Final Project

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Executive Summary

This graphic explains some of the trends of assassinations over the past 10 years (from 2007 to 2016). It demonstrates that assassinations are increasing and that the main target of those assassinations are government officials. Although there are many assassinations recorded all over the world, the visual shows various groupings making it obvious to see the places where assassinations are most common; for example, the Pakistan/Afghanistan area.

Data Background

This graphic uses a dataset from the Global Terrorism Database from the National Consortium for the Study of Terrorism and Responses to Terrorism (START), University of Maryland. It originally had over 135 variables describing over 170,000 terrorist acts from 1970 to 2016. Some of these variables included the location, type of act, type of target, and weapons used.

Data Cleaning

This was a large dataset with lots of information. I started the cleaning process by selecting the variables I wanted to consider for my visualization. I then started sifting through the types of terrorist acts I wanted to include and the time frame. Due to the nature of mapping this information geographically, I removed any terrorist acts without longitude and latitude coordinates.

After cleaning the data, I organized the information into three separate data sets to have an easy-to-work-with data frame based on the types of visuals I wanted to design. Most of them included grouping certain variables and counting the number of terrorist acts for a given type of targeted people and/or location.

```
library(tidyverse)
library(scales)
library(ggrepel)
library(sf)
```

```
world_shapes <- st_read("data/ne_50m_admin_0_countries/ne_50m_admin_0_countries.shp",stringsAsFactors =
```

```
## Reading layer `ne_50m_admin_0_countries' from data source `C:\Users\James\Desktop\School\BYU\Fall 20
## Simple feature collection with 241 features and 63 fields
## geometry type:  MULTIPOLYGON
## dimension:      XY
## bbox:           xmin: -180 ymin: -89.99893 xmax: 180 ymax: 83.59961
## epsg (SRID):    4326
## proj4string:    +proj=longlat +datum=WGS84 +no_defs
```

```
terrorism_raw <- read_csv("data/globalterrorismdb_0617dist.csv")

terrorism_clean <- terrorism_raw[ c(1, 2, 9, 14, 15, 30, 36) ]  %>%
  filter(targtype1_txt %in% c("Private Citizens & Property", "Military", "Police", "Government (General
```

```
  filter(iyear <= 2016, iyear >= 2007) %>%
  filter(attacktype1_txt == "Assassination") %>%
  drop_na(latitude)

# map data
terrorism_map1 <- terrorism_clean %>%
  st_as_sf(coords = c("longitude", "latitude"), crs = 4326)

terrorism_map2 <- terrorism_map1 %>%
  st_transform(crs = st_crs("+proj=robin"))

terrorism_map <- cbind(terrorism_map2, st_coordinates(terrorism_map2))

#timeline chart data
terrorism_assassination <- terrorism_clean %>%
  filter(attacktype1_txt == "Assassination") %>%
  group_by(iyear, country_txt) %>%
  count(iyear, country_txt) %>%
  filter(country_txt %in% c("Philippines", "Afghanistan", "Pakistan", "Somalia"))

#lollipop chart data
terrorism_targets <- terrorism_clean %>%
  group_by(targtype1_txt) %>%
  count(targtype1_txt, sort = TRUE)
```

Individual Figures

Main Figure - Map Chart

First, I wanted to look at where the assassinations were happening around the world and who was being targeted, so I projected a map of the assassinations in the last 10 years using the Robinson map projection. I chose this map projection, because I knew that it was one people would be familiar with.

