How the Terrorism Affect Countries?

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1. Introduction

Terrorism is an important factor affecting world peace and countries' safety, and it's getting more and more attention from people. In our project, we plan to do a research about terrorism and the impact of terrorism on national development by using different data visualization method. The project mainly studied the overall distribution of terrorism from time and geographical location and the change of national dimension, aiming to help people to understand the current situation of terrorism intuitively and comprehensively, and to discover the deeper rules between terrorism and countries' development.

Our project can be divided into three parts. The first part contains two graphics showing the geographical and temporal distribution of terrorist attacks and the number of victim and wounded. The second part contains two graphics. We aggregated data in country dimensions and showed the number of attacks per country. We aggregated data in country dimensions and showed the number of attacks per country. We also show the distribution of deaths and injuries in the nine countries most affected by terrorist attacks from the time dimension. In the third part, we introduced some indicators to measure national development, including population, economy and education to show the relevance between countries' development and terrorism. The three parts are interrelated and together illustrate the impact of terrorist attacks on the country.

2. Data:

2.1: Global terrorism dataset

Global terrorism dataset is from the GLOBAL TERRORISM DATABASE (GTD) website (https://www.start.umd.edu/), which is a professional organization to collect data about each terrorism event. The global terrorism dataset contains more than 180,000 attacks from 1970 to 2017 includes more than 88,000 bombings, 19,000 assassinations, and 11,000 kidnapping. Since only the data from 1998 to 2017 were reviewed, we will mainly use the data in this time period in the project. After cleaning data, there are about 100,000 pieces of data.

There are 17 attributes in dataset which describe the time, place, target of the attack, the manner of the attack, the weapons used, and the casualties caused and so on. We mainly 7 attributes including latitude and longitude, region and countries' information, date, victim and wounded.

2.2: The World Development Indicators

The World Development Indicators is a compilation of relevant, high-quality, and internationally comparable statistics about global development. The database contains 1,600-time series indicators for 217 economies and more than 40 country groups, with data for many indicators going back more than 50 years.

The dataset is from The World Bank Group website(http://www.worldbank.org), which offer support to developing countries through policy advice, research and analysis, technical assistance, and shares its knowledge and engages with the public, to ensure that countries can access the best global expertise and help generate cutting-edge knowledge.

We pick some development indicators measuring the level of countries, including economic data, people and education. We only selected data from 1998 to 2017, because we focus on the terrorism accused in this period. And the dataset is processed and integrated with some data from global terrorism dataset for better visualization by using some methods in python. On the economic, we chose GDP as an indicator of the country's economic level. In terms of people, we have chosen the population. In education, we have chosen primary, secondary and tertiary enrollment rate as indicators of education.

2.3 Data cleaning

For the data of terrorism, because of the large amount of data, we removed the unneeded attributes. For the null values in the attribute, we delete the entire record. For the data world development indictor, we keep the null values.

3. Tool

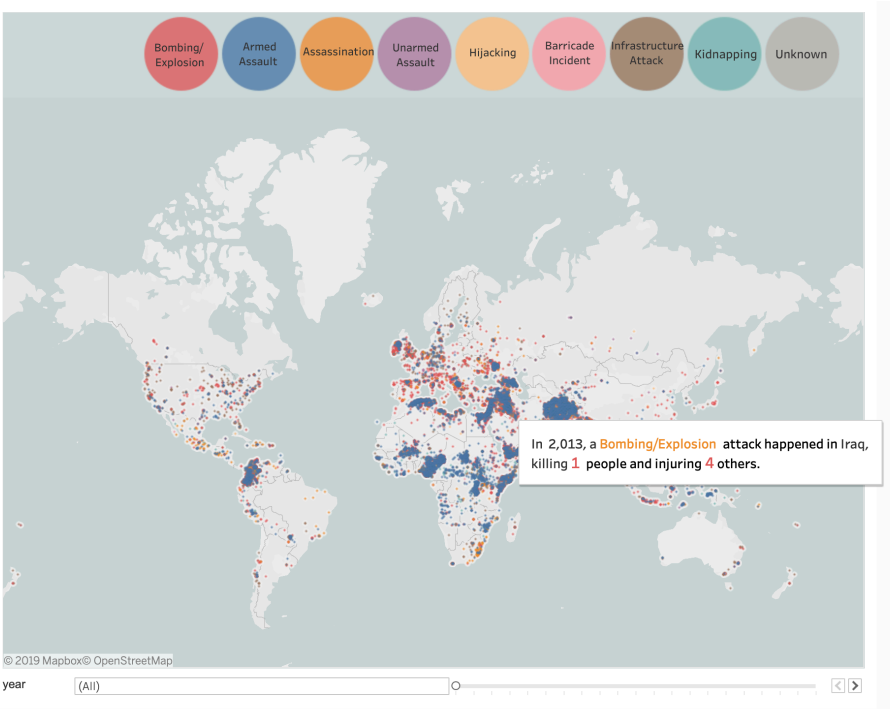
In the project, we chose Tableau as the visualization tool. In the process of visualization, we explored the various functions of tableau.

