Terrorism Analysis

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Purpose:

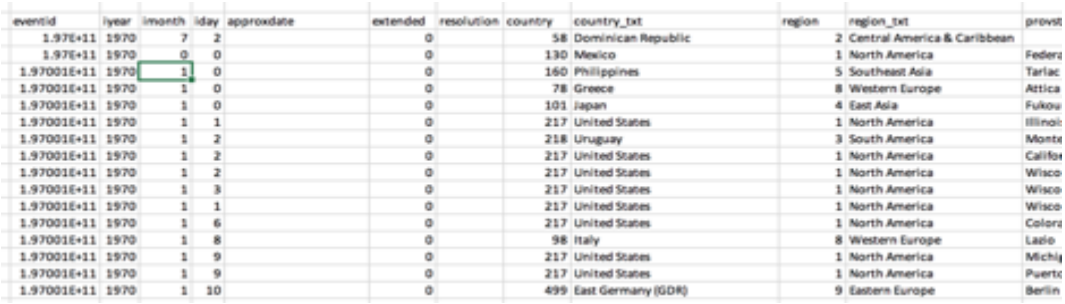
The overall objective of this project is to increase the viewers awareness to terrorist happenings across the world through the analysis of a global terrorism data set. Terrorism has impacted many countries across the globe and dates back to as early as the first century. This study is focused between the years of 2000-2018. The visualizations of this project will be focused on the results that produced the largest summation.

The analysis of a large excel file containing thousands of cells of data without the use of visualization software may prove difficult for a viewer to fully understand and be able to form a hypothesis. With the aid of our groups visualizations, we are confident that a viewer can generate a hypothesis and be able to support their claim. The use of data visualization tools is a crucial aspect across all industries. The importance of data visualization stems down to allowing quick, informative and appealing ways for data manipulation and interpretation.

In this class during the semester we have learned many different types of high impact visualizations through the use of Tableau and SAS Visual Analytics. This project was strictly completed using Tableau. Once our group created visualizations we noticed a common occurance of terror activity in the Middle East. The group created filters that allowed the visualizations to analyze specific years. As a group we thought to analyze the data around the year 2003. In 2003 the United States declared war on Iraq starting Operation Iraqi Freedom.

Background Information:

The dataset that our group used was found on Kaggle. Kaggle is an online website that allows users to post datasets. The specific dataset that our group used contains data that summarizes over 135 different variables. The variables found with in this dataset range from year, country, attack type, targets and weapon type. The variables that our group used in our visualizations include: event_id, i_year, attack_type_1_text, country_text, target_type_1, weapon_subtype_1_text, region_text, and n_kill. The reason that our group decided to include these variables are: the event_id variable is the unique identifier for each particular terror event, the i_year variable is the year that the terrorist attack happened, the attack_type_1_text variable is a categorized summary of the attack, the country_text variable is the country where the terrorist attack happened, the region_text variable is the continent where the attack occurred, the target_type_1_text variable is a categorized summary of the place where the terrorist attack occurred, the weapon_type_1 variable is a categorized summary of the weapon used in the terror event, the n_kill variable is the amount of persons killed during the attack. The aggregation data type that the group decided to use was summation and count. Summation was used to display the number of terrorist attacks. This data type emphasised the severity of terrorism. The use of count helped display the number of occurrences in particular nations. This data type helped the group visualize the nations with the most amount of terror attacks.



eventid	iyear	imonth	iday	approxdate	extended	resolution	country	country_txt	region	region_txt	provst
1.97E+11	1970	7	2		0		58	Dominican Republic	2	Central America & Caribbean	
1.97E+11	1970	0	0		0		130	Mexico	1	North America	Federa
1.97001E+11	1970	1	0		0		160	Philippines	5	Southeast Asia	Tarlac
1.97001E+11	1970	1	0		0		78	Greece	8	Western Europe	Attica
1.97001E+11	1970	1	0		0		101	Japan	4	East Asia	Fukou
1.97001E+11	1970	1	1		0		217	United States	1	North America	Illinoi
1.97001E+11	1970	1	2		0		218	Uruguay	3	South America	Monte
1.97001E+11	1970	1	2		0		217	United States	1	North America	Califo
1.97001E+11	1970	1	2		0		217	United States	1	North America	Wisco
1.97001E+11	1970	1	3		0		217	United States	1	North America	Wisco
1.97001E+11	1970	1	1		0		217	United States	1	North America	Wisco
1.97001E+11	1970	1	6		0		217	United States	1	North America	Colora
1.97001E+11	1970	1	8		0		98	Italy	8	Western Europe	Lazio
1.97001E+11	1970	1	9		0		217	United States	1	North America	Michig
1.97001E+11	1970	1	9		0		217	United States	1	North America	Puerto
1.97001E+11	1970	1	10		0		499	East Germany (GDR)	9	Eastern Europe	Berlin

Data variables:

The categorical variables that our group used in the presentation are: attack_type_1_text which includes assignation, hostage taking, bombing/explosion, facility/infrastructure attack etc., target_type_1_text which includes Private Citizens & Property, Government, Journalists & Media, Police etc., weapon_subtype_1_text which includes automatic or semi-automatic rifle, unknown explosive type, arson/fire etc. The use of categorical variables were used for the creation of bar charts and geographic maps which incorporated pie charts. These variables will help our viewers gain a better understanding about terror events that have occurred across the globe.

