School of Informatics & IT
TEMASEK POLYTECHNIC

DATA VISUALISATION (CIA2C13)

Submitted by

PRACTICAL GROUP P02

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Chosen Application

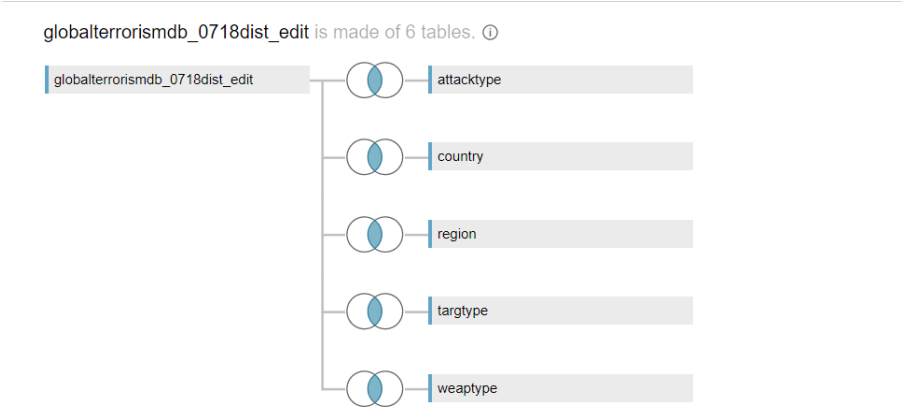
The application that I have chosen is Tableau.
Tableau is a data visualisation tool which helps to convert textual and numerical information to beautiful interactive dashboard. It is also one of the best ways to change or transform the raw data into easily understandable data.

The reason why I chose Tableau is because it is easy to use and user friendly. The user interface is well organised which allows customising the view with a few clicks and is extremely easy to integrate with multiple data sources. Furthermore, Tableau can handle large amount of data.

The implementation process is simple through using the drag-n-drop functionalities of tableau, user can create a very interactive visual. Tableau is also intuitive where it suggests user the chart types to use under the “show me” panel based on the fields the user choose. With such functionalities, the learning curve of using Tableau is manageable.

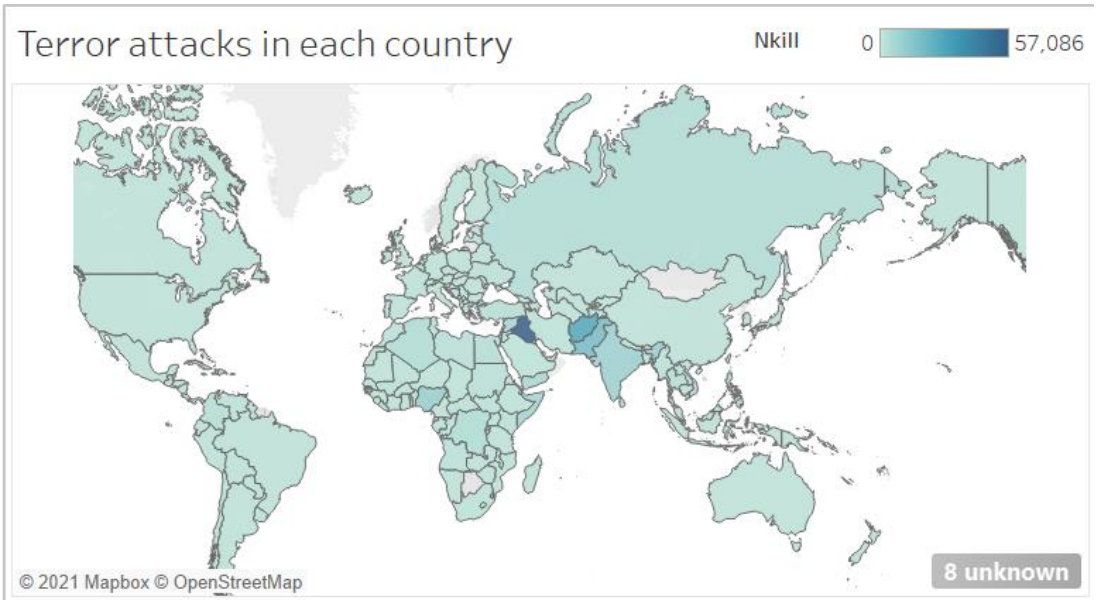
Linking of Data

As the original dataset has values that were in numeric form for columns such as attack type, country, region, target type and weapon. Hence, I did an inner join for the mentioned columns to change the numeric values into string values through the common column’s IDs.