4. Visualization

We mainly consider the issues we want to study from three chunks.
One is the general state of terrorist attacks over the years. These include changes in the global geographical distribution of terrorist attacks over time and casualties caused by terrorist attacks. We used two pictures separately to illustrate the two points.
Second, specific to a number of countries and regions, the general situation of terrorist attacks. These include the number of terrorist attacks that have changed over time and the number of casualties caused, as well as the comparison of data on indicators between different countries. We also used two diagrams to illustrate the two points separately.
Third is our exploratory study, and we want to know whether terrorist attacks have had an impact on some of the country's development, and how much impact they have had. So, we have introduced other data, including the country's population, GDP, and the educational attainment of the country's age-appropriate children. By visualizing these factors, we explore the impact of the discovery of terrorist attacks on these factors. Economy, population, and education are important indicators of a country, and that's why we pick these three. We used three diagrams each to visualize the analysis.

4.1 Geographical distribution of terrorist attacks

4.1.1 Visualization Result



4.1.2 Visualization Method

This is an explorative visualization. This visualization is mainly to show the geographical distribution of terrorist attacks, so we choose the map to present. At the same time, we use different colors to distinguish the eight types of terrorist attacks, so that users can explore the impact of different types of attacks. Users can click on any type of attack and only keep this type of attack on the map so that they can explore more information. In addition, we also provide a choice of time from 1998 to 2017. When the user clicks on the time, it can observe the geographical changes of the terrorist attack over time.

4.1.3 Visualization Analysis

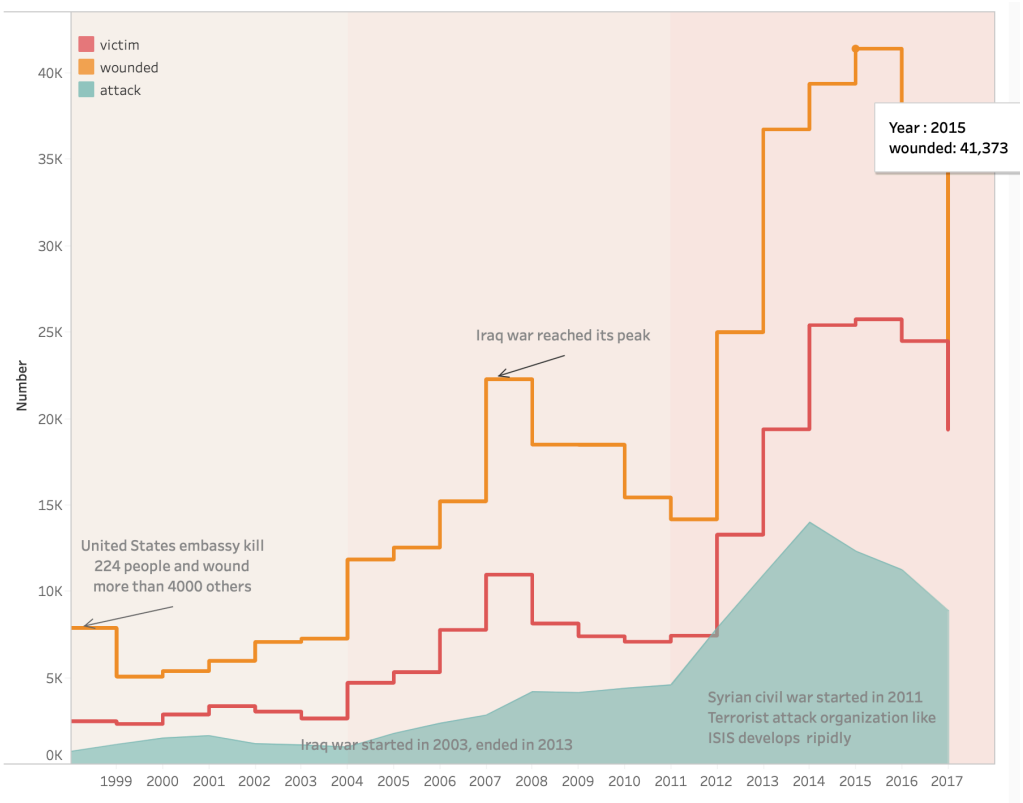
This visualization is a visual representation of the casualties suffered by various area in the world as a result of terrorist attacks. From the geographical distribution, we can intuitively see that terrorist attacks are mainly concentrated in South America, the Middle East, Africa, and a small part of Europe.

