Terrorism in the world

Final project by Ivan Kompaniets

Dataset. Terrorism in the world from 1970 to 2017.

1. Description of the data

The present study will be based on the record of terrorist attacks committed in the world between 1970 and 2017.

We can see the date and the place where each attack was perpetrated; as well as the type of attack, the perpetrator, the number of victims and a brief description of the events.

The analysis will concern the entire 47-year period, from 1970 to 2017, covered by the dataset.

3. Data set

Terrorism in the world - Ivan Kompaniets.csv

2. Hypothesis

Attacks committed in the world between 1970 and 2017 did not have the same modus operandi and did not affect different countries in the same way.

In this paper, we will try to understand how the geography and modus operandi of global terrorism changed over time by calculating the number of attacks by country and type in each year.

At the same time, we will see if the average number of attack victims per year has changed, which will give us an indication of the effectiveness of public policies to prevent terrorist attacks.

The results of the research can be used by states and supranational counter-terrorism organizations to improve their counter-terrorist policies.

Terrorism in the world. Aim, scope, end-user

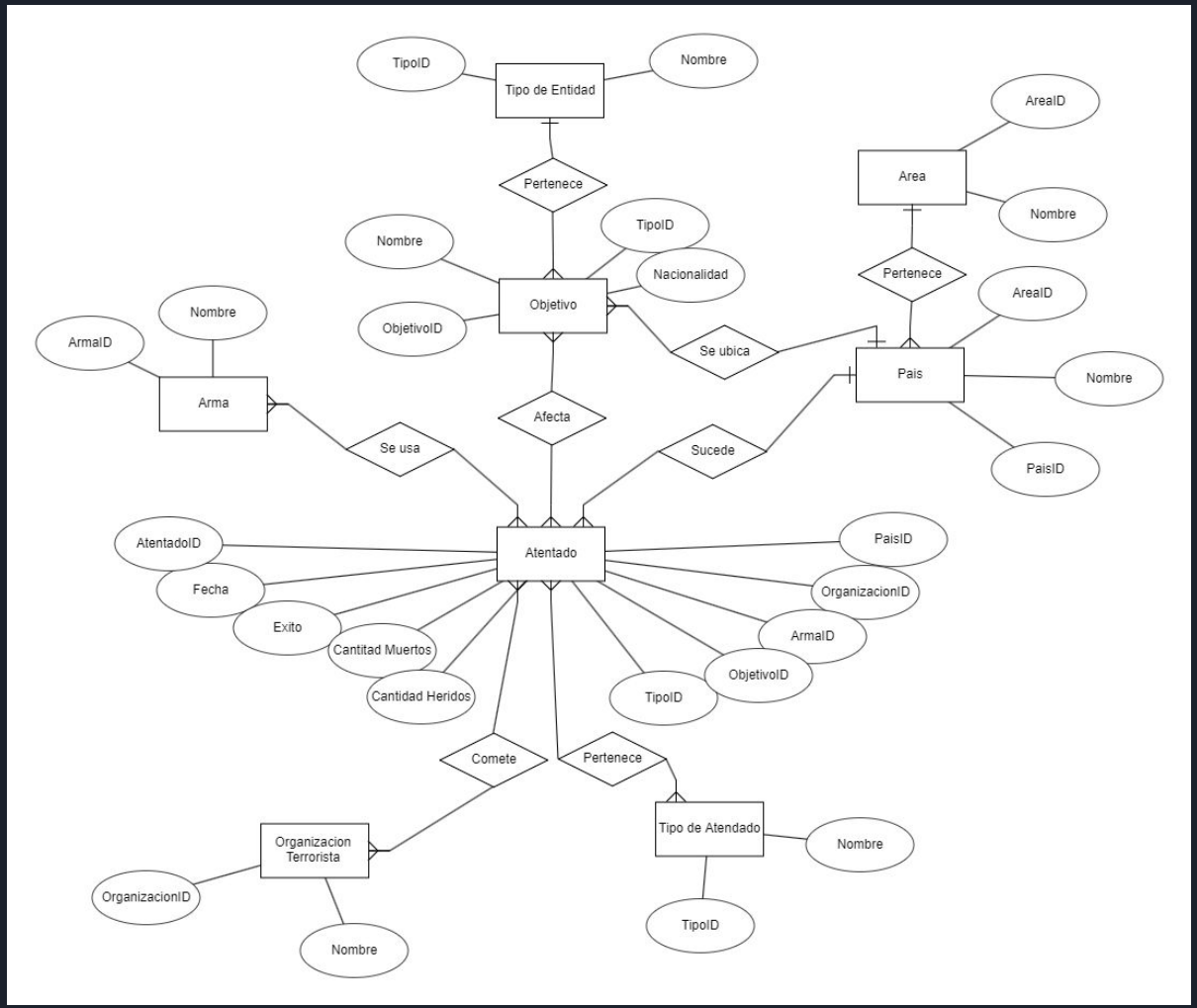
Aim: The present project aims to analyze the attacks that occurred in the world between 1970 and 2017, in order to discover how terrorism has evolved over time. This will allow states and supranational organizations to adapt their policies in different areas.