The use of date-time variables can be seen in our visualizations with the use of i_year. This variable was used because it helped show the specific year that the terror event occurred. This is a very important variable across many visualizations because it helps in the creation of a story. In one instance our group narrowed down the data set between the years of 2000 – 2004. This will allow our viewers to see certain events that occured within the time frame.

The use of geographic variables is crucial in visualizing data because it helps show viewers where the event occurred. The geographic variables that our group used include country_text and region_text. The group used these variables to demonstrate which regions contained the highest amount of terror events.

The use of continuous variables helps show a range with in our visualizations. The continuous variable that our group used was n_kill. This variable was used to help show the

range of number of people killed. This variable will allow viewers to see the extent and severity of terrorism.

Relationship among variables:

Explicit Relationship:

In order to create effective data visualizations one must fully understand the data first. Explicit relationship can be described as understanding the data without much analysis. The first explicit relationships in the global terrorism dataset can be found between country_text and region_text. The is an obvious relationship which simply explains the country that the attack occurred will be found in that specific region. An example of this relationship would be the September 11, World Trade Center attack which occured in the United States in North America.

Implicit Relationships:

The occurrence of implicit relationships in our dataset was much more common than explicit relationships. Implicit relationships can be summarized as using deeper analysis to understand data and draw trends. The first implicit relationship found in the global terrorism dataset would be found between attack_type_1_text and n_kill. In order to understand this relationship we must first acknowledge that all data found in this dataset are confirmed terrorism events. Understanding that an attack was committed against citizens in the use of violence we can then conclude that persons have been injured or killed. The second implicit relationship in this dataset is found between weapon_subtype_1_text and attack_type_1_text. In order to understand this relationship some analysis is required. One can come to conclusion that some form of weapon was used in the attack.

Visualization Findings:

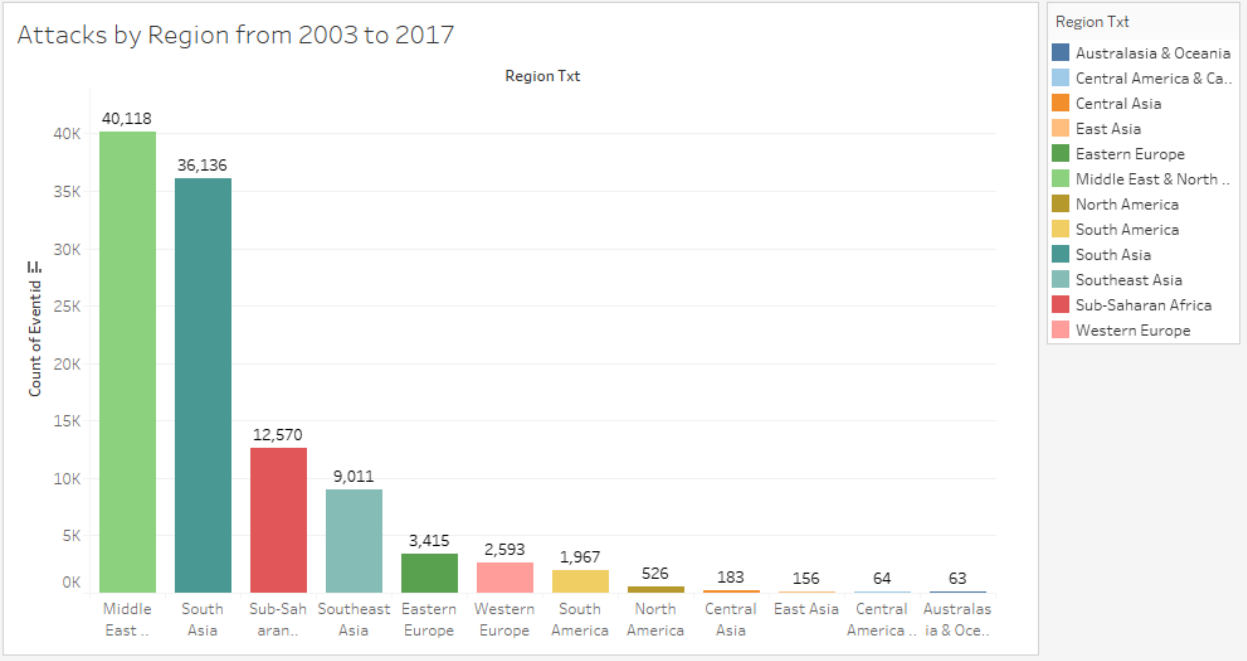
Side by Side Bar Chart

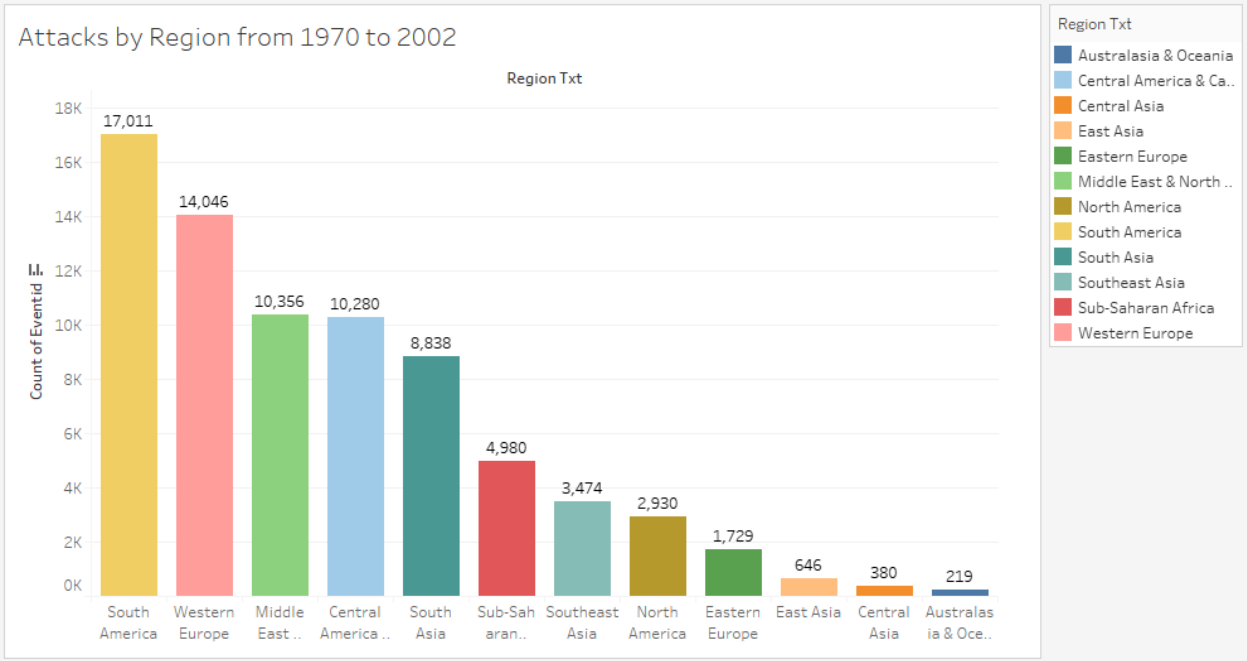
These two visualizations serve two purposes. The first purpose is to show the regions with the highest number of terrorist attacks. The second purpose is to compare the total number of terrorist attacks and the regions with the most terrorist attacks before and after Operation Iraqi Freedom. By looking at these visualizations, the difference between the two time periods is substantial in several different ways. The first major difference is the total amount of terrorist attacks. Between the years 1970 and 2002, there were a total of 74,889 terrorist attacks throughout the world. Compared to the time period of 2003 to 2017 (during and after Operation

Iraqi Freedom), that total amount jumped to 181,691. That is approximately a 140% increase in total terrorist attacks. Another significant difference is the comparison of where in the world the attacks decreased as well as where the attacks increase. By looking at the visualizations, it is obvious that the region that has experienced the most amount of change when it comes to terrorist attacks is the Middle East. While this is not surprising given the fact that the country of Iraq is in the Middle East, and this is where Operation Iraqi Freedom took place. The amount of increase in terrorist attacks in that region is important. Before Operation Iraqi Freedom, which covers a time period of over 30 years, there was a total of 10,356 attacks in the Middle East. That number increased dramatically in less than half that time to a total of 40,118 attacks. If put into percentages, that is about a 400% increase in attacks in only a 14-year span. It can be reasonably assumed that Operation Iraqi Freedom had a significant impact on the number of terrorist attacks in the Middle East.

Justification:

The side-by-side charts were used to display the number of terrorists attacks by region. The different colors for each region were used to differentiate between separate regions easier. Also, the number of attacks were labeled on each bar to make the chart more readable. The side-by-side bar chart also allows the reader to easily identify which regions have the most attacks and which regions have the least amount of attacks just by looking at the size of the bars.





