Course: User and Context in Data Science and Visualization

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Project: Conflict and Violence In Nigeria

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1 Project and data description

1.1 Background

Nigerian states in North East, North Central, and South South have been the most affected by conflicts and violences. Conflict and violence in North East Nigeria is primarily attributable to Boko Haram, the terrorist group responsible for human rights abuses across Nigeria, Chad, Cameroon, and Niger. The violent radicalization of the Boko Haram members and the resulting military operations have reportedly affected nearly fifteen million people since 2009. The south south of Nigeria is renowned for its oil wealth. Militant and pirate groups have operated in the region for decades, targeting oil companies, pipelines, and individuals. Killings, abductions, and robberies are not uncommon, and many people have been displaced from their homes or communities as a result of the violence. In recent years, conflict in the North Central zone has both escalated and expanded as tensions between farmers and herders have risen. The conflict centers around agricultural households and nomadic cattle-herding groups who come into conflict over land access. ABUL et al. 2018

1.2 Research Questions

The objectives of this project is to use visualizations to response to the following questions:

- How is the conflicts and violence distributed across Nigeria?

- Are these conflicts and violence across Nigeria by the different actors related?

- Do the different actors or arm groups have territorial interest?

- Is there a possibility to predict future violence in certain regions by certain arm groups?

- Which are the regions that can be mapped as danger zones for tourists?

1.3 Dataset Description

This data set records the dates, actors, types of violence, locations, and fatalities of all reported political violence and protest events in Nigeria. Political violence and protest activity includes events that occur within civil wars and periods of instability, public demonstrations, and regime breakdown. A subset of the data from January 2016 to December 2017 was extracted for this study. There were 3058 data points with a dimension of 31. Out of the 31 dimensions, the following dimensions were used for this project.

Variable Name	Description	Type	Cardinality
Event Date	When the event took place. Recorded as Day,Month,Year	DateTime	
Year	The year in which an event took place	Categorical	2
Event Type	The types of event that caused the fatality	Categorical	6
Actor1	A named actor or group involved in the event	Categorical	118
Admin1	The largest sub-national administrative	Categorical	37
Location	The location in which the event took place	Categorical	843
Latitude	The latitude of the location	Numerical	
Longitude	The longitude of the location	Numerical	
Notes	A short description of the event	Comment	
Fatalities	Number or estimate of fatalities due to event	Numerical	

Table 1: Variables used for visualisation

This data set was taken from https://www.acleddata.com/data/. The Armed Conflict Location Event Data Project (ACLED) which is a disaggregated data collection, analysis, and crisis mapping project