From the different color distribution of different attack type, we can see that armed assault, bombing and explosion are the most common used attack type. From the time change, the initially difference in the number of attacks types were not large, but as time went on, the explosion gradually became the most important attack type.

From the time perspective, from 1998 to the last few years, we have found that terrorist attacks have become more frequent and more widespread. This may indicate that the world we live in is not getting safer, but more and more dangerous. Perhaps when people see this visualization, they will do something to prevent terrorist attacks.

4.2 Temporal change in terrorist attacks, deaths and injuries

4.2.1 Visualization result:



4.2.2 Visualization Method

This is a descriptive visualization. In order to show the temporal changes in the number of terrorist attacks, victim and wounded, we use time dimensions to present changes in time and numerical dimensions to show changes in values. Basis on that, we found that the terrorist attack is clearly divided into three stages, so we join the reference interval to

help users quickly find these three stages. We can get his specific data by placing the mouse at a certain point.

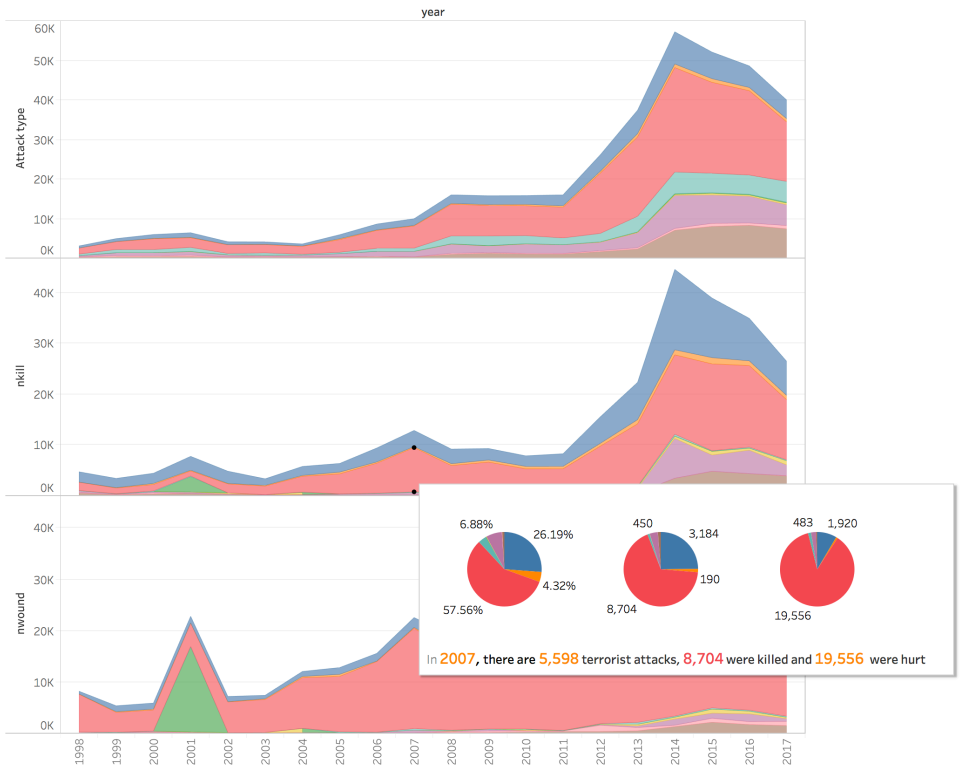
We also explored the reasons for the changes in different stages and gave notes. For unusual values, we also give an explanation.

4.2.3 Visualization Analysis

We can find that the total number of terrorist attacks as well as the number of casualties is increasing year by year. As can be seen from the visualization, the development of terrorist attacks can be divided into three states from 1998 to 2017. In the first phase, there was a significant unnormal value in 1998, because during the year, the US Embassy bombings caused serious casualties. There is an explosive increase in each phase and the previous phase. In the second state, there is also a unnormal value in 2007, that is because the Iraq war reached its peak in that year. Since 2011, the growth of terrorist attacks in the third state has caused a large increase in the number of casualties. 2014 was the year with the most terrorist attacks, and the number of injuries caused by the terrorist attacks in 2015 was the most.