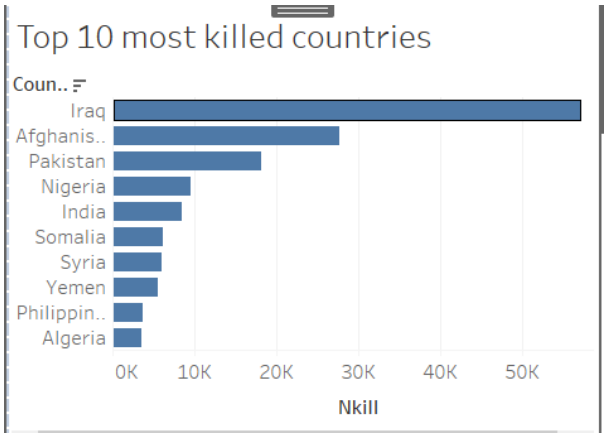
Dashboard 1 analysis

Map distribution



Using a map, tells the distribution of attacks in each country. Based on this map, Iraq is the most attacked country with 21,812 attacks furthermore, there were 57,086 people killed, 121,100 people injured. We can also see that Afghanistan is the next country with the most number fatalities with 27,615 deaths, 36,977 injuries and 9,350 attacks. The colour represents the number of people killed hence the darker the shade of the colour, the more people were killed in that country.

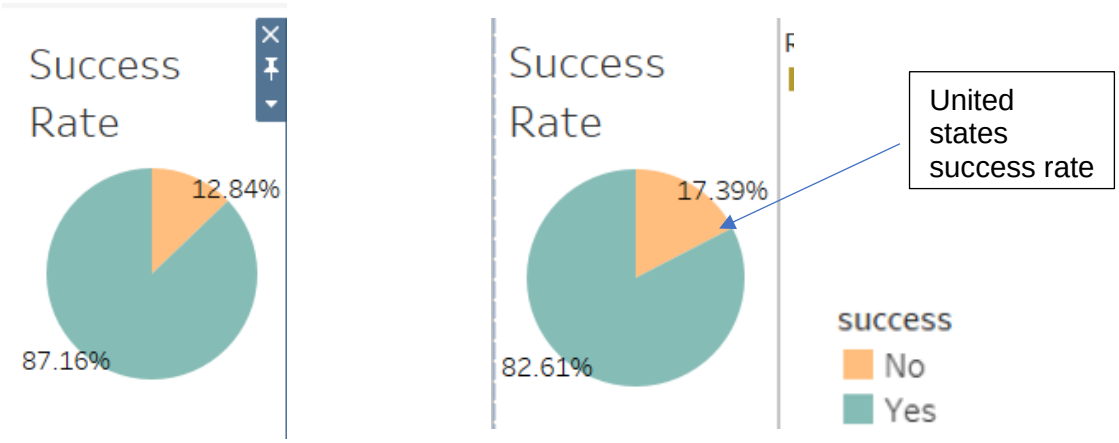
Top 10 most killed countries



The bar chart above shows the Top 10 countries that people were killed. Based on the bar chart, we can Iraq Is country with 57,086 fatalities followed by Afghanistan with 27,615 fatalities. The least fatalities amongst the top 10 country is Algeria with 3,519 fatalities.

The reason why I used a bar chart is because it allows us to visualise the ranking among the countries.

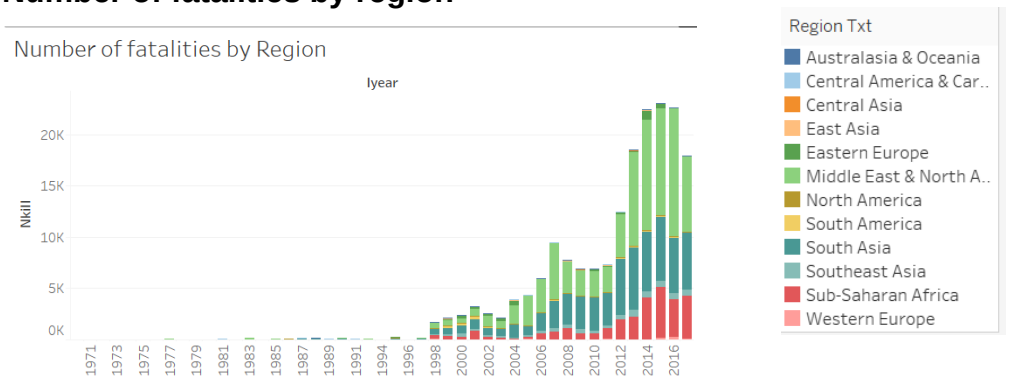
Success Rate



This pie chart shows us the overall success rate of the terrorist attack. We can see that the overall success rate is 87.16% while the unsuccessful rate is 12.84%. This Pie chart allow users to view at a specific country's success rate by selecting a country on the map chart. An example is United states, we can see that the success rate is 82.61% while the unsuccessful rate is 17.39%.

Using a pie chart allows user to understand the visualisation quickly.