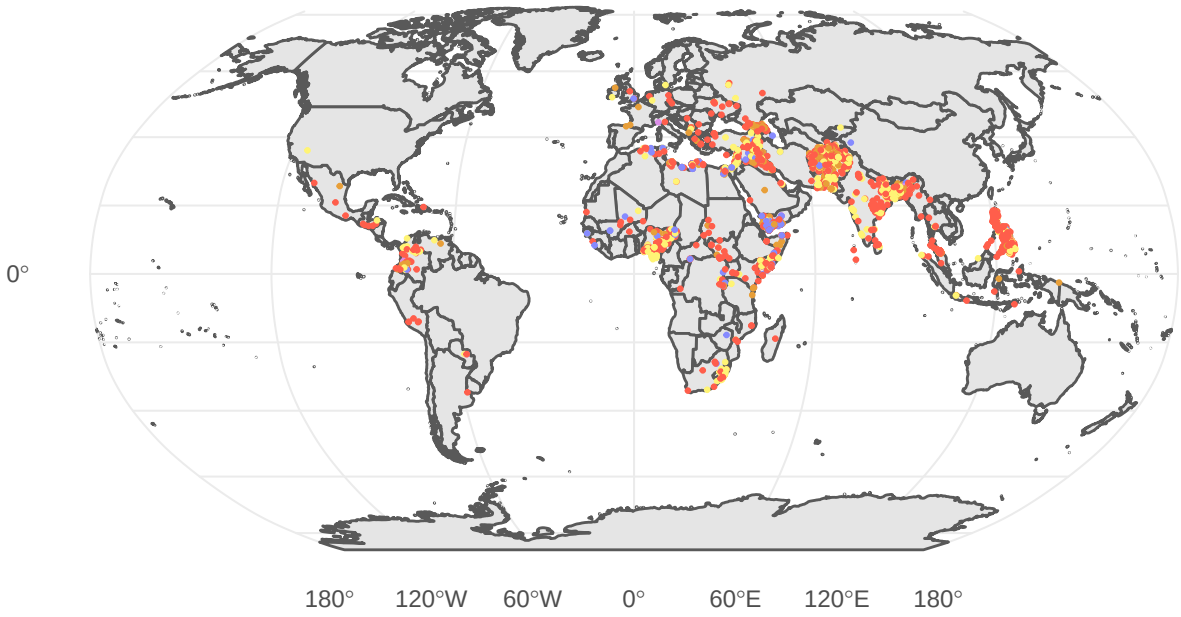
I made this map using the geom_sf function to get the shapes of the country. I then layered it with geom_point to show the actual places where assassinations were happening. The trickiest part was taking the coodinates in my dataset and converting them to a mapable variable. This included converting the original coordinates to the Department of Defense mapping coordinate system to have both longitude and latitude in the same variable, then transforming that new variable to compatible coordinates of the type of map projection I wanted to use (Robinson), and finally, to add all those things together so that I had mapable coordinates for my geom_sf layer and mapable points for my geom_point layer.

I wanted to make it simple and affective. Some of the struggles were finding a good balance for the size of the points. I also chose colors that would be different enough for my audience to see where the different types of assassinations were happening. The scale used was also kept simple so that my audience wouldn't be overwhelmed by the latitude and longitude. I didn't include a legend, title, other text, or sources because they are shared with other graphics. All fonts were modified in Illustrator.

```
assassination_map <- ggplot() +
  geom_sf(data = world_shapes) +
  geom_point(data = terrorism_map, inherit.aes = FALSE, aes(x = X, y = Y, color = targtype1_txt), size =
  coord_sf(crs = st_crs("+proj=robin")) +
  labs(x = NULL, y = NULL) +
  theme_minimal() +
```

```
  theme(legend.position = "none",
        legend.title = element_blank(),
        panel.grid.minor = element_blank()) +
  scale_color_manual(values = c("#DB8EE8",  "#FF5E4B","#868BFF", "#E89F39", "#FFF475"))

assassination_map
```




```
ggsave(assassination_map,
       filename = "output/assassination_map.pdf",
       width = 7,
       height = 4)
```