4.2.4 Other methods we tried

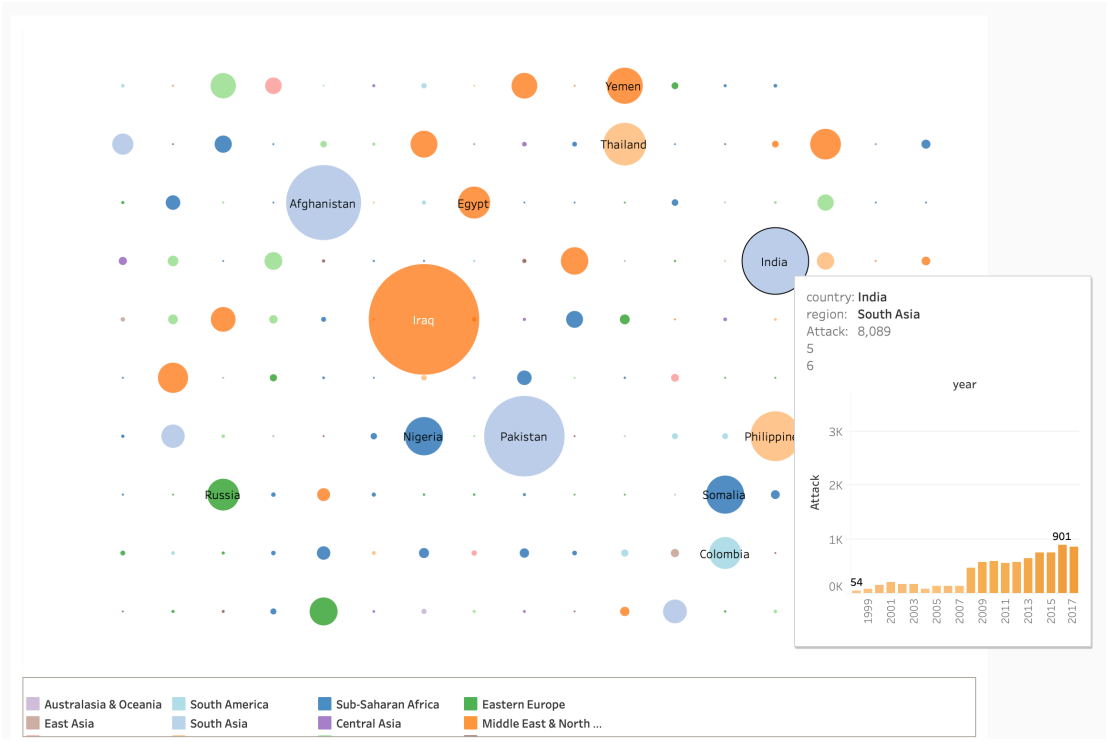
table 1



Initially we used a stacking diagram to show the different types of attacks and compare the number of casualties. However, in this picture, the small proportion of terrorist attacks will be severely squeezed, even invisible, and the contrast is not intuitive enough, so we gave up this visualization.

4.3 Terrorist attacks on the countries

4.3.1 visualization result



4.3.2 Visualization Method

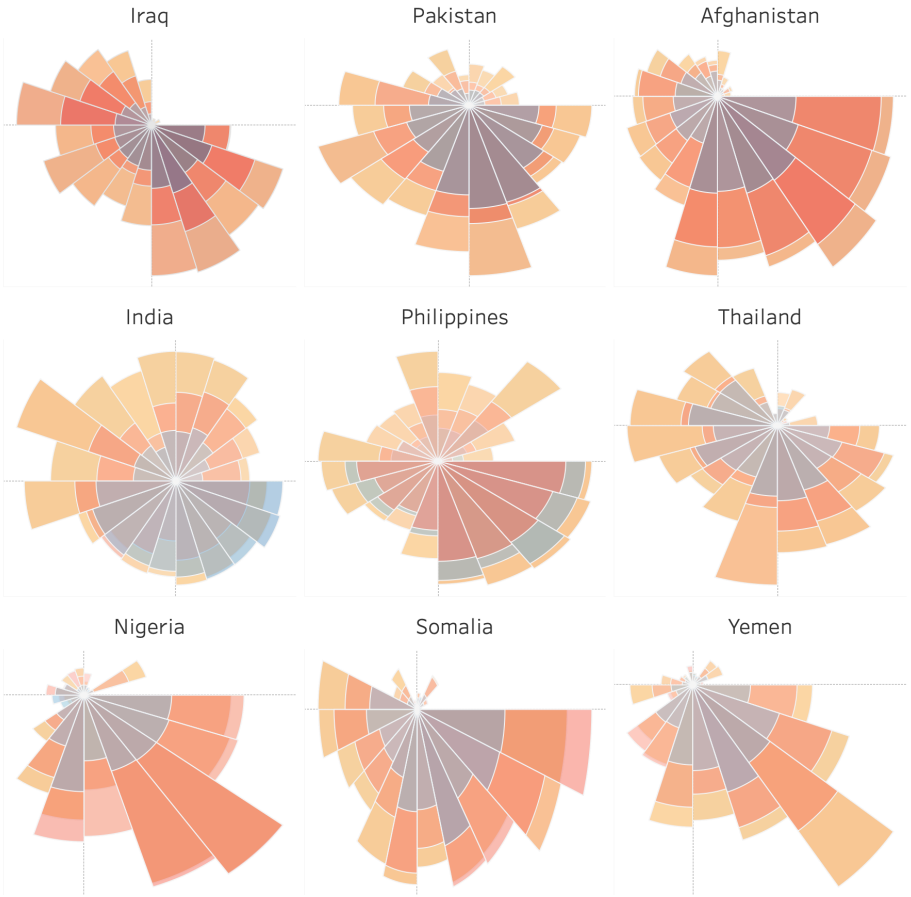
This is a descriptive and explorative visualization. This picture is a visual representation of the number of terrorist attacks in different countries. Each circle represents a country. In order to show the difference in the country's terrorist attacks, we use the size of the circle to indicate the number of terrorist attacks on a country. Different colors represent the region where the country is located. When the mouse is placed in a country, it shows the trend of the number of terrorist attacks in this country over the years. User can explore more information about each country.