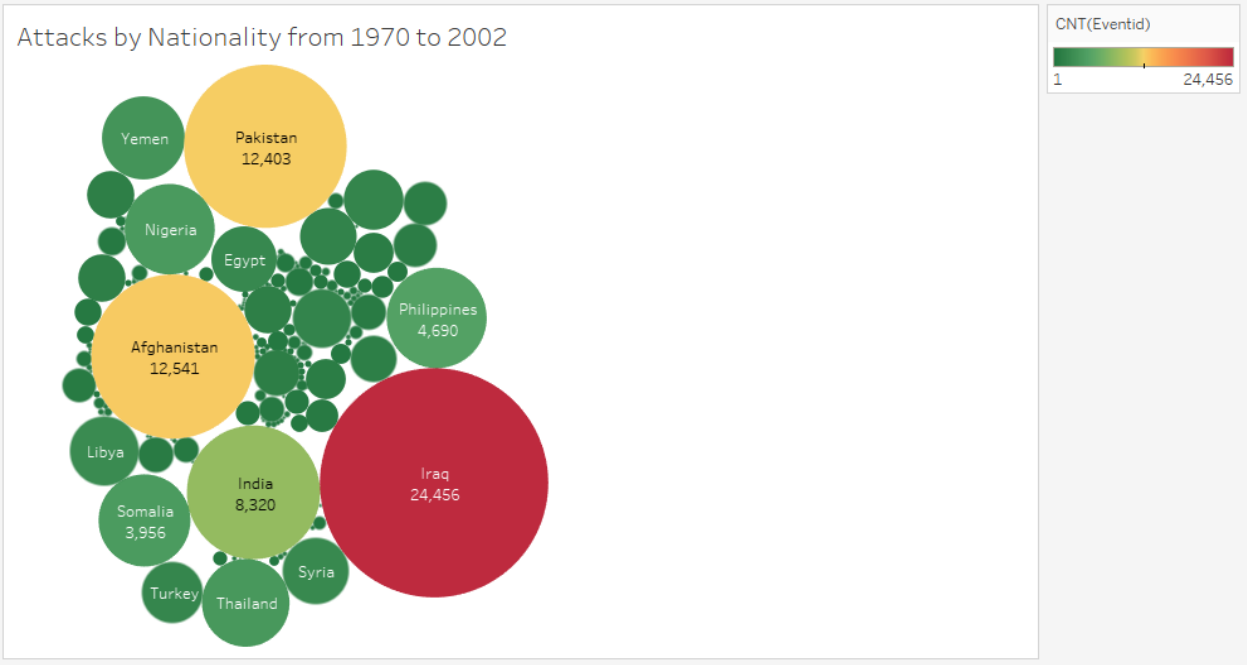
Bubble Chart

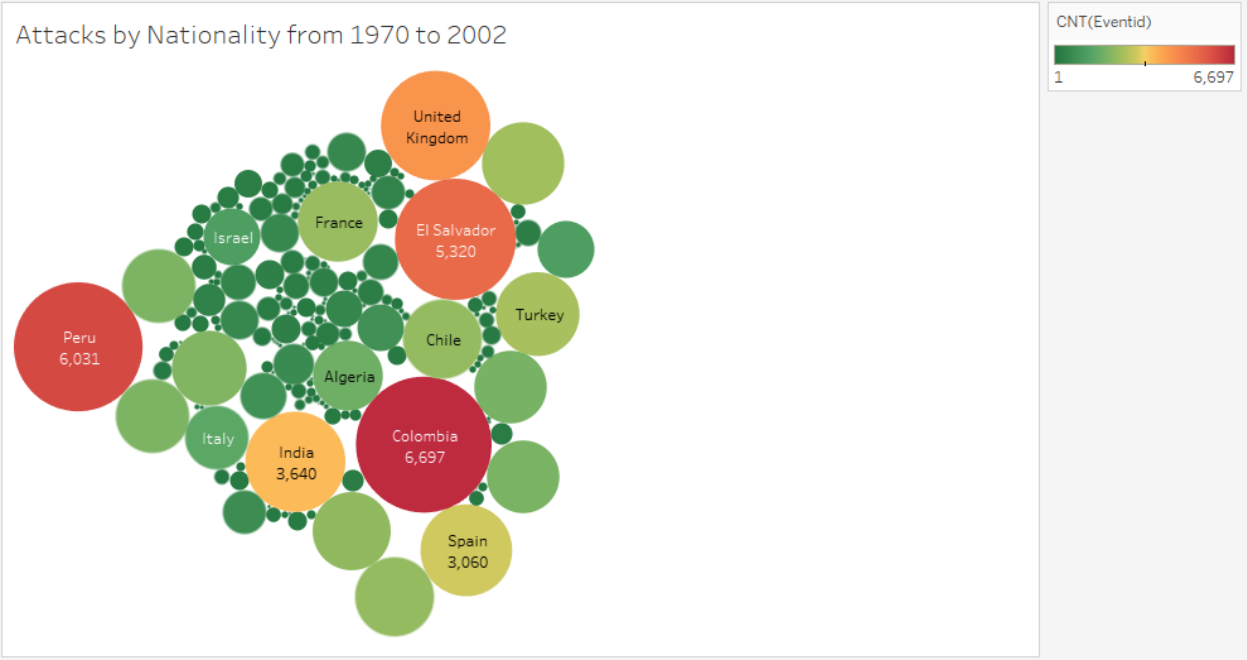
The two bubble charts show the amount of terrorist attacks based on the nationality of the attacker. Again, by using the comparison of before and after Operation Iraqi Freedom, the

differences between them are profound. One glaring fact that is shown by the bubble chart is the sheer amount of attacks that were performed by people of Iraqi nationality during the time span of 2003 to 2017. The total amount of attacks by people of Iraqi nationality almost equals the next two nationalities combined. While this is important, what is even more powerful is that the next two greatest nationalities in terms of terrorist attacks are also located in the Middle East. When compared to the time period between 1970 and 2002, not even one Middle Eastern country can be seen on the bubble chart. This speaks to dramatic effect Operation Iraqi Freedom had on the region of the Middle East. A conclusion that can be made from these graphs is that Operation Iraqi Freedom not only caused a large terrorist attack spike in the countries of the Middle East, but also compelled terrorist organizations located in these countries to significantly increase the number of attacks. This calls into question if Operation Iraqi Freedom helped or hurt the people living in these Middle Eastern countries.

Justification:

The bubble charts were used to display which nationalities participated in the most terrorist attacks and the actual number of attacks. The size of the bubbles represents the amount of terrorist attacks. The larger the bubble, the more attacks a person of that specific nationality participated in. Also, color was used to help highlight the nationalities that committed the most amount of attacks.