Scope: The study will focus on the most common types of attacks in different periods, and will identify the geographical areas, as well as the political or economic entities most affected by this phenomenon. From the results of the analysis, it will be possible to identify the political, economic and ideological factors that increase the risk of terrorist activities in a country.

End-user: The study is aimed at national governments and international organizations, with the goals of providing a better understanding of the phenomenon of terrorism and enabling the implementation of more effective attack prevention policies.
Level of application: The results of this study may be used both at the operational level, to adapt national security policies, and at the strategic level, to address the root causes of terrorism and reduce its impact in the future through appropriate public policies in education and other areas.

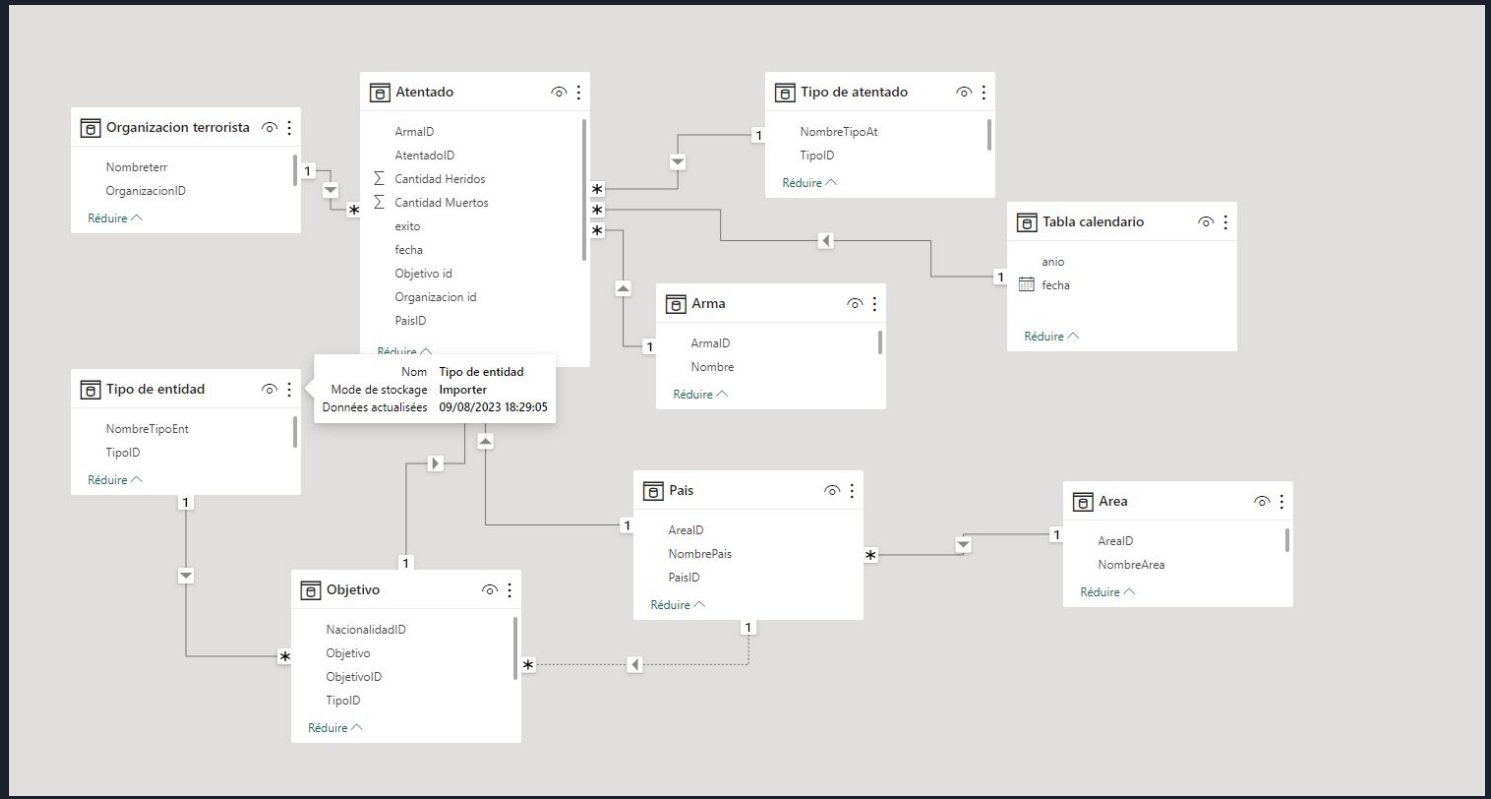
Entity-Relationship Diagram

The following slide shows the entity-relationship diagram that was created to organize the data.


TipoID
Tipo de Entidad
Nombre
Pertenece
AreaID
Area
Nombre
Pertenece
AreaID
Pais
Nombre
PaisID
Nombre
TipoID
Nacionalidad
Objetivo
ObjetivoID
Se ubica
Nombre
ArmaID
Arma
Afecta
Se usa
Sucede
AtentadoID
Fecha
Exito
Cantitad Muertos
Cantidad Heridos
Atentado
PaisID
OrganizacionID
ArmaID
ObjetivoID
TipoID
Comete
Pertenece
Organizacion Terrorista
OrganizacionID
Nombre
Tipo de Atendado
Nombre
TipoID

Entity-Relationship Diagram

The Entity-Relationship diagram mentioned above was implemented in Power BI as follows:



List of Tables

In the following slides, a brief description of each of the tables, including the corresponding primary and foreign keys, will be presented:

- Attack: Contains information on the date of the attack, the number of killed and wounded, the organizer, the weapon used, the affected entity, the location, the type of attack and whether it was successful or not.
  The fields TypeID, TargetID, WeaponID and OrganizationID contain information on the type of attack, target, weapon and perpetrator. They will be linked to explanatory tables.
  - PK: AtentadoID
  - FK: TipoID
  - FK: ObjectiveID
  - FK: ArmaID
  - FK: OrganizacionID
  - FK: PaisID

List of Tables

- Weapon: Contains information on types of weapons used to perpetrate attacks.
  - PK: ArmaID
- Target: Contains data on organizations that have been targeted by attacks, including their names, types and nationalities.
  - PK: ObjectiveID
  - FK: TipoID
- Type of Entity: Contains the different types of organizations and entities that have been attacked by terrorists.
  - PK: TipoID
- Terrorist organization: Contains the names of organizations responsible for attacks.
  - PK: OrganizationID

List of Tables

- Country: Contains the names of countries where attacks took place as well as the geographical areas to which they belong.
  - PK: CountryID
  - FK: AreaID
- Area: Contains the geographic areas the countries belong to .
  - PK: AreaID
- Type of attack: Contains attack types.
  - PK: TipoID
- Calendar table: Includes the dataset dates.
  - PK: Date

List of columns by tables

In the following slides, we will present the columns of each table along with their field type and key:

Attack		
Field	Field type	Type of key
AttackID	varchar(12)	PK - index
TypeID (1-2-3)	varchar(2)	FK
ObjectiveID (1-2-3)	int	FK
ArmaID (1-2-3)	varchar(2)	FK
OrganizationID (1-2-3)	int	FK
CountryID	varchar(3)	FK
Date	date	-
Success	bit	-
Number Killed	int	-
Number Injured	int	-

List of columns per table

Weapon		
Field	Field type	Type of key
ArmaID	varchar(2)	PK
Name	varchar(50)	-

Type of entity		
Field	Field type	Type of key
TipoID	varchar(2)	PK
Name	varchar(50)	-