4.3.3 Visualization Analysis

We can clearly see that Iraq, Pakistan, Afghanistan, India are the countries with more terrorist attacks. The orange and the blue which represent Middle East and South Asia region are areas where terrorist attacks occur more frequently. The trends in different countries are different, such as Iraq and India have significant step-by-step growth.

4.4 Attacks, victim, wounded on nine important countries

4.4.1 Visualization Result:



4.4.2 Visualization Method

This is a descriptive visualization. We selected nine countries most affected by terrorist attacks, using the Nightingale chart to compare the internal terrorist attacks in the country, victims and wounded. The Nightingale chart can show the proportional relationship very well, and the small data will not be covered. Blue indicates the number of attacks, with dark orange indicating the death toll and light orange representing the

number of injuries. Each slice represents a year, the first lattice in the upper-right area is the beginning of 1998, and the counterclockwise begins to increase gradually. The size of the slice is proportion to the values.

4.4.3 Visualization Analysis

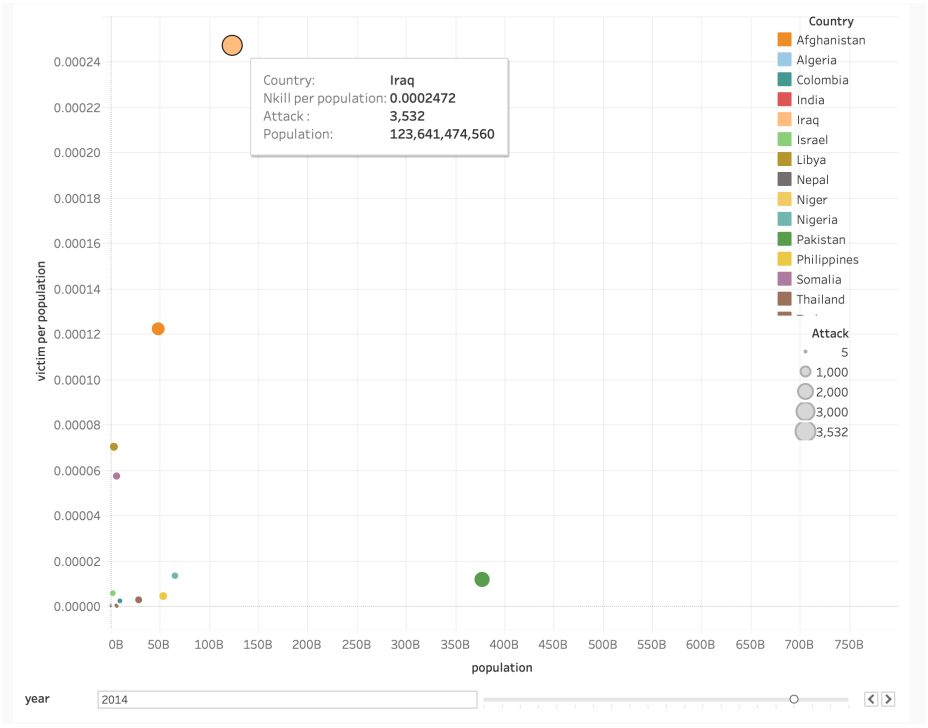
This visualization can see in detail the changes in terrorist attacks in these countries. The changes in different countries are different. For example, Iraq has experienced significant growth in 2003-2007, and has declined in the next five years, and then increased significantly in the next five years. In India, although its initial decade of terrorist attacks was small, the number of deaths and injuries caused by it was high. In the next decade, terrorist attacks increased significantly, but the rate of deaths and injuries declined.