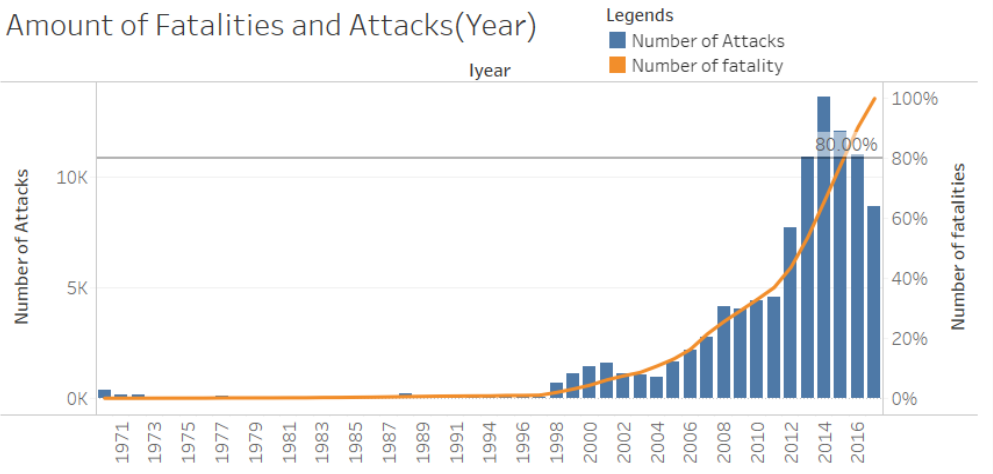
Number of fatalities by region



This stacked chart shows us the number of fatalities by region. Based on the stacked chart we can see that Middle East and North Africa is the most affected region in terms of fatalities. We can see a steady increased number of fatalities over the years. Likewise, there is an upward trend of increasing deaths in the Middle East and North Africa regions.

The reason why I chose to present this chart as a stacked chart is because it gives a clear comparison between the regions.

Number of fatalities and attack (year)



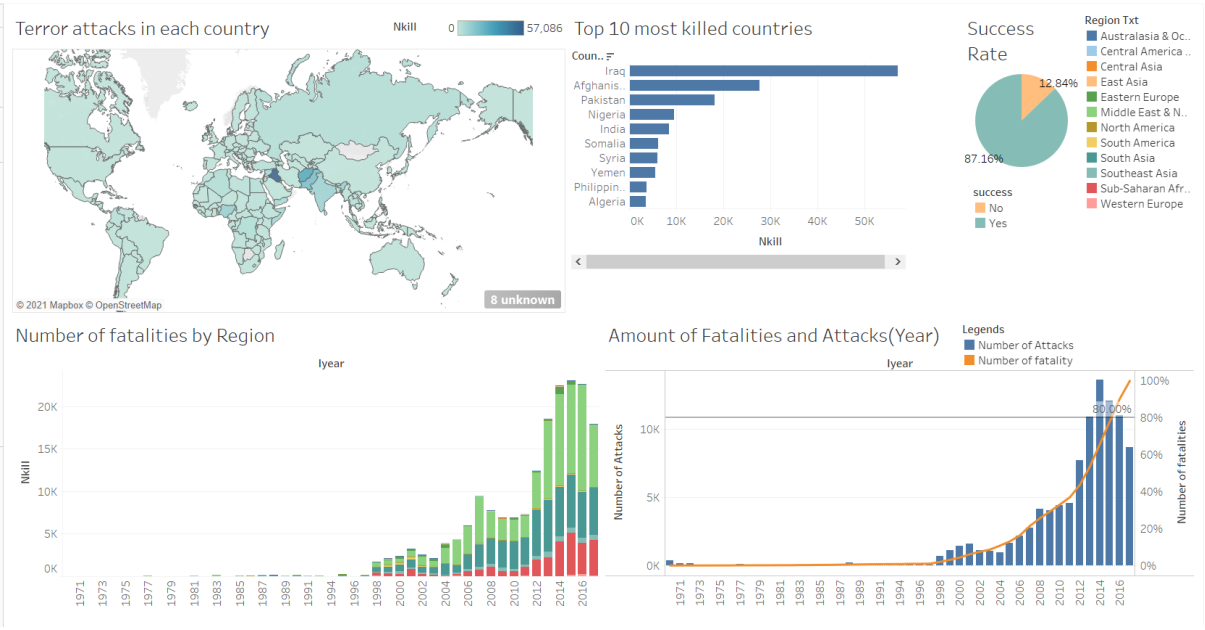
This pareto chart shows us the number of fatalities and attacks by year. Based on this chart we can see that from 2002 to 2014 there has been a steady increase of attacks and fatalities over the years. 2014 was the peak of attacks with 13,596 attacks and 65.71% fatalities. There has been an increase of 58.24% of fatalities since 2002 to 2014. However, from 2015-2017 there has been a decrease in the number of attacks.

The reason for using a pareto chart is to see if there is any correlation between the two axes. Based on the chart we can see a correlation between the number of attacks and amount of fatality.

Dashboard 1:

How many fatalities from terrorism attack and how it changed over time.

Overall Analysis



For this dashboard, it is an overall analysis of the number of fatalities caused by terrorism in each country.

This dashboard would be used to answer the following questions.

1. Which country is the most attacked country with the most fatality?
2. What are the common countries that has the most fatalities?
3. What is the overall success rate (over the years and each country and each region)?
4. What is the distribution for the number of fatalities among all the regions?
5. How did the number and attack and number of fatalities change over time?

Dashboard Design Consideration

The reason why I did a map visualisation is to analyse and display the geographical data and present it in the form of maps. This kind of data expression is clearer and more intuitive as user can visually see the distribution of deaths rates in each country.

I then used the bar chart to represent the top 10 most killed countries. This bar chart allows users to visualise the ranking of fatalities rate among the different countries.