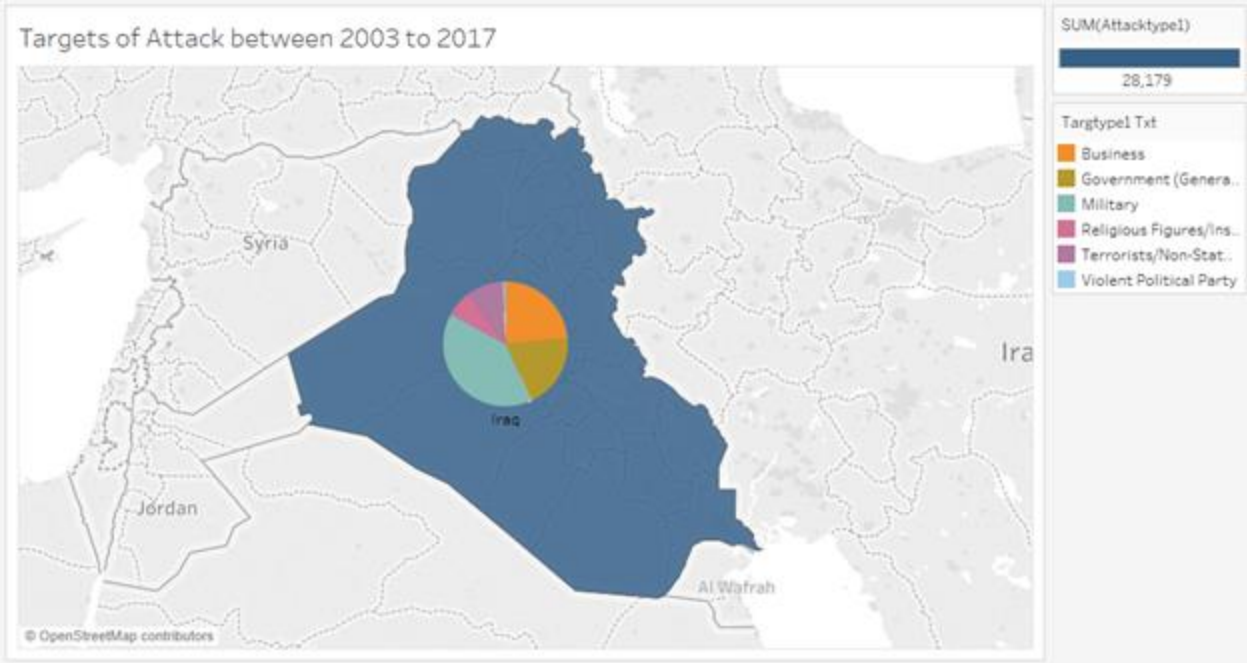
Geographic Map with Pie-Chart

In this visualization the type of targets is shown based on the total number of attacks. There were over 20 different types of targets included in the dataset, so the most relevant target

types were chosen based on the number of attacks. The target types include Business, Government, Military, Religious Figures, Terrorists, and Violent Political Parties. Since Iraq had the highest number of terrorist attacks during the time period of 2003 to 2017, this map shows what were the targets of those attacks. Based on the pie chart, the highest target type was the Military. The category of military includes military outposts, buildings, vehicles and weapons, and troops from foreign and domestic countries. Since Military targets made up almost half of all attacks, it can be concluded that the United State's military increased presence in primarily Iraq, as well as other Middle Eastern countries, has caused a significant increase in the amount of terrorist attacks in the country of Iraq.

Justification:

In this visualization, the color of the country (Iraq) represents the amount of attacks that have took place in that specific country, and the color of the angles in the pie chart represent the different target types of each attack. The darker color the country is, the more attacks that have taken place in that country. The choice to focus in on just Iraq was because after the event of Operation Iraqi Freedom, Iraq leads the entire world in number of terrorist attacks by a wide margin. The point of this graph is to try and highlight who and what places are being targeted by terrorist in the country of Iraq.