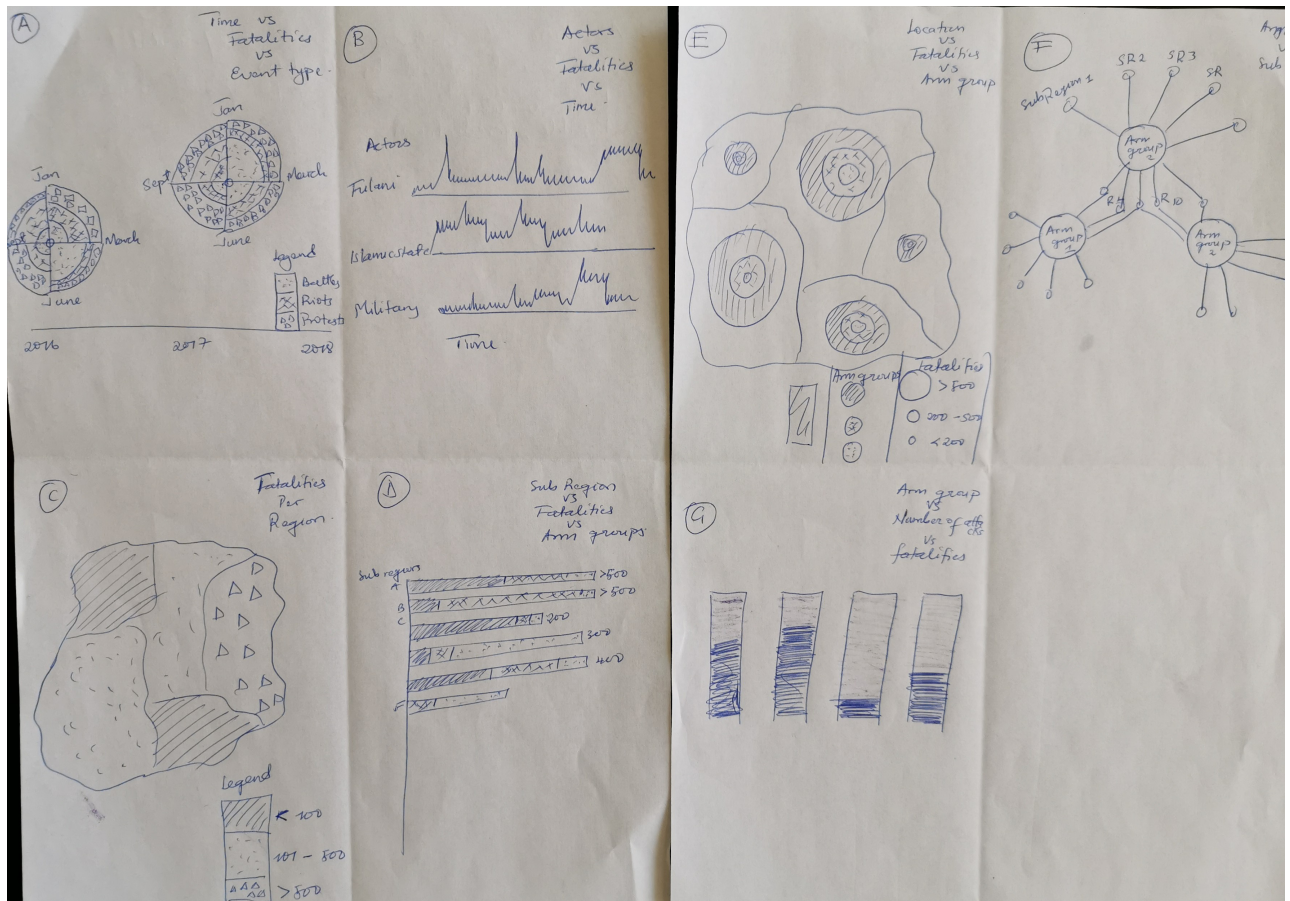# 2 Visual Design

2.1 Exploring Design Space

Figure 1: Exploring Design Space

The sketches in figure 1 helps explore the design space.

- Sketch A shows the fatality rate by event type over time (Quarterly and yearly). Each slice out of the four representing the four quarters of year. It compares the fatality rate by event types. The whole pie vertical position tells the fatality rate over the years.

- Sketch B is a Time series plot of fatality rate by the different actors. It Compares the fatality rate over time by the different actors.

- Sketch C is a geographic representation of fatalities by region. Using different shapes or colors to represent fatality rates by each region.

- Sketch D shows sub region fatalities by the different arm groups. This sketch is linked to sketch (C) showing the different fatality by each sub region by the different arm groups.

- Sketch E: Geographic representation of fatalities by different arm groups. The size of each pies represents the fatalities rate. This pie is sub divided representing the fatalities by each arm group

- Sketch F: A Network representing the various arm groups as large nodes with small nodes representing the regions. This is is to illustrate if particular regions are of interest to arm groups.

- Sketch G shows the number of attacks by each arm group with the fatality rate. This is to illustrate how deadly is each of group.