4.4.4 Limitation discussion

Although this visualization can well show the changes of various parameters in a country, it cannot compare the differences between countries. Because the size of each slice is determined by the country's own data, not the data between countries. In addition, this visualization does not show the specific number of attacks, victims and wounded, users cannot obtain specific data.

4.5 Victim ratio and population

4.5.1 Visualization result:



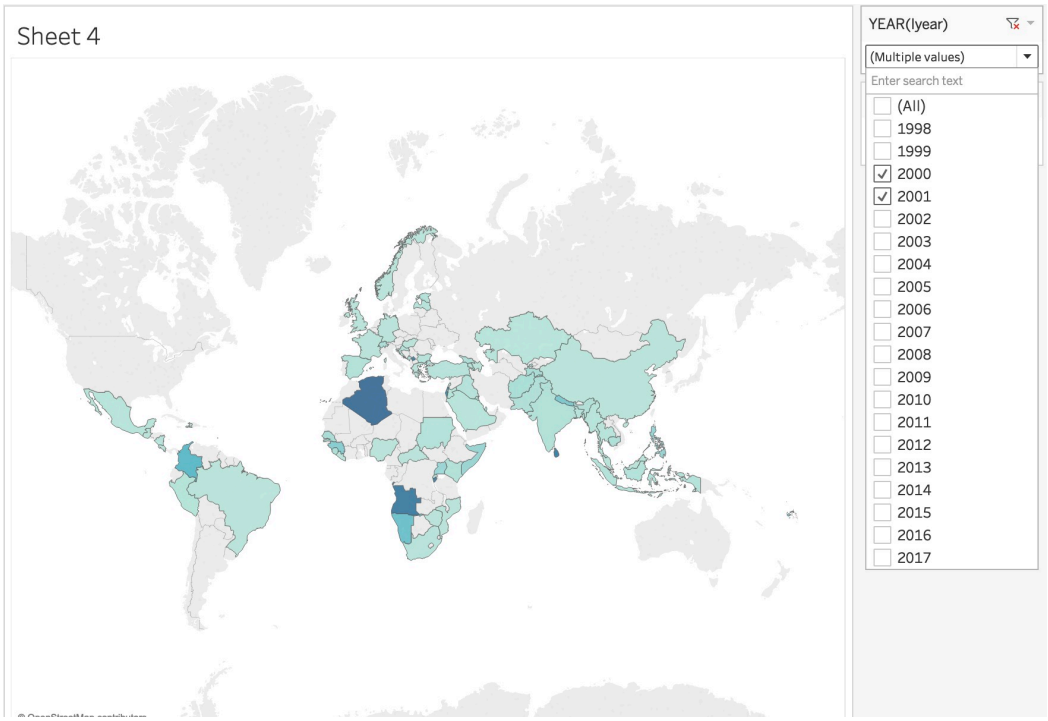
4.5.2 Visualization method

This is an explosive visualization for user to explore the relation between attack and population in order to know the impact of terrorist attacks on the population. The vertical axis data is calculated by dividing the total population of the country by the number of deaths from terrorist attacks. The size of the circle represents the number of attack. Different colors represent different countries. By changing the year, we can see dynamic trends in this data for each country.

4.5.3 Visualization Analysis

This chart is an intuitive illustration of the proportion of the total population of people who have died as a result of terrorist attacks in different countries in each year. We can see from an example in the picture that in 2014, in Iraq, three out of every thousand will die because of terrorist attacks.