Using a pie chart allows the user to understand the success rate of the terrorist attack quickly and efficiently.

The reason why I used a stacked bar chart to represent the fatalities by region is because there are several regions hence through a stacked bar chart allows to have a clear comparison between the regions.

Lastly, using a pareto chart allows us to see if there is any correlation between the two axes. Based on the chart we can see a correlation between the number of attacks and amount of fatality.

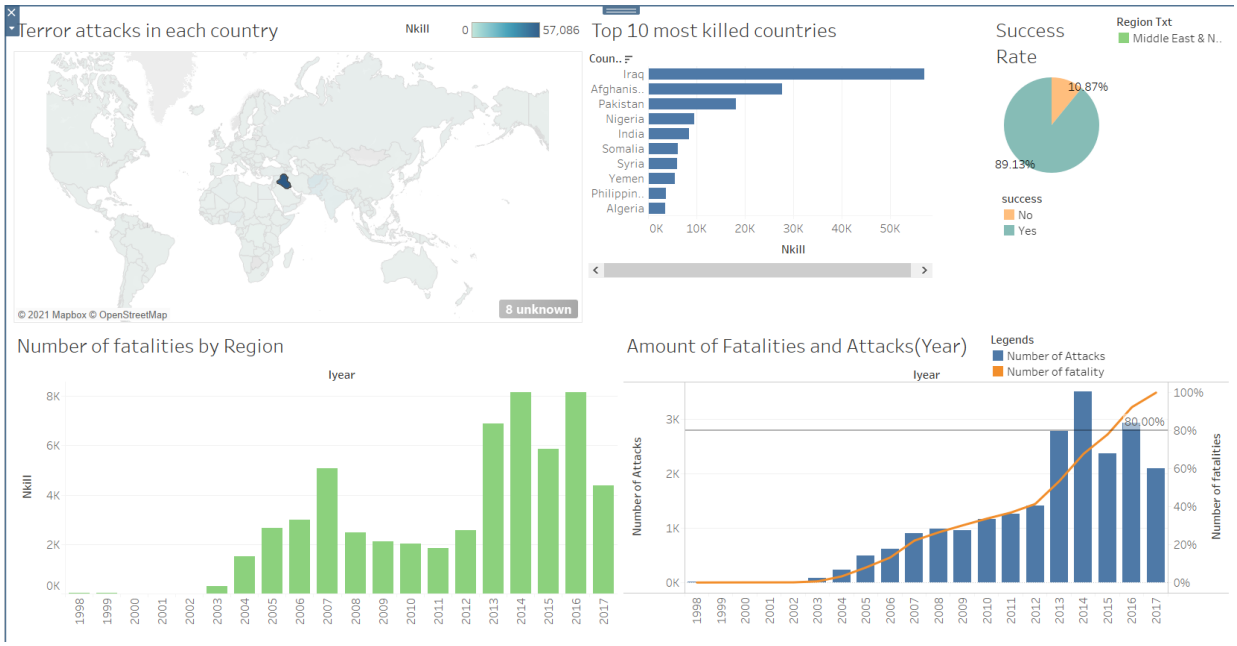
Overall, this dashboard was designed in a way to focus on the distribution of fatalities caused by terrorism over the years in each country.

Through using filter, it helps users to narrow down the content of each visualisation.

Findings

1. There has been a steady increase of number of attacks over the years especially from 2002 onwards till 2014. However, after 2014 the number of attacks is slowly declining. The peak of attacks was in 2014 with 13,595 attacks.

Iraq Analysis



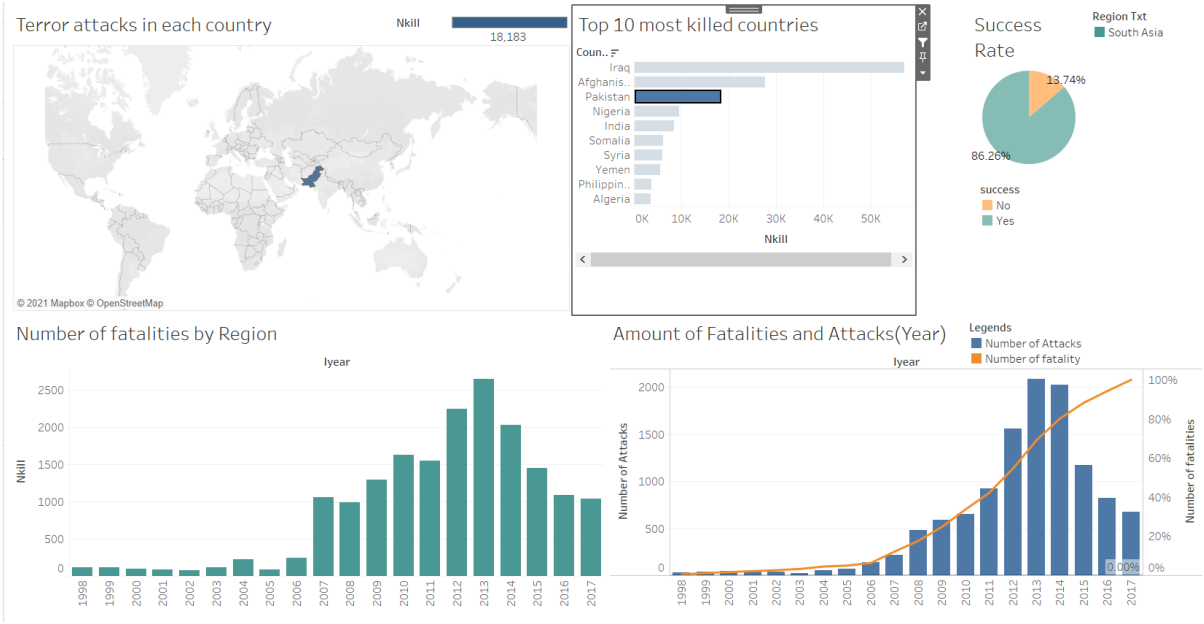
Findings:

1. We can see that Iraq is country with the most attacks and fatalities Therefore zooming into Iraq, we can see that the success rate over the years is 89.13%. We can see that there is a jump in the number of attacks and fatalities in the year 2013 from 2012.

The number of attacks increase significantly between 2012 and 2013. The number of attacks rose from 1407 attacks to 2782 attacks in the following year.

Similarly, we can see the number of fatalities in Iraq increased in 2013 by 169.60% from 2012.

Pakistan Analysis



Findings

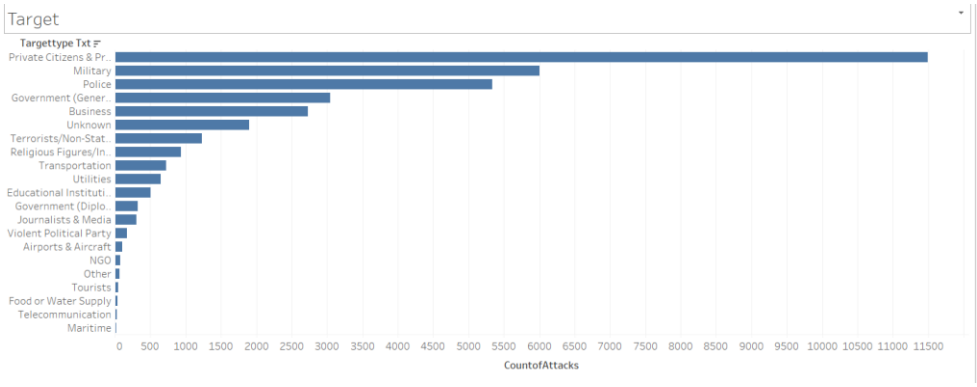
1. We can see that Pakistan is in third place in terms of most fatalities caused by terrorism. Looking at the fatalities by region we can see that from 2007 to 2013 there is an upward trend in Pakistan. However, from 2014 to 2017 has been a gradual decline in the number of deaths. This is also happening in the number of attacks. Therefore, we see a correlation between the number of attacks and number of fatalities in a country. The higher the number of attacks the higher the number of fatalities.

Recommendation for dashboard 1

1. Based on the dashboard we can see that countries in the middle east regions are the most vulnerable. Therefore, I would recommend these countries to tighten their security. For example, they can tighten their airport/border security by doing a stricter immigration check.
2. To reduce the number of fatalities, the government should let citizens evacuate to a safe place thus the government can consider building more of such safe shelter for their citizens.

Dashboard 2 Analysis of each chart

Target Type



The bar chart above shows us the distribution of target type in the terrorist attack. Based on the bar chart we see that the private citizens and property is the most common target with 11,491 attacks. This is almost twice the attacks from Military target group. The least target group is Maritime with only 19 attacks.
Using a bar chart to view the distribution of target type allows viewer to interpret the chart quickly and easily.

Weapon type Summary

Weapon used summary

Weapons	Attack T..	Weapon Count	Fatalities	Injuries	Total Victims
▶ Explosives		60,222	117,573	288,083	405,656
▶ Firearms		29,561	62,536	39,927	102,463
▶ Incendiary		5,455	1,633	3,101	4,734
▶ Melee		2,011	3,643	2,595	6,238
▶ Chemical		124	181	5,472	5,653
▶ Radiological		1	2	4	6

Weapon used summary

Weapons	Attack Type	Weapon Count	Fatalities	Injuries	Total Victims
▼ Explosives	Armed Assa..	1,541	5,129	5,009	10,138
	Assassinati..	2,090	2,792	6,184	8,976
	Bombing/Ex..	56,348	106,891	273,721	380,612
	Facility/Infr..	4	2	3	5
	Hijacking	39	68	60	128
	Hostage Tak..	88	1,847	2,402	4,249
	Hostage Tak..	112	844	704	1,548
▶ Firearms		29,561	62,536	39,927	102,463
▶ Incendiary		5,455	1,633	3,101	4,734
▶ Melee		2,011	3,643	2,595	6,238
▶ Chemical		124	181	5,472	5,653
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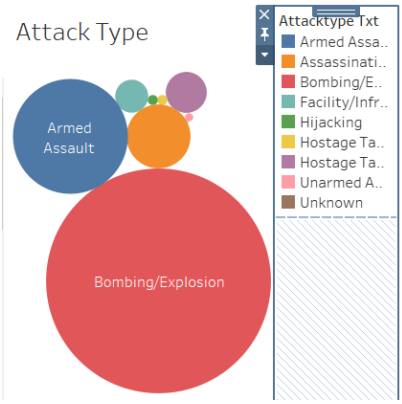
This is a weapon used summary table where it presents the how many times was the weapon used in the terrorist attack over the years. We can also see how many victims was affected by the use of the specific weapon. Based on the table here, we