List of columns per table

Target		
Field	Field type	Type of key
TargetID	int	PK
Name	varchar(50)	-
Nationality	varchar(3)	FK
TipoID	varchar(2)	FK

List of columns per table

Country		
Field	Field type	Type of key
CountryID	varchar(3)	PK
Name	varchar(50)	-
AreaID	varchar(2)	FK

Area		
Field	Field type	Type of key
AreaID	varchar(2)	PK
Name	varchar(50)	-

List of columns per table

Terrorist organization		
Field	Field type	Type of key
OrganizationID	int	PK
Name	varchar(50)	-

Type of attack		
Field	Field type	Type of key
TipoID	varchar(2)	PK
Name	varchar(50)	-

List of columns per table

Calendar table		
Field	Field type	Type of key
Date	date	PK
Anio	varchar(4)	-

Transformations

Before importing the database to Power BI, the following transformations were performed in Excel:

- Columns unnecessary for the intended analysis were deleted, leaving the following columns: AttackID, datey, datem, dated, success, typeID, OrganizationID, WeaponID, CountryID, Number Killed, Number Wounded.
- The datey, datem and dated columns were merged into a single date column.
- Data on types of weapons, terrorist organizations, targets, countries, areas and types of attacks were organized in separate tables, linked to the table Attack by primary keys.
- An "Entity type" table was created, compiling the data on the types of targets in relation to the Target table.
- The records in the Terrorist Organization and Target tables were numbered in increasing order incrementing by one. The numbers obtained were added to the Attack table to serve as primary keys.

Transformations

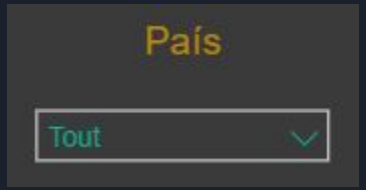
To perform the database analysis, the following transformations were applied in Power BI:

- Null records were replaced by "Unknown" for efficient filtering.
- When importing the database in Power BI, 12 errors caused by incorrect data were corrected. The data in question was replaced by "Unknown".
- A calendar table was created with a column of dates and years. The table has a one-to-many relationship with the table "Attacked".
- The year 1993 was excluded from the analysis by applying a filter at the project level because only one attack is recorded for that year, making it unrepresentative.

Segmentation

In the work performed, two types of segmentation are used:

- Drop-downs: Allow filtering attacks by country, area and success/failure according to the page. There were designed as follows:



- Slider: Allows to choose a period between two dates. It was designed as follows:

- Filters can be reset by clicking on the following button, located in the upper right corner of each page:

Geography

The "Number of attacks" (Cantidad de atentados) measure was added to the "Geography" slide to show the total number of attacks committed during the period analyzed. In addition, the measure "Most affected country" (País más afectado) was added, which shows the country with the most attacks according to the filters applied. The measures were calculated as follows:

Cantidad de atentados = calculate(COUNT(Attack[AttackID]))

País más afectado = TOPN (1, VALUES(Country[Name]), calculate(count(Attacked[AttackedID])))

Typology

Four measures were included in the "Typology" slide: "Proportion of successful attacks" (Proporcion exito), "Mean killed" (avg muertos), "Mean wounded" (Avg heridos), "Most used weapon" (Arma más usada), “Deadliest weapon” (Arma más mortal). The measures allow comparing different types of attacks which can be filtered by year, country and success/failure to see how the impact of attacks varies by type. The measures were calculated as follows:

Proporcion exito = CALCULATE(count(Attacked[AttackedID]), Attacked[success] = 1)/count(Attacked[AttackedID])

avg muertos= average(Attack[Number Killed])

Avg heridos = average(Attack[Number Injured])

Arma más usada = TOPN (1, VALUES(Weapon[name]), calculate(count(Attack[AttackID])))

Typology

Arma más mortal =
VAR armas = SUMMARIZE(arma, Arma[Nombre], "canti", calculate(AVERAGE(Atentado[Cantidad Muertos])))
VAR max_canti = MAXX(armas, [canti])
VAR weapon_name = CALCULATE(min(weapon[name]), FILTER(weapons, [canti] = max_canti))
RETURN "Weapon: " & IF(weapon_name = "Vehicle (not to include vehicle-borne explosives, i.e., car or truck bombs)", "Vehicle", weapon_name) & "
Average number of deaths per attack: " & round(max_canti, 1)