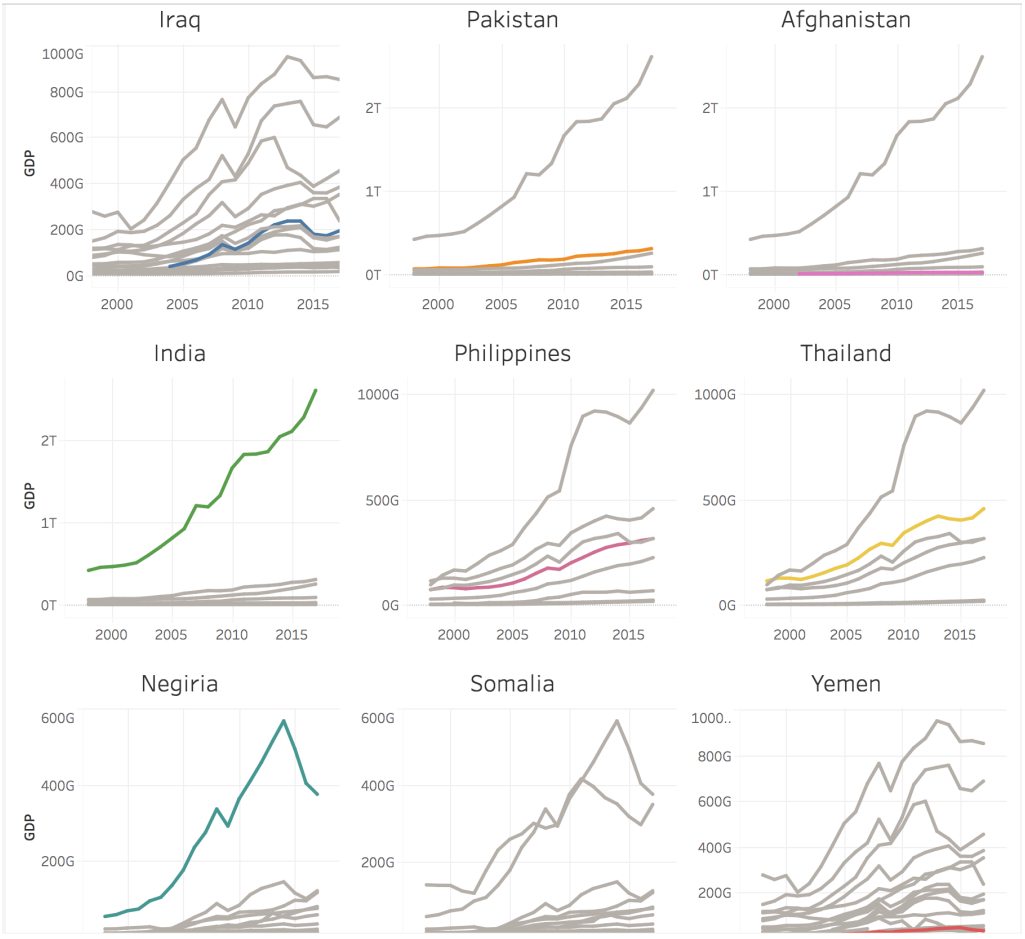
4.5.4 Other method we tried



We tried to use a map to illustrate this information, however the map will highlight countries with small values but large areas, and there is no data about population change, so we use another method.

4.6 GDP in country

4.6.1 Visualization result:



4.6.2 Visualization Method:

This is a descriptive visualization to show the distribution of GDP in recent years in the 9 countries where most terrorist attacks took place. GDP is affected by many factors. In order to see this impact, we introduced data from neighboring countries. The color line is the countries that we focus on, and the grey line represents other countries.

4.6.3 Visualization analysis:

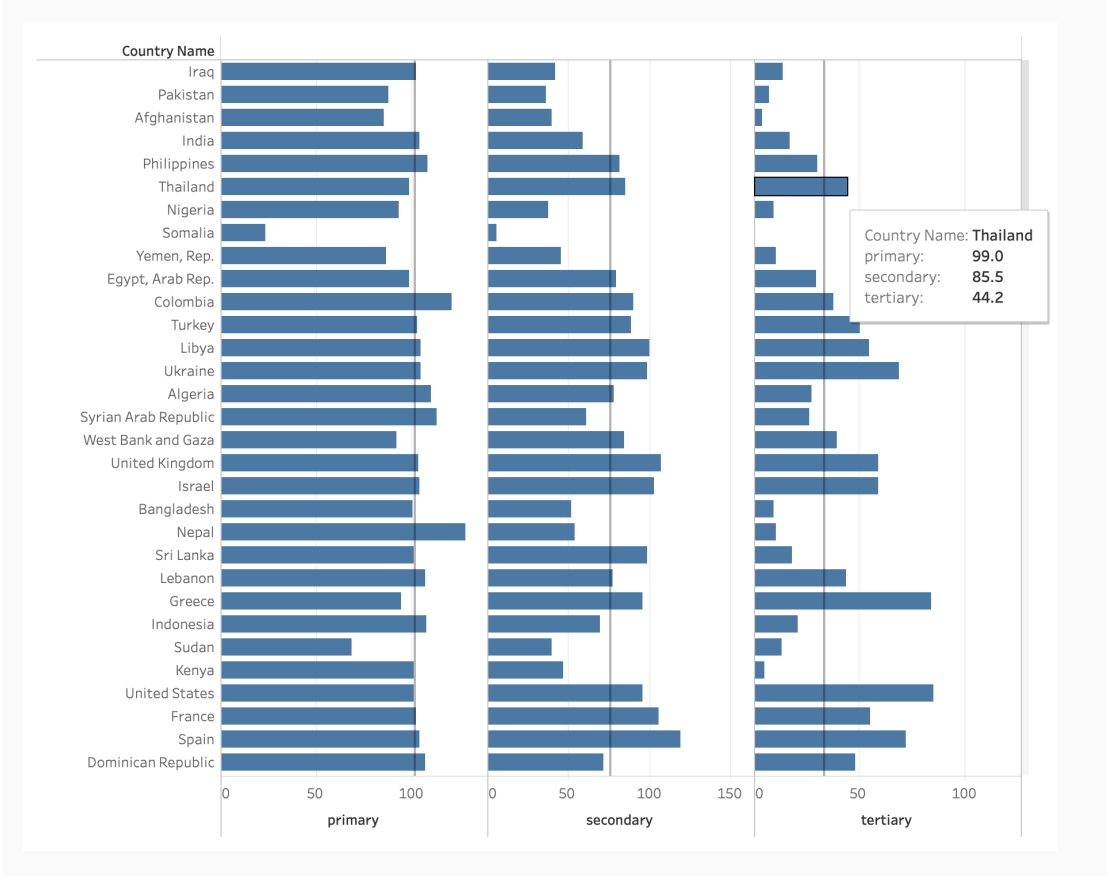
We can see that, while the number of terrorist attacks in various countries is increasing year by year (based on the results of previous visualizations), the GDP of individual countries has not been greatly affected as a result, and is still increasing by the year in general. Even in Iraq, the country with the most terrorist attacks, GDP is growing year by year, only a little slower. The economy of the world is getting better all year, and terrorist attacks have no big negative effect on the world economy.