can see that explosive weapons is the most commonly used as a result it has the most number of victims. Therefore we can conclude the explosive weapons is one of the most fatal weapons used by terrorist groups and is also the most commonly used.

This table can also drill futher down to display how many times a certain weapon was used in the different types of attacks. This table further narrows to the number of fatalities and number of injuries in each attack by weapon type.

Doing a drill down in a table format allows users to go deeper into more specific layers of the data or information being analysed.

Attack Type

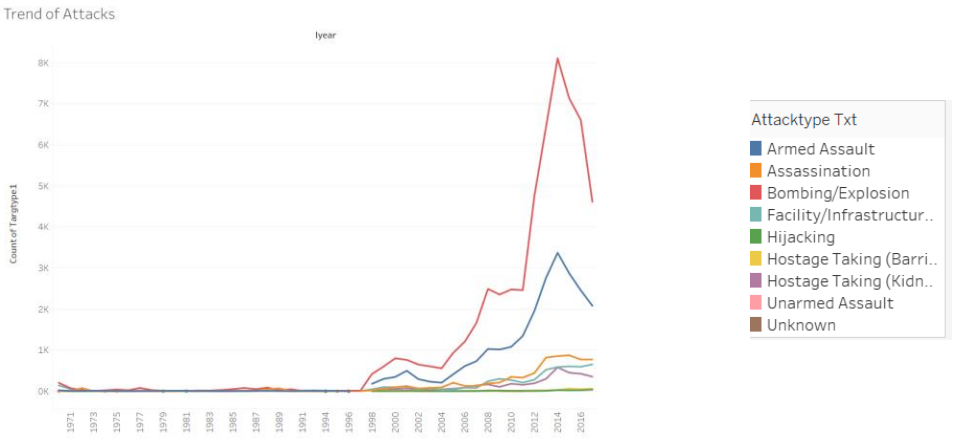


This bubble chart can effectively show us the number of attacks in each attack type. At first glance, we can tell that Bombing/Explosion is the most common attack type with 25,489 attacks followed by armed assault with 6,663 attacks.

This shows us that bombing/explosion is a popular choice for attack type used by the terrorist groups. However, the least popular choice besides “unknown” were armed assault with 34 cases and hijacking 48 cases.

The reason why I choose to present the attack type in a bubble chart is because it can effectively display the different type of attacks through its size and colour. This also enables better visual experience.

Trend of attacks



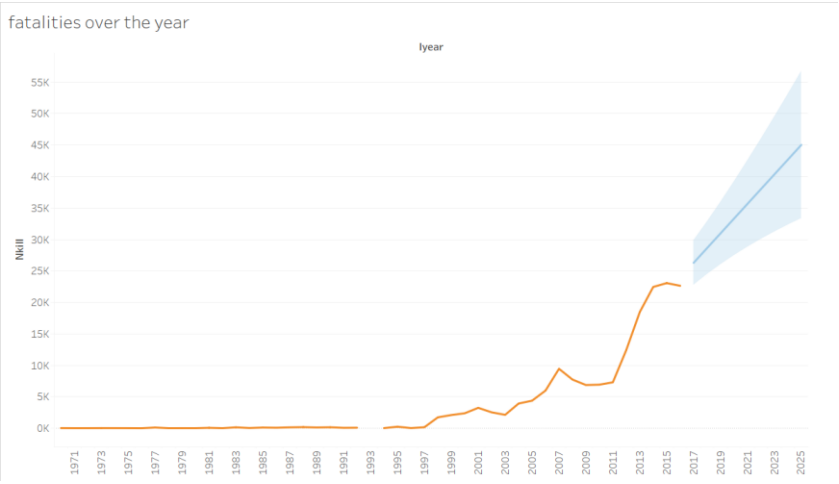
This line chart represents the number of targets based on the type of attack over the years. We can see that there is a steady increase in the attack types for all. However, in 2011 to 2014 we can see a sharp increase in the bombing/explosions and the peak was in 2014 with 8109 targets.

After 2014 the number of targets for bombing/explosion attack type we can see that it drop almost half in 2017. We can also see a similar downward trend for armed assault as well the target count also decreased. For the other types of attacks, it generally fluctuate across the years but is still in an upward trend.

Reason for using a line chart

A line chart is able to track changes over short and long periods of time. Line chart is also used to compare the changes over the same period of time for more than one group. In this case we can see the trend of attacks type over the years.