Terrorist organizations

In the slide "Terrorist organizations", we included the measures "Number of organizations" (cant organizaciones) and "Area with most organizations" (Area más organizaciones). The first one shows the total number of terrorist organizations and can be filtered by area, country and year. The second shows the area with the most terrorist organizations and can be filtered by year. The two measures were calculated as follows:

```
cant organizaciones = CALCULATE(DISTINCTCOUNT(Attack[Organization id]))
```

```
Area más organizaciones =
VAR order_areas = SUMMARIZE('Area',
   'Area'[AreaName],
   "Cantat", DISTINCTCOUNT('Atentado'[Organizacion id]))
VAR max_at = MAXX(order_areas, [Cantat])
VAR cant = CALCULATE(
   MIN(Area[AreaName]),
   FILTER(order_areas, [Cantat] = max_at))
RETURN "" & cant & " -
" & max_at & " organizations"
```

Attack targets

In the slide "Attack targets", we the calculated measures "Share of targets attacked abroad" (Proporcionextint), "Year with the most targets attacked" (Anioobjetivos). They allow to evaluate the importance of international terrorism (which affects nationals of other countries), as well as the year in which the largest number of targets were attacked. The data can be filtered by area, country and time period, in case a more focused analysis is needed. The two measures were calculated as follows:

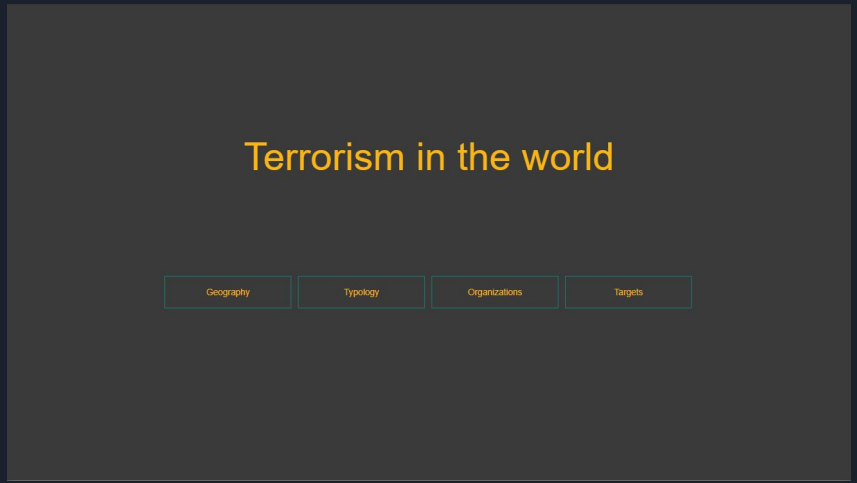
```
Proportionxtint =
VAR atext = calculate(count(Attacked[AttackedID]), FILTER(Attacked, RELATED(Target[NationalityID]) <> Attacked[CountryID]), NOT(ISBLANK(Target[NationalityID]))))
VAR atint = calculate(count(Attacked[AttackedID]), FILTER(Attacked, RELATED(Target[NationalityID]) = Attacked[CountryID]), NOT(ISBLANK(Target[NationalityID]))))
RETURN round(atext/(atext+atint)*100, 2) & "%"

Anioobjetivos =
VAR orderanio = SUMMARIZE('Calendar table', 'Calendar table'[anio], "objs", COUNT(Attack[Target id]))
VAR maxobjs = MAXX(orderanio, [objs])
VAR year = CALCULATE(MIN('Calendar table'[year]), FILTER(orderanium, [objs] = maxobjs))
RETURN anio & " -
 " & maxobjs & " blanks"
```

Data visualization

In the following slides, we will present the tabs that were created in Power BI.

1. Home page

On the home page of the report you can see the title of the project "Terrorism in the world", as well as the buttons "Geography", "Typology", "Organizations" and "Targets" leading to each tab of the report.