4.6.4 Limitation discussion

The data we use here is the total GDP of each country, however the total GDP is closely related to the population. Therefore, this factor cannot be well ruled out. During the process, we did not find the per capita GDP data, and also tried to divide the total GDP by the population to obtain this data, but the data obtained is very sparse, so we finally used the total GDP data.

4.7 Enrollment ratio in country

4.7.1 Visualization Result



4.7.2 Visualization Method

This is an explosive visualization for user to explore the Gross enrollment ratio of each country. Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponding to the level of education shown. Thus, some values will larger than 100 because it includes people who are not in age group. We sorted each country from top to bottom based on the total number of attacks,

and set a reference line which is the average enrollment ratio. People can compare the difference between countries and the average values.

4.7.3 Visualization Analysis

Overall, the enrollment rate from primary to tertiary is gradually decreasing in three stages. The top ten countries in the terrorist attacks have low enrollment ratio in tertiary.

5. Conclusion

5.1 Visualization Conclusion

After visualizing the data on the terrorist attacks, we have the following conclusions：

1）Geographically, terrorist attacks are mainly concentrated in South America, the Middle East, Africa, and a small part of Europe, and have the trend of spreading.

2) Temporally, the terrorist attacks have shown a three-stage growth trend in the past 20 years. The development of war and terrorist groups has an important impact on terrorist attacks.

3）Iraq, Pakistan, Afghanistan, India are the counties most affected by terrorist attacks. Middle East and South Asia are the two areas most affected by terrorist attacks.

4) The development of terrorist attacks in different countries is different. In general, nine countries are still suffering from many terrorist attacks in recent years.

5) The impact of a terrorist attack on a country's population, economy and education level is not the most critical. Even if it suffers from many terrorist attacks, such as Iraq, its economy can still grow. There is no significant reduction in the population. Primary education can also reach the average level.

5.2 Project Conclusion

5.2.1 Difficulty

Initially, our difficulties came from the inability to find a direction to explore terrorist attacks. In the process of visualization, we have a lot of visual methods and dimensions to choose from. Choosing the one that best suits us is the second problem we face.

5.2.2 Limitation Discussion

1) The purpose of our visualization is to explore the impact of terrorist attacks on the development of the country. As far as the results of our visualization are concerned, it seems that the impact is very small. We still cannot answer this question very well.
2) Some data metrics have yet to be optimized, such as the GDP mentioned above.
3) We chose fewer tools during the visualization process, only Tableau.

5.2.3 Improvement

In order to answer our questions, we can further introduce more data on national development and refine the impact. Data from terrorist attacks can also introduce more dimensions to explore this impact.

5.2.4 Tool

Our visualization use tableau. Tableau can do some basic graphic design, but the degree of freedom of adjustment is limited. In addition, tableau can't finish drawing the diagram, it is its biggest flaw.

6. Task by each member

Bai Lu	Shen Fanyi	Fang pan
1. All Visualization	1. All Webpage	1. Cleaning data
2. Writing report	2. Writing report	2. Writing report
3. Searching data	3. Cleaning data	3. Recording video
		4. Searching data