Number of fatalities over the year

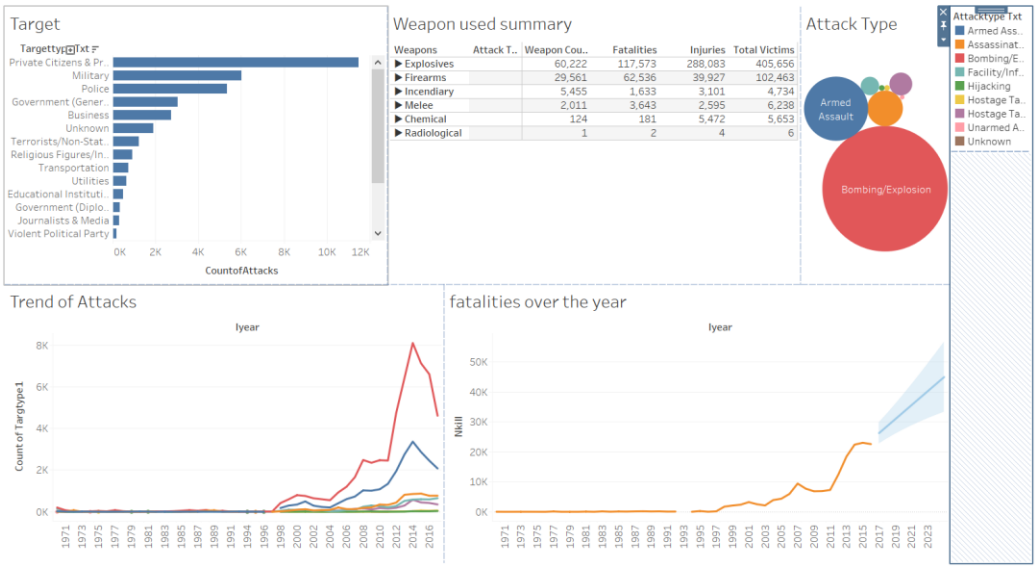


This line chart here shows us the trend in the number of fatalities over the years. There is a rather constant fatalities rate from 1971 to 1992 and there is no record of

fatalities in 1993. 1994 onwards is where there is a gradual increase of fatalities over the years. However, in 2007-2011 there was a dip it had a 22.7% decreased in the number of deaths. In 2011, it had a spike where the death rates were increasing 2015 was the peak where the fatalities rate is the highest. Based on the forecast, it is estimated that the fatalities will be increasing.

Using a line chart is able to show us the trend lines and do a forecast of the future attacks. This is useful as it can better prepare the country against terrorist attacks.

Dashboard 2 : What are the weapon type and target affected from these attack?



For this dashboard, it was created to mainly focus on what are they attack type and weapon used against the targets and how it change over time.

This dashboard answers the following questions

1. Who is the common target?
2. What are the weapons used in the terrorism?
3. Distribution of attack type
4. How is the trend of attacks like over the years.
5. Fatalities over the year (Based on target/attack type / weapon type)

Dashboard Design Consideration

Using a bar chart to view the distribution of target type allows viewer to interpret the chart quickly and easily.

Doing a table can give a detailed analysis of the weapon used in each attack. We can also have a detailed analysis in the number of victims for each weapon and attack type.

Having a bubble chart can effectively display the different type of attacks through its size and colour. This also enables better visual experience for the user.

A line chart was used to present the trends over the year. Through the line chart we can gain insights on how the target affected changed over the years based on the attack type.

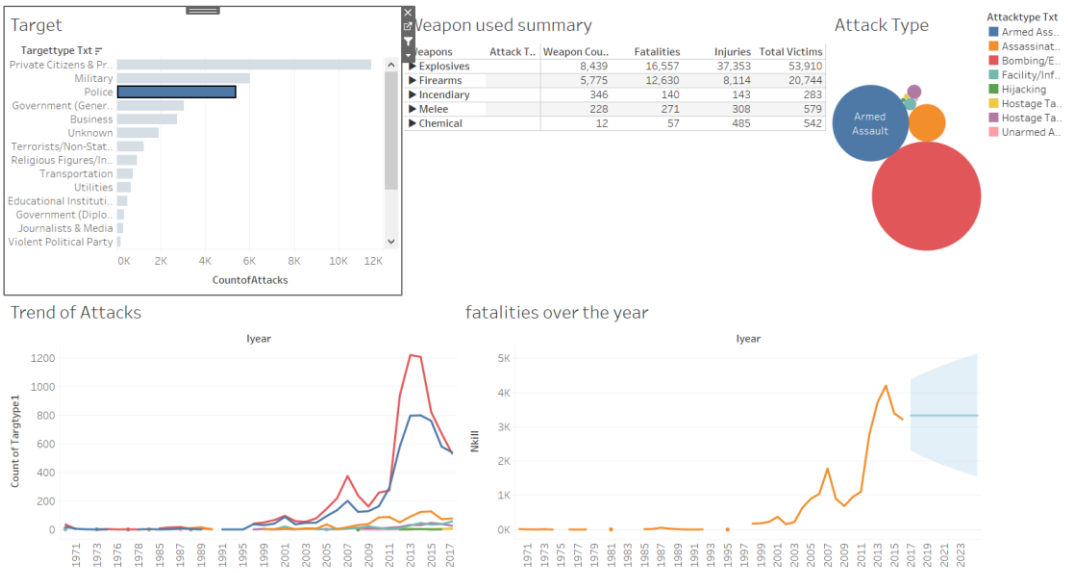
To present the number of fatalities over the years, I also used a line chart as it not only can show us the trend over years but also it is able to do a prediction on the number of fatalities.