2.2 Implementation Tools

The visuals implementation was done using a combination of Vega Lite, Vega and Python(Altaire package) programming languages.
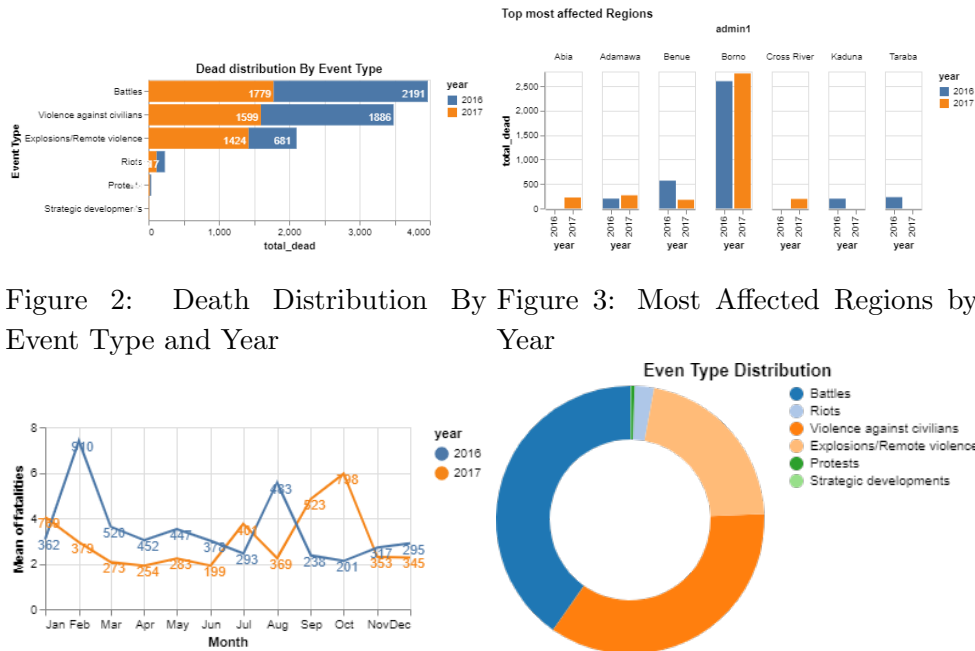
2.3 Exploratory Analysis

Figure 2: Death Distribution By Event Type and Year

Figure 3: Most Affected Regions by Year

Figure 4: Mean Monthly Death Distribution By Year

Figure 5: Death Distribution By Event Type

In total, there were 9,842 fatalities in Nigeria between January 2016 and December 2017. From the event type distribution in figure 5, approximately 97% of the total fatalities were caused by battles, violence against civilians and Explosions/Remote violence. As seen in figure 2, there were more casualties in total in 2016 than 2017 for most of the event types. On the average, there more deaths in every month of 2016 than 2017 except for July, September and October as seen in figure 4. Borno state (5,364 out of the 9,842 deaths) seems to be the most affected with Adamawa and Benue following closely from figure 3.

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3 Results

3.1 Geographical Distribution

Figure 6 is a geographical representation of the total deaths for each event type (figure left) and total number of attacks (figure right). Hovering over each point gives a tool tip of the total death and total attack for each location respectively. The size of each circle has a direct relationship with the total deaths and total attacks. The legend is interactive as it filters the visuals based on the selected event type (figure 7 and 8).