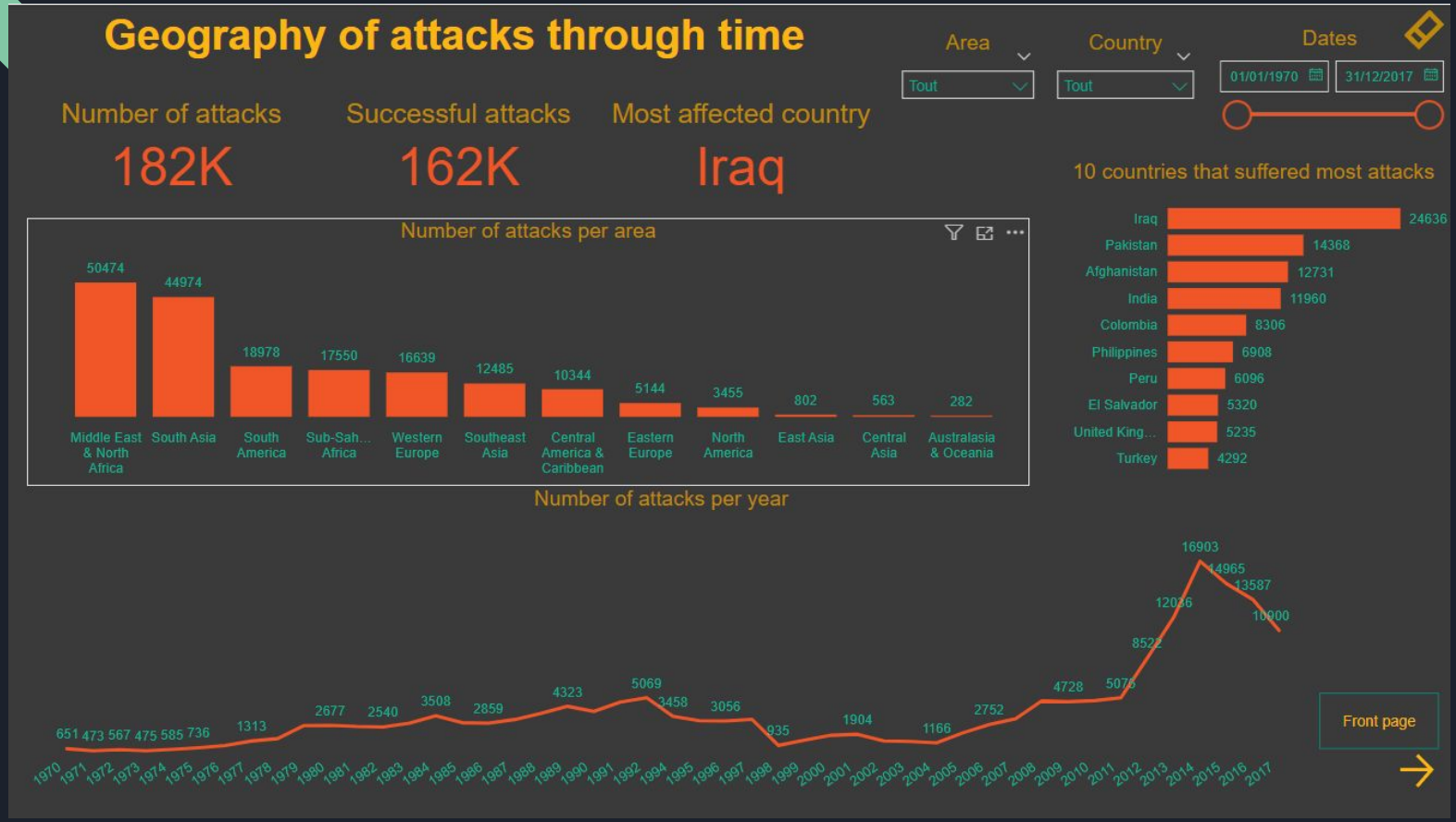
Data visualization

2. Geography of attacks through time

At the bottom of this tab, a line graph was added to show the number of attacks perpetrated in the world each year between 1970 and 2017, excluding 1993. Two bar charts were also created to show the distribution of attacks by geographic area and the 10 countries most affected by attacks in the period analyzed. The data can be filtered by area, country and period, in case the user wants to proceed with a focused analysis.

Finally, navigation arrows and a button redirecting to the home page have been added in the bottom right corner.