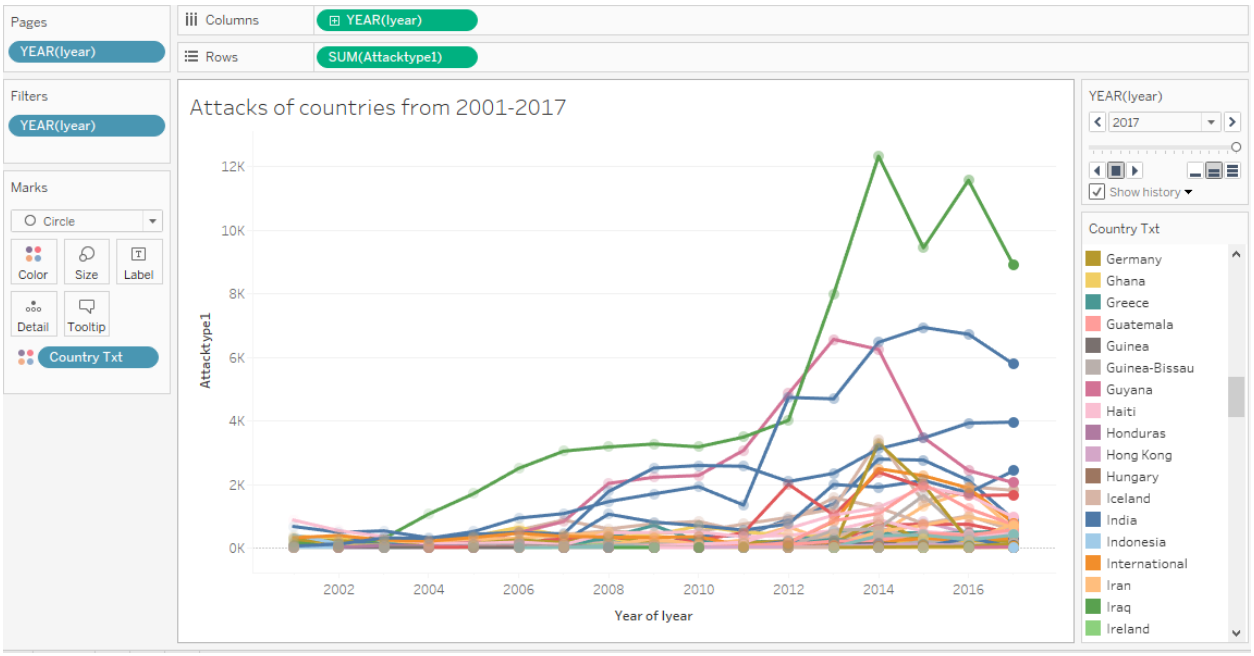
Motion Chart

Our time frame we chose was from 2001-2017 due to the fact that from 1970-2000, the attack-types were fairly consistent. In 2001, that is when we had the historic Sept. 11th terrorist attack here in the United States. The country that caught our attention throughout this model was Iraq. Iraq was the mastermind, it is believed, behind the Sept. 11th attack on the Twin Towers. The "Operation Iraqi Freedom" came on the scene after the United States invaded Iraq and we went to war in 2003. In this same year, we see a jump from less than 150 attack-types to 282. As we go further down the visual it jumps to 1,053 attack-types in 2004, 1,695 in 2005, 2,940 in 2006; and that is just the beginning! From just 2001-2006, the total attacks of different attack-types (involving assassinations, bombing/explosions, armed assault, facility/infrastructure attack, hijacking, kidnapping, and some unknown) has gone up by almost 10.5 times the amount when the Iraq-United States war started. Looking closer into this trend, from 2007-2012, the total attack-types go over 3,000, but plateaus there not exceeding 4,100 total attack-types. Moving

forward to 2013, we see the attack-types skyrocket up to 7,969; with the Iraq country line exceeding 12,000 attack-types going at one point in the time frame. This is an astounding amount of attacks that can occur in one country. From 2003 to 2014, attacks increased from 282 to 12,313. The only country that gets close to Iraq is Afghanistan with 6,295 attacks ranging in the attack-types listed, which was a giant in its reputation for terrorism groups. The next highest is Pakistan, so it supports what was said earlier about a great majority of terrorist attacks are occurring in the middle eastern countries. Iraq is, without a doubt, the leader from our study with its number nearly doubling both Afghanistan and Pakistan.

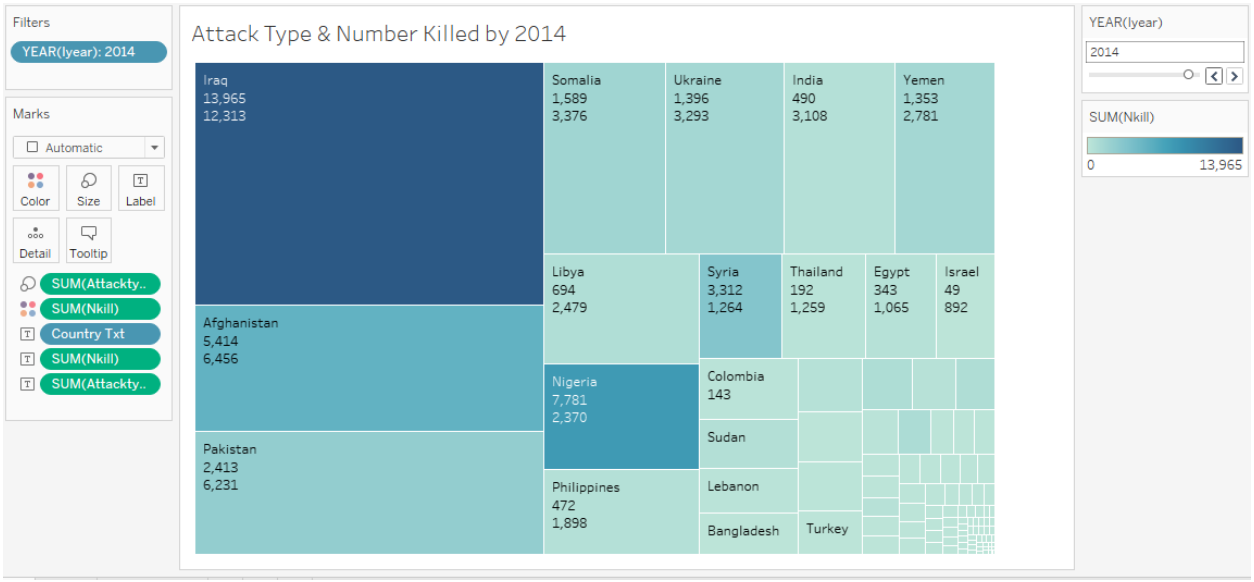
Justification:

We decided to use a motion chart to show the growing terrorist attacks while identifying key trends of each country across the world. Seeing the continuous movement of the data across the timeline gives a greater look at when a bulk of attacks started becoming frequent in specific areas. Each country has a specified color with data point on each line where the value of attacks in a year can be found.