Total deaths and total attacks as seen in figure 6 was unevenly distributed as more deaths by the different event types. There is a cluster of points seen in the north east part of Nigeria indicating large amount of deaths and attacks respectively. Less causalities is seen around the centre part of the country. Other clusters can be seen around the south and southeast part of the country. Looking at the death distribution by event type, figure 7 shows deaths caused by violence civilians seems evenly distributed in the north east, centre and south east. But this is not the case for the deaths caused by battles (figure 8)as more deaths can be found in the northeast part of the country.
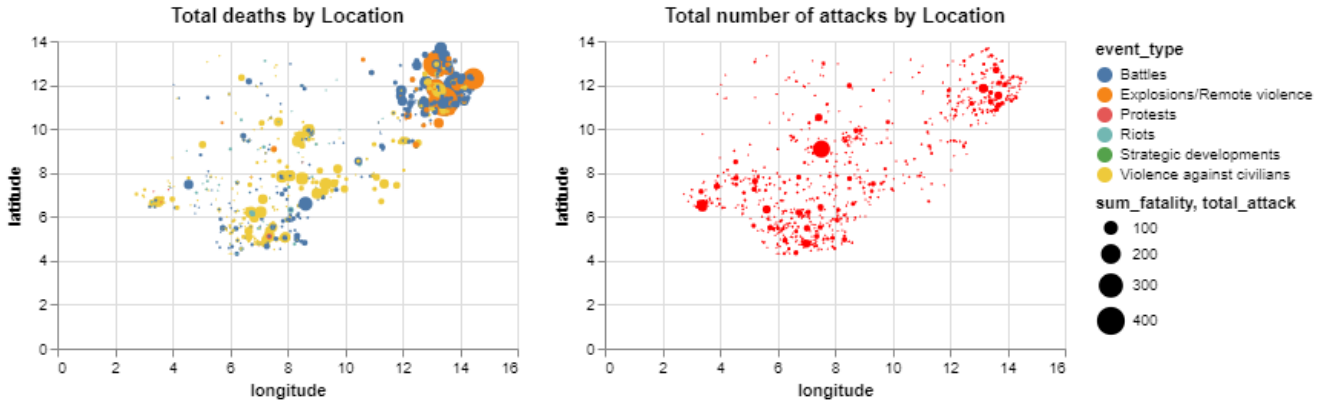

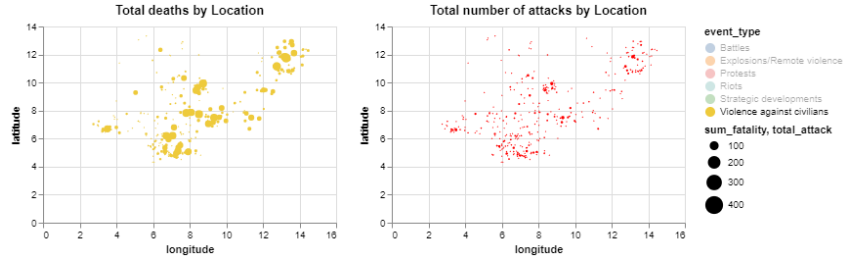Figure 6: Geographical death distribution by Location and Event Type

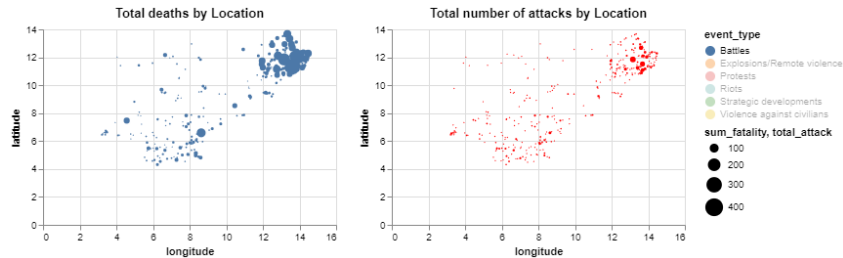Figure 7: Death Distribution By Violence Against civilians

Figure 8: Death Distribution By Battles

3.2 Death Distribution by Actors, Event Type and Year

Figure 9 is an interactive dashboard consisting of three visuals. Top figure is a cross heat map of total deaths and total attacks by event type and administrative unit. The color intensity is relative to the total number of deaths and the size of the inner circles the total number of attacks. The bottom left figure is an interactive bar chart displaying the most deathly groups(actors). There is a slider option to control the number of groups displayed ranging from 5 to 20 with 10 as default. The trend plot (bottom right) shows the total monthly death trend by year. Clicking on the bars for each group filters the heat map and trend plot as seen in figure 10 and 11.