Data visualization



Data visualization

3. Typology of attacks

In this tab you can see a bar chart representing the share of successful attacks by type of attack, a pie chart showing the 5 most frequent types of targets and a ring chart with the 5 most frequent types of weapons. At the bottom of the tab, you can see a tree diagram summarizing the most frequent types of attacks, as well as a grouped bar chart showing the average number of dead and wounded per attack type.

The calculated measure "Most deadly weapon" is associated with the tooltip "Killed by weapon" which shows details on the deadliness of each type of weapon.

Data can be filtered by time period, country and success/failure of attacks for in-depth analysis.

Based on the visualizations, it is possible to identify the types of attacks that pose the greatest risk to individuals and the types of targets that need the most protection. The graph representing the share of successful attacks suggests that the majority of attacks are successful independently of their types, highlighting the importance of attack prevention by the authorities before perpetrators can take action.

Data visualization

Data visualization

4. Terrorist Organizations

This tab contains information on the perpetrators of the attacks. The line graph under the heading presents the number of attacks, killed and wounded per year. The bar graphs at the bottom of the tab show the 10 terrorist organizations with the most attacks and the 10 terrorist organizations that have killed and wounded the most people.

Using the area, country and date filters, as well as through the interactions between visualizations, you can identify the most active terrorist organizations in an area, a country or a time period. You can also analyze the periods of activity of an organization by clicking on its name on one of the bar charts.