TreeMap

Furthermore, the number of people killed in the attacks are about the same amount as the attacks that have been carried out, with about half of the years showing more deaths than attacks occurring. In creating a dashboard, we were able to link the motion chart together with a TreeMap as scene below:



Justification:

The tree map gives us a great picture comparison of the major countries with higher terrorist attacks and influences. In this screenshot, we see the top three countries as far as attacks and number of people killed. It gives a clearer picture of all the countries and their results all side by side.

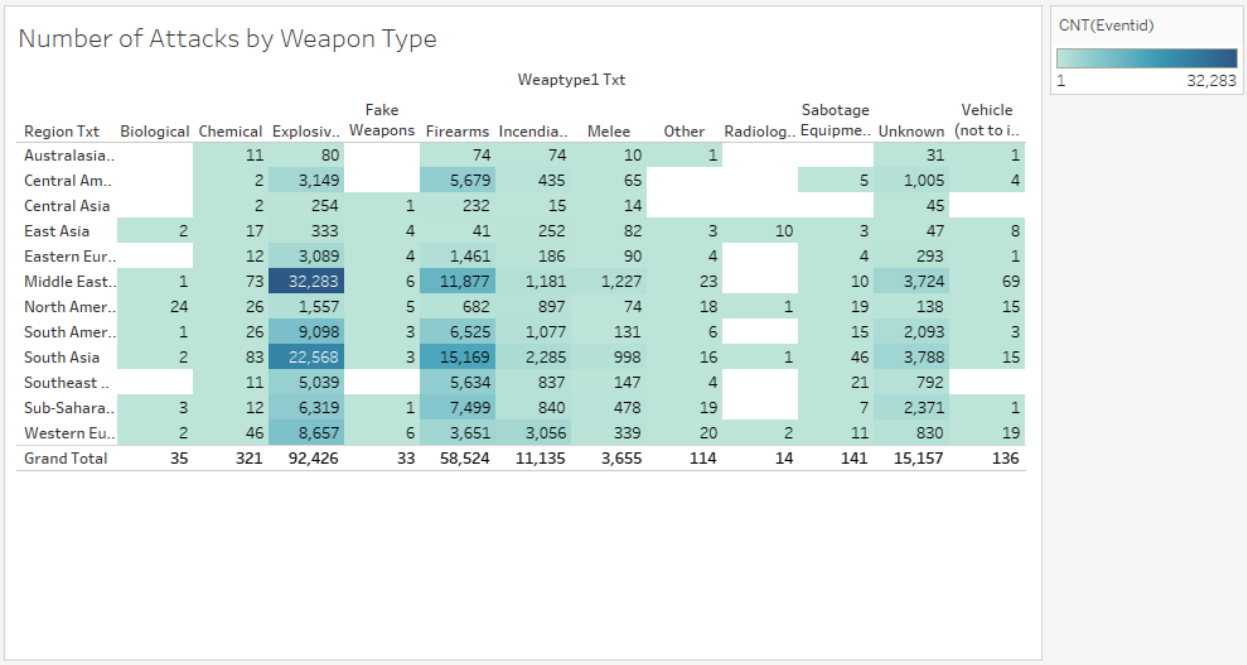
We have uploaded our dashboard through Tableau for you to refer to the rest of the numbers to see how they increase and decrease in attacks and number killed in each country. The first number is the number of people killed in attacks in the year and the bottom is the attack-types.

Highlight Table

The Highlight Table is used to compare which type of weapons are used most often during terrorist attacks. Highlighted in dark blue, far and away the favorite weapon type of terrorists, specifically in the Middle East, are explosive type weapons. Explosive weapons used in terrorist attacks include IED's, rockets, car bombs, and even suicide bombings. The reasons for the vast majority of terrorists using explosives to carry out their attacks are numerous. One reason is the ease of acquiring the chemicals necessary to create different types of explosives. Because terrorist are usually far weaker, in terms of numbers and firepower, than their targets, explosives allow terrorists to increase their firepower to carry out the attacks. Another reason for using explosives is the publicity that comes with them. The more publicity acquired from the attacks, the more sympathizers terrorist can acquire.

Justification:

The highlight table counts the number of attacks by specific attack types, and separates them by region. This table uses color saturation to bring attention to the attack types with the most uses in specific regions.