From figure 9 Borno region seems to be characterised with high total number of deaths and total attacks due to the high color intensity and and the sizes of the circle. Death caused by protest seems to be the only event type that is found in all the regions. Military forces of Nigeria, Fulani ethnic militia and Islamic State(Boko Haram) can be regarded as the three most deadly. 2016 generally has more deaths than 2017 for most of the months of the year. As seen in figure 10 and 11, the military forces caused more deaths in many regions than the Islamic state group. But both caused had high number of deaths in the Borno region. The military forces were inconsistent in their attacks as seen in 10 bottom left figure with all the months represents. The Islamic state group started their attacks at the end of 2016 and continue consistently in 2017.
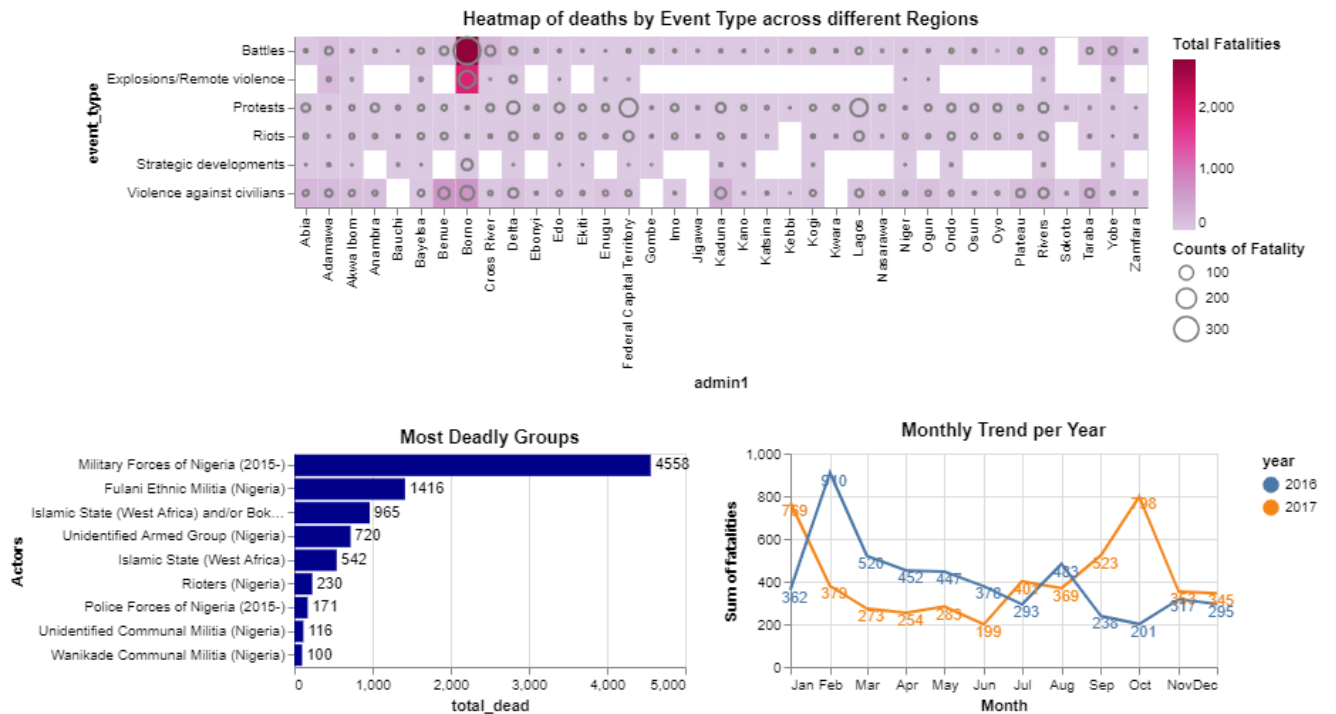

Figure 9: Interactive Visual of Total deaths and Total attack by Event types, Administrative Units, actors and Monthly Trend by Year