Figure 1 - Timeline Chart

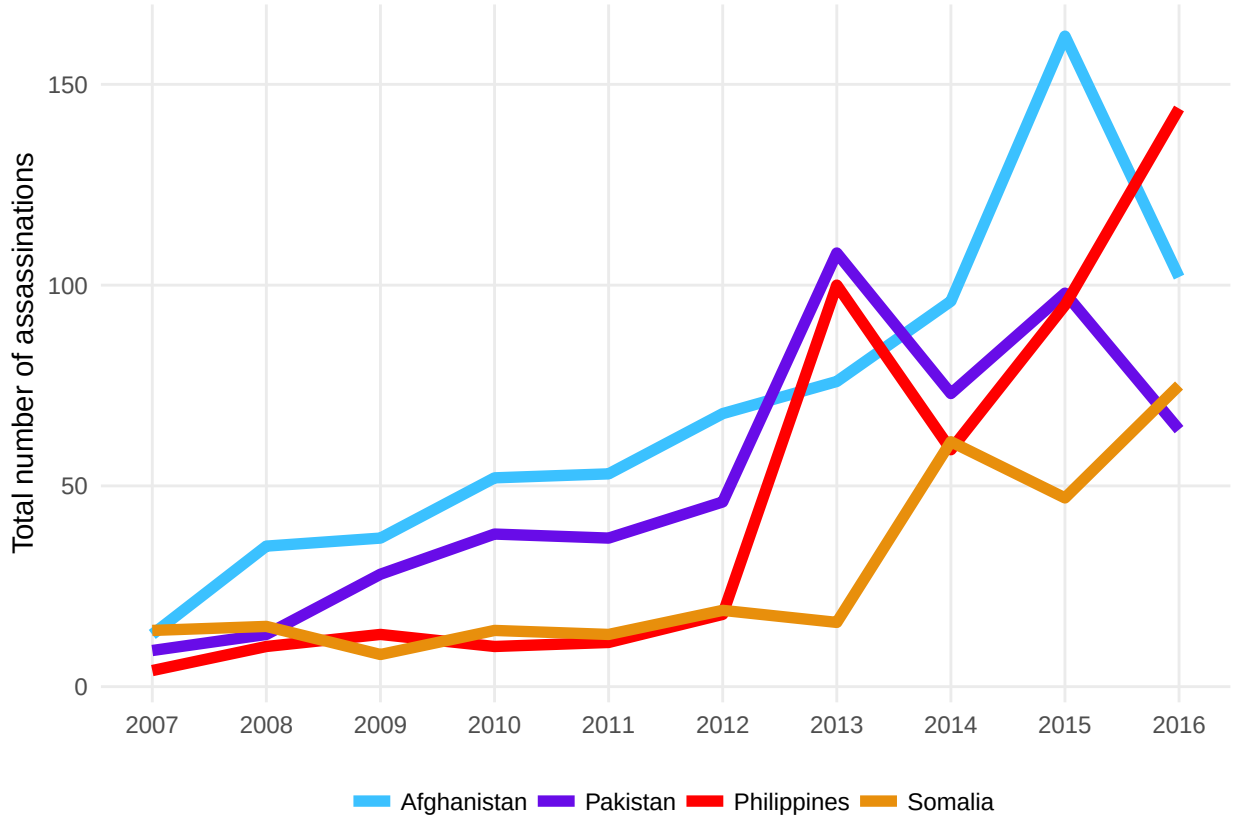
While the map is great, there is no way of knowing how many of those points happened in what year. To clarify, I created a timeline of the top 4 most countries by number of total assassinations. This showcases where assassinations have happened most frequently over the past 10 years.

I made this plot by grouping the countries and years and then counting them based on the number of assassinations in each country per year. Then I looked at the top four countries and mapped them on the timeline chart using geom_line.

I used different and bold colors to make each of the countries highlighted here to standout. This was a little bit of a challenge because I wanted different colors than the map used because they were highlighting different information. The challenge was finding different enough colors yet keeping them in the same type of theme. All fonts were modified in Illustrator.

```
assassination_timeline <- ggplot(terrorism_assassination, aes(x = iyear, y = n, color = country_txt)) +
  geom_line(size = 2) +
  scale_x_continuous(breaks = c(2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016)) +
   scale_color_manual(values = c("#3BC1FF", "#680CE8", "#FF0000", "#E88F0C")) +
   labs(x = NULL, y = "Total number of assassinations") +
  theme_minimal() +
  theme(legend.position = "bottom",
        legend.title = element_blank(),
        panel.grid.minor = element_blank())

assassination_timeline
```




```
ggsave(assassination_timeline,
       filename = "output/assassination_timeline.pdf",
       width = 7,
       height = 4)
```

Figure 2 - Lollipop Chart

Last, I was interested in seeing what types of targets were the most popular targets. Although you get the idea with the map, I used a lollipop chart to show an actual number associated with the top five types of targeted people.