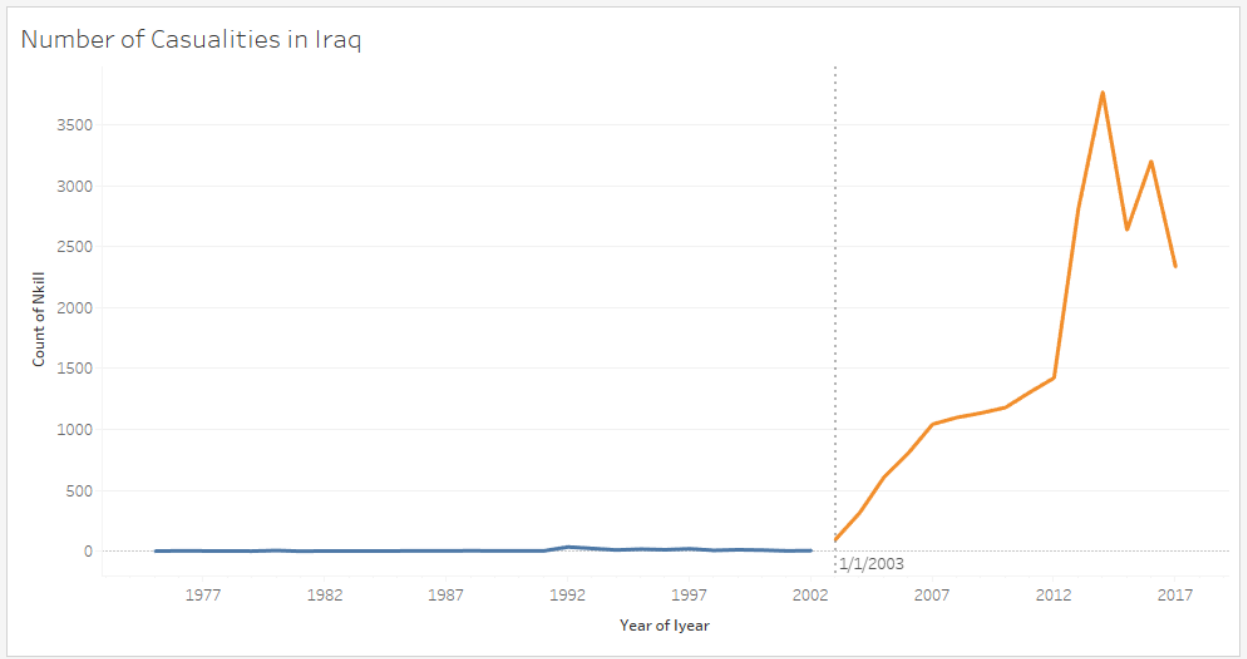
Region Txt	Biological	Chemical	Explosiv..	Fake Weapons	Firearms	Incendia..	Melee	Other	Radiolog..	Sabotage Equipme..	Unknown	Vehicle (not to i..
Australasia..		11	80		74	74	10	1			31	1
Central Am..		2	3,149		5,679	435	65			5	1,005	4
Central Asia		2	254	1	232	15	14				45	
East Asia	2	17	333	4	41	252	82	3	10	3	47	8
Eastern Eur..		12	3,089	4	1,461	186	90	4		4	293	1
Middle East..	1	73	32,283	6	11,877	1,181	1,227	23		10	3,724	69
North Amer..	24	26	1,557	5	682	897	74	18	1	19	138	15
South Amer..	1	26	9,098	3	6,525	1,077	131	6		15	2,093	3
South Asia	2	83	22,568	3	15,169	2,285	998	16	1	46	3,788	15
Southeast ..		11	5,039		5,634	837	147	4		21	792	
Sub-Sahara..	3	12	6,319	1	7,499	840	478	19		7	2,371	1
Western Eu..	2	46	8,657	6	3,651	3,056	339	20	2	11	830	19
Grand Total	35	321	92,426	33	58,524	11,135	3,655	114	14	141	15,157	136

Line Chart with Reference Line

Rather than focus on the number of attacks, as most of the visualizations have, this chart highlights the casualties caused by those attacks in the country of Iraq. The purpose is to show the sharp contrast of deaths before Operation Iraqi Freedom, and after. The reference line begins at the point in time when Operation Iraqi Freedom was implemented. The data points after that point are highlighted in orange to help show the difference between the two timelines. It is very obvious by just glancing at this visualization the effect Operation Iraqi Freedom had on the country of Iraq. Before the operation, the number of deaths each year due to terrorist attacks was close to none. After the operation, the number of casualties immediately increases to the thousands. Included in the casualties are not only terrorist and military personal, but also civilian deaths as well.

Justification:

The line chart with the reference line was used to show the number of casualties before and after Operation Iraqi Freedom. The choice to use the number of deaths rather than number of attacks was because terrorist attacks that result in deaths are more impactful and have a larger effect on the attacked area. Also, two tools were used to highlight the difference between the two time periods. The first tool was the reference line which begins in the year that Operation Iraqi Freedom began. The second tool was highlighting the data after the reference line to draw more attention to it.



Conclusion:

The purpose of this project was fully understood by our group. The process of finding a dataset, cleaning the dataset, importing the data and finally creating visualizations was a challenge for the group. An initial struggle that our group faced was switching to a new dataset

with a week left of this project. The original dataset had a vast amount of information which made us confident. The issue we faced as a group was creating visualizations. I believe this issue was due to the fact that we are still new to the concept of creating visualizations. This project has helped give us the principles to creating high impact visualizations.

Through our project, we were able to narrow the down the countries who had the highest levels of killings and attacks. Drilling into Iraq, there is a large amount of terrorism stemming from here. The "Operation Iraqi Freedom" has played a huge role we feel. From the time that this agenda has been established, the amount of terrorism from the Middle East has more than doubled based on past trends before 2000-2017. The other countries as well have a high attack-type rate with many people being murdered because of it.

As a group, we question if Operation Iraqi Freedom has helped Iraq, countries in the Middle East, and the rest of the world. Based on the specific data gathered, terrorist attacks, terrorist activities, and casualties have all increased drastically. We concentrated on Iraq and the Middle East in our visualizations, but these acts have increased globally as well. Primarily going off the data we gathered, Operation Iraqi Freedom has not helped Iraq and the rest of the Middle East. A conclusion can be made that the region of the Middle East has suffered more because of Operation Iraqi Freedom and the war in the Middle East. If things continue as they have been, we will see the destruction possibly of entire nations.