Overall, this dashboard was designed to allow viewers to gain insights on what are the method of attacks and weapon used against the different target group and how did it change over time. Thus, by doing a filter in each of the chart the viewer is able to gain a detailed analysis.

Findings

1. We can see the most common type of attack is through bombing/Explosion. If we were to look at the trends of attack over time, we can see the use of bombing and assault has been a popular choice used to attack amongst all the other attack types. The use of bombing/explosion tripled in 2014 as compared to 2011. The victims of such terrorism are mostly private citizens and property. In general the number of fatalities has been increasing over the years since 1971.
2. The weapon summary chart tells us which weapon is the most fatal we can see that the use of explosion weapon is the most fatal as it has the most victims. We can also see the least fatal weapon used is radiological which only has 6 victims thus terrorist group does not really use radiological weapons. There is only one instances where it was used which happened in 2007.

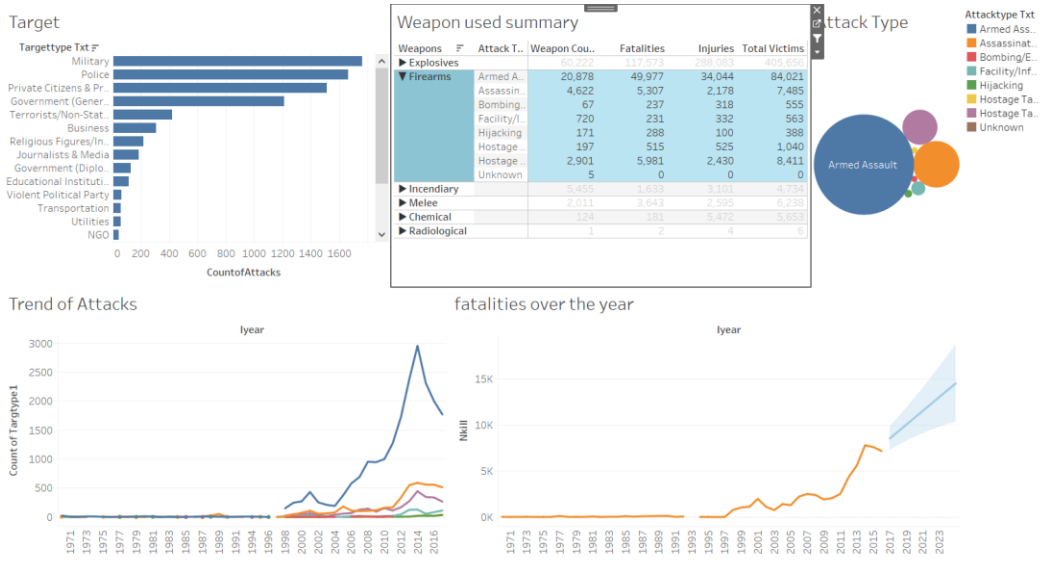
Target type analysis (Police)



Findings

1. We see that the two most common attacks type for police targets are bombing/explosion and assault. Over the years the number of attacks through bombing and armed assault has been increasing steadily. In 2013 there has been in surge in the number of police that were attacked by bombing/explosion and armed assault. This also led to the drastic increase in the number of police fatalities. However, from 2014 onwards, the number of attacks targeted towards police has drop substantially. As a result, there is a decrease in the number of deaths by 27.45%.

Weapon Type analysis (Firearms)



Findings

1. We can see that the use of firearm is commonly targeted towards the military and police through attacks such as armed assault and assassination. We can see that Armed assault is widely used as the attack type targeted towards the military and the police. The year 1998, was where armed assault started becoming popular and since then it had a steady rose till 2001 it dropped a little. However, in the year 2004 it increases rapidly between 2004 and 2014. As a result, there is there is a correlation to the rise of fatalities between 2004 and 2014.

Recommendations for dashboard 2 :

1. Based on the most common target victims we can see that is private citizens and property therefore there is a need to prepare the public on how to respond when there is a terrorism attack.

   For example, in Singapore, The Singapore Police Force conducted an island wide counter-terrorism exercise from 17 to 18 October 2016. This exercise was designed to strength the nation's capacity to deal with terrorist attacks hence there was simulation of roleplay. Through this exercise it was able to educate at the same time prepare the public on how to respond to an actual terror attack.

   Therefore, my recommendation would be to have such simulation exercise to prepare the citizen.
2. Another recommendation is to create an app like SGSecure for citizens to report any suspicious activities. Through the app, citizens can quickly alert the authorities.
3. Lastly, the government should also impose stricter restriction on purchasing weapons like guns and firearms especially explosives weapons as it has the most victims.