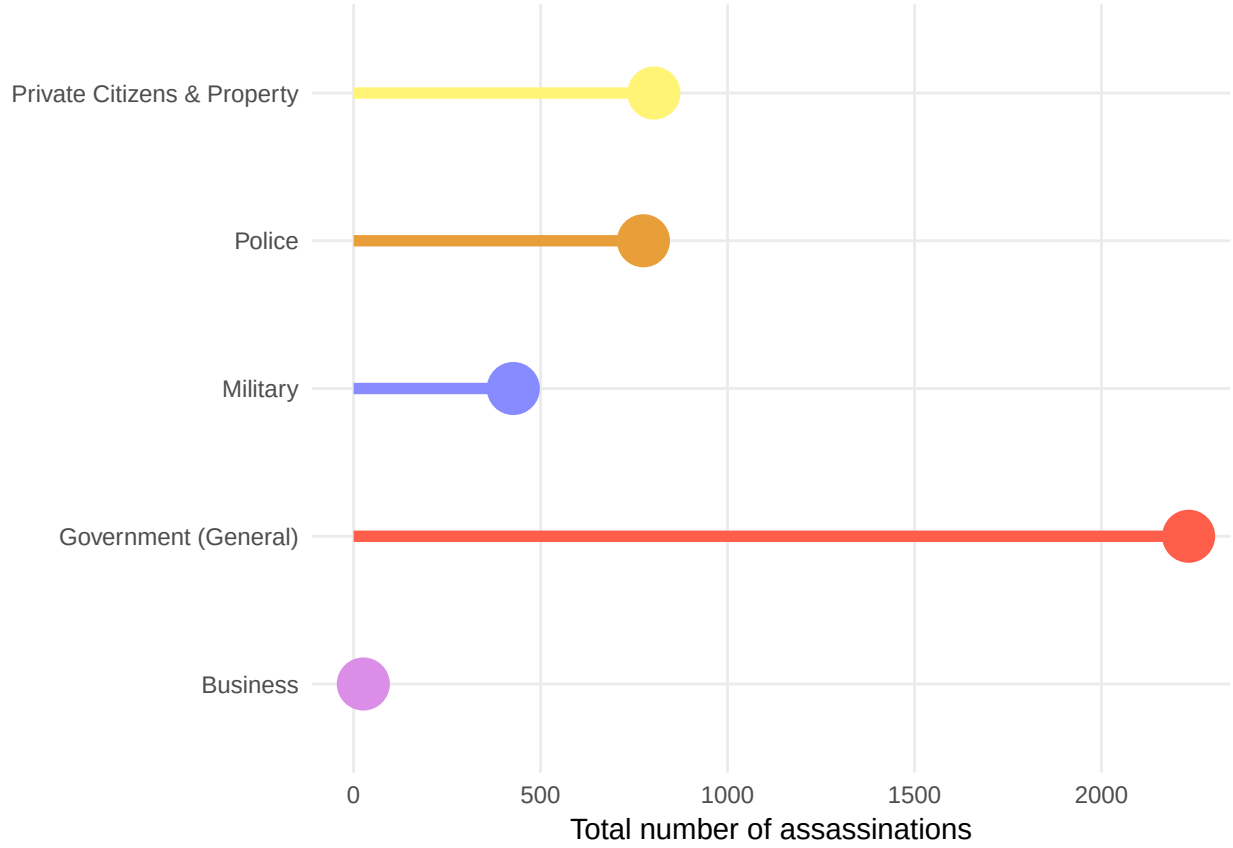
I made this using the geom_pointrange layer. I wanted the bulbs at the end to be large enough so that I could place the actual numbers associated with each target type inside the bulbs. I had to change quit few

things in Illustrator to get it looking how I wanted it to, but it worked out in the end.

Again, I used bold, yet different, colors to differentiate between the types of targets. I used the same coloring system that I used for the map so that I could share some kind of legend in the final product. All fonts were modified in Illustrator.

```
assassination_lollipop <- ggplot(terrorism_targets, aes(x = targtype1_txt, y = n, color = targtype1_txt)
  geom_pointrange(aes(ymin = 0, ymax = n), size = 2, position = position_dodge(width = 0.5)) +
  coord_flip() +
  labs(x = NULL, y = "Total number of assassinations") +
  theme_minimal() +
  theme(legend.position = "none",
        legend.title = element_blank(),
        panel.grid.minor = element_blank()) +
  scale_color_manual(values = c("#DB8EE8",  "#FF5E4B","#868BFF", "#E89F39", "#FFF475"))

assassination_lollipop
```




```
ggsave(assassination_lollipop,
       filename = "output/assassination_lollipop.pdf",
       width = 7,
       height = 4)
```

Final Assassination Visual

I actually had a lot of issues trying to come up with how to add all three images together. I knew they went together (that's why I made the individuals images I did), but getting them to look nice together was a challenge. I ultimately decided to use the map as the main part of the image and using the other two to enhance what the map was saying. Once I figured that out, it was just a matter of where to put those graphics on the map. I wanted the timeline to be close to the countries I was highlighting, but it was hard to find a place for it because there were so many assassinations in that part of the world. I chose to put the timeline towards the top and over America because there wasn't a closer place to fit it without looking awkward. This was a little disappointing because I'm sure my audience would like to see how many - and what type of - assassinations were happening in the US. It turns out that there was almost none there and decided it was OK to cover in order to make the overall image look a little more beautiful. I put the lollipop chart down at the bottom and out of the way because it didn't really matter where I put it and I saw placing it on the leftside - I figure most of my audience reads from left to right - over the rightside.

I added a title and subtitle at the top left so that the reader would know what the visual was saying right away. I also included some text in that space to explain some of the visuals. It was a little tricky not including an explicit legend for the types of targeted people, but I felt like it wasn't necessary given the lollipop chart. So I used the supplemental text to direct people to the lollipop chart so they would know how to read the map at large.

Additionally, I formatted some of the individual graphics in Illustrator to give them a more polished look. In the end, I wanted to show the countries highlighted in *Figure 1*, so I circled the countries and drew lines to where they were on the timeline. I also included small text to go with each of the countries detailing the number of government officials that had been assassinated over the past 10 years.

In the end, I think this visual conveys truth. Adding different dimensions to the graphic helps it convey even more truth by providing clarity.

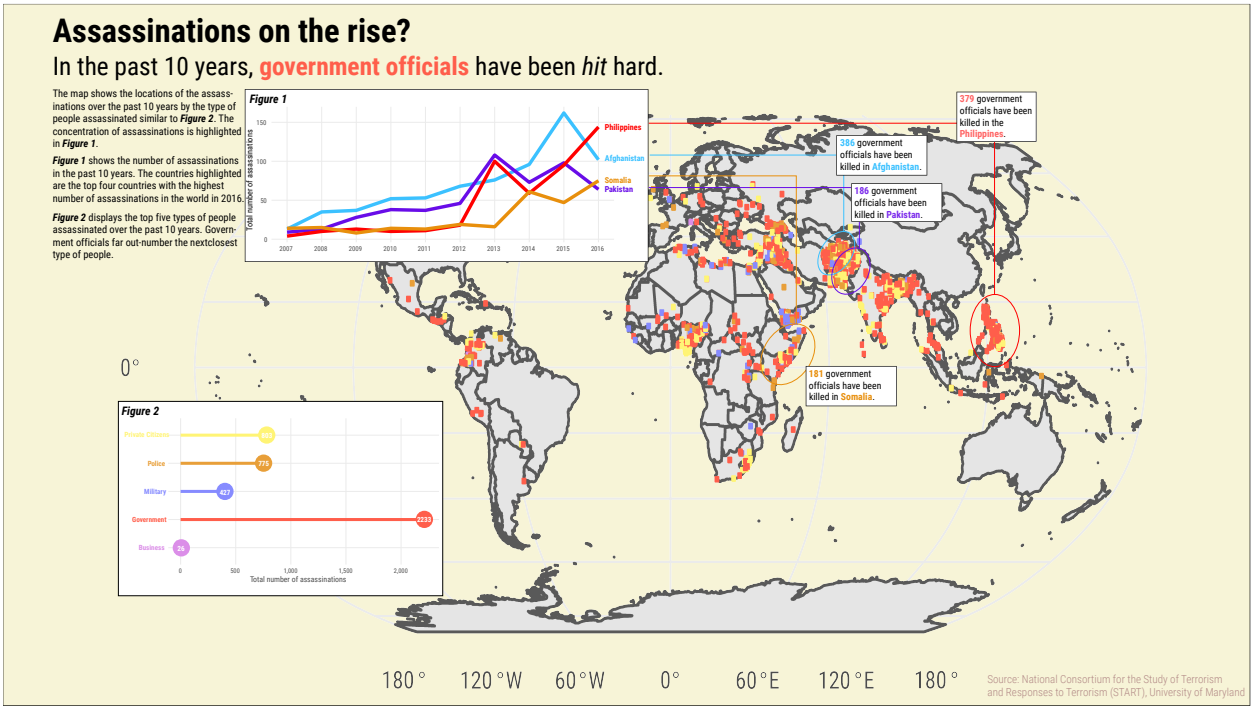


Figure 1: Final Assassination Visual