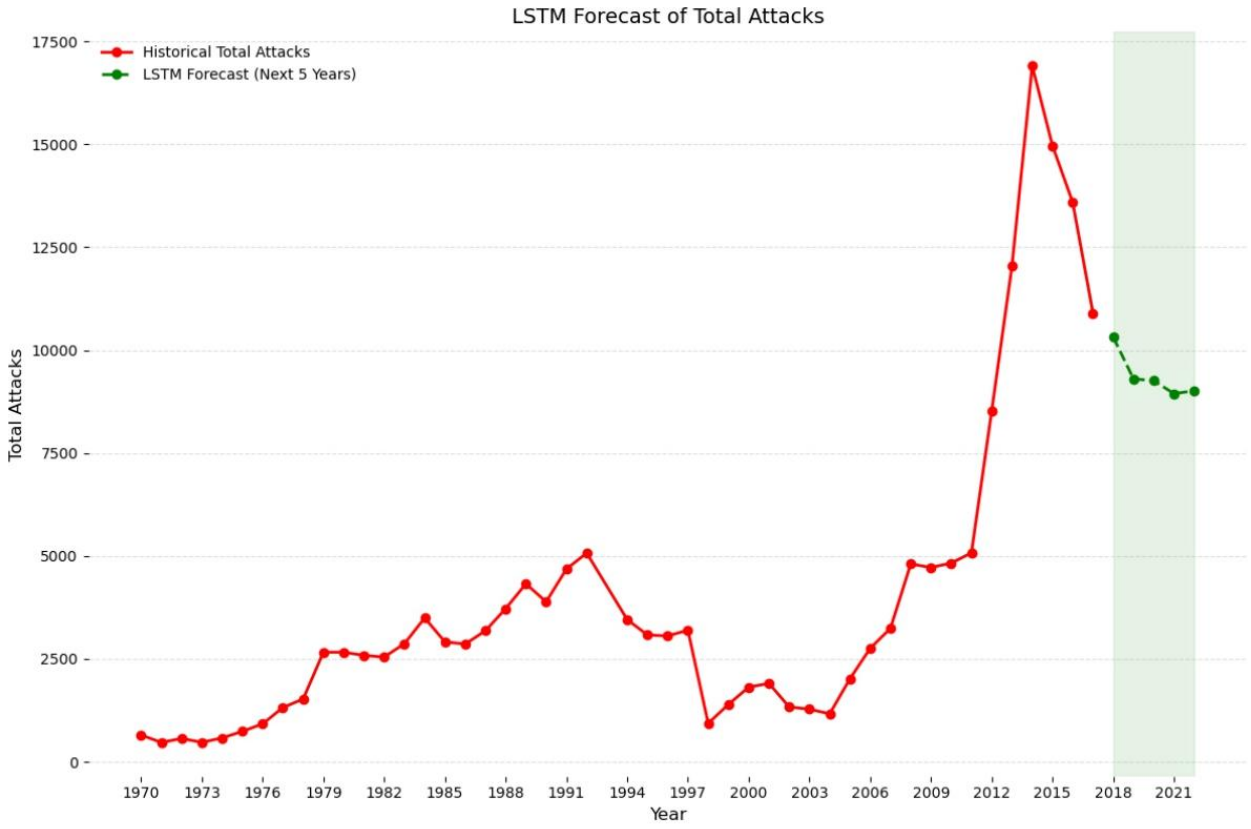
The position, color, and size channels are all independently mapped and non-overlapping in interpretation. This enhances clarity—each variable provides its own cue:

Position shows development vs terrorism,

Color shows GTI score intensity,

Size or surrounding context adds migration relevance.

Forecasting



Data Classification

Data Types	Variable	Description
Quantitative	Iyear	Time in years from 1970 to 2017, 2018-2021
Quantitative	Total Terror Attacks	Annual count of terrorism incidents

Marks

This visualization uses 0D (Dot) marks:

- Points (Dots) (0D): To mark individual data values for each year.

- Line: Connecting dots to creating line in order to represent the trend of terrorist attacks over time.

Channels

Channel Type	Purpose & Mapping
Horizontal Position(X-axis)	Maps Year – horizontal positioning shows temporal progression
Vertical Position(Y-axis)	Maps Terrorism Count – vertical height represents intensity of incidents
Color (Hue)	Red tone used for actual and predicted values, lighter shade for prediction band

Visualization Summary

Why This Plot:

A time series line chart with forecast extension was selected to visualize the temporal dynamics of terrorism and to project future trends. The line shows historic growth and decline, while the shaded area provides a statistical prediction interval for future observations with 95% confidence.

Why This Color Scheme:

A monochromatic red scheme with darker red for the main line and lighter red for prediction bounds helps users distinguish between observed and predicted values. The warmth of red naturally draws attention to peaks and high-risk years.

Task Performed:

Terrorism data from 1970 to 2017 was plotted and then extended to 2025 using time series forecasting. A 95% prediction interval was added using shaded ribbons to indicate uncertainty. The visualization aims to offer insight into trends and future possibilities in terrorism patterns.

Discriminability

Each year's value is distinct and clearly separated using point marks. The prediction band is also shaded lightly, making it distinguishable from the main forecast line without crowding the visual space.

Separability

The color of the prediction band and the position of the line are independent and non-conflicting. This separation makes it easy for viewers to interpret the main trend and the associated uncertainty simultaneously without confusion.

KEY TAKE AWAY FROM COURSE & PROJECT KEY

1. Scrollbars Indicate Layout Issues

Scrollbars appear when the content doesn't fit inside the sheet or dashboard container. This usually results from auto-scaling or improper axis control.

2. Axis Control is Crucial for Maps

Maps in Tableau must be constrained using fixed axes (Latitude and Longitude). Without this, Tableau zooms dynamically, causing layout overflow. Set Fixed Start and Fixed End for both Latitude and Longitude to anchor map view and avoid scrollbars.

3. Canvas Fit Options Affect Visual Integrity

Use Fit → Entire View (from Worksheet menu) to ensure the full chart or map fits within the visible area. Tableau's automatic fit might not behave well for maps unless you control axes first.

4. Floating vs Tiled Elements in Dashboard

Floating items offer pixel-level control but can misalign easily and introduce unnecessary scrollbars. Always ensure map dimensions match their container size when floating.

5. Format and Shading Options Help Clean Visual Output

Use Format pane to remove gray/empty space and customize layout background. Helps eliminate distracting elements and improves visual polish.

6. Toolbar Controls are Contextual

Toolbar visibility depends on whether you're in a sheet or a dashboard. In worksheets, map options are accessed via Map → Map Options. In dashboards, resizing and container padding plays a role.

7. Calculated Fields

Calculated fields helped create custom metrics and logic directly in Tableau, allowing for deeper insights without changing the original dataset. They made the visualizations more dynamic and tailored to the analysis needs.

8. Relationships

Relationships allowed linking datasets at different granularities without merging them, preserving data accuracy and improving performance in visualizations.