Data visualization

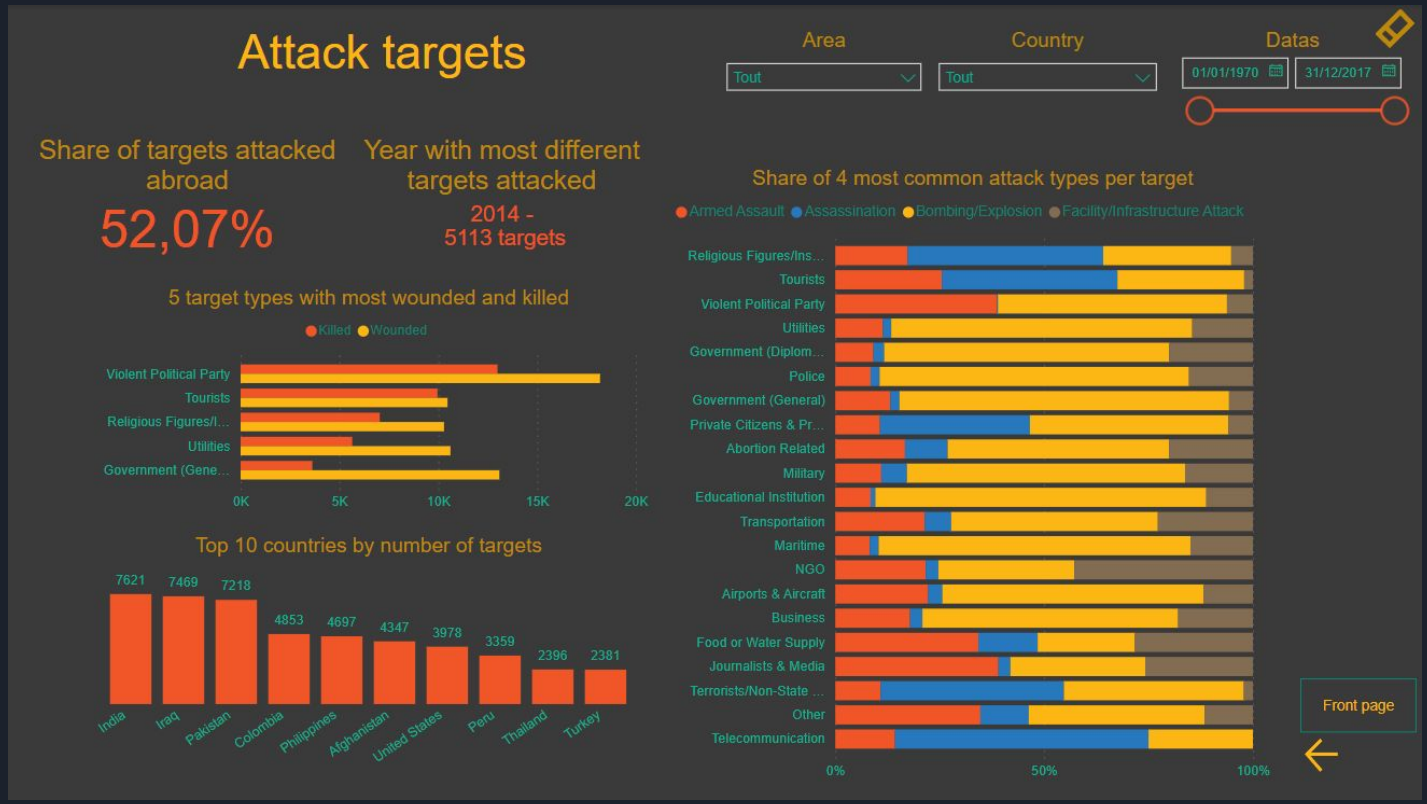
Data visualization

5. Attack targets

This tab allows the user to focus on the types of targets attacked by terrorists. In the grouped bar chart, the 5 types of targets with the largest number of dead and wounded can be seen. The bar chart allows you to see the nationalities of targets most attacked. Despite a large proportion of attacks committed abroad, the nationalities suffering the most attacks coincide with the most affected countries identified in the "Geography" tab, except for the United States for which the number of attacks is lower by 1143 than the number of targets, meaning that many attacks against U.S. citizens occurred abroad.

Finally, the stacked bar chart shows the 4 most frequent types of attacks and their distribution by target type. The graph makes it clear that certain types of targets suffer more from certain types of attacks than others, although explosions are a type of attack that significantly affects all types of targets.

Data visualization



Conclusion

Based on the graphs and the calculated measures, it has been observed that the number of attacks and their distribution goes hand in hand with global events, such as wars, guerrillas or political unrest. The area with the most attacks between 1970 and 1990 was South America with the armed conflicts in Colombia and Peru and the dictatorship in Chile.

However, since the 1990s, the focus of international terrorism has shifted to the Middle East and Southeast Asia with the war in Afghanistan and the emergence of radical Islamism.

Since 2010, there has been an explosion in the number of attacks in the Middle East due to the political instability caused by the Iraq war, the Syrian civil war and the war in Afghanistan.

It was noted that the most frequent weapon used by terrorists throughout the period was explosives and bombing was the most widespread type of attack. However, it is noteworthy that the most deadly weapon is the vehicle, due to the 9/11 attacks which were perpetrated with airplanes and caused an very large number of deaths.

Conclusion

The terrorist organizations whose attacks caused the most deaths include the Taliban, the Islamic State, the Shining Path and the Farabundo Marti Front. The first two developed their activities in the context of the wars of the 1990s and 2000s in the Middle East, while the latter two are linked to the armed conflicts of the 1980s in Peru and El Salvador, respectively. The connection between the emergence of violent groups and the aforementioned armed conflicts is thus clearly visible.

Finally, it has been noted that half of the attacks committed during the period affected persons or entities outside their own country, which confirms the importance of international terrorism. Particularly noteworthy is the case of the United States, whose territory suffered 2835 attacks but whose nationals or organizations were targeted by 3978 attacks.

Conclusion

The graph of the share of successful attacks clearly shows that the majority of attacks were successful once the terrorists took action, which means that the prevention of attacks is essential to reduce their impact.

Considering the causes of the attacks, this should be done through the resolution of armed conflicts and the improvement of political dialogue in the countries affected by the problem.

More concrete measures can also be taken to prevent attacks, such as reinforced control of weapons and explosive substances, protection of public buildings and political personalities at risk, surveillance of places visited by tourists.

Given the importance of international terrorism, countries should work together both diplomatically and economically to help the most affected places to reduce the problem.

Future lines of analysis

The analysis could be extended by adding updated data on attacks in recent years.

With this report, researchers can carry out an in-depth analysis of terrorism in a particular area or region, using the filters of area, country and date.

The cases of countries that over time have managed to significantly reduce the problem of terrorism on their territory, such as Peru, El Salvador or Spain, can be studied in order to identify efficient measures and policies to combat the phenomenon.

A comparative study of the most active terrorist organizations of the present and the past, named in the report, can be carried out, identifying the common features and differences between them, in order to look for examples of efficient anti-terrorist policies.

Source of data

https://www.kaggle.com/datasets/START-UMD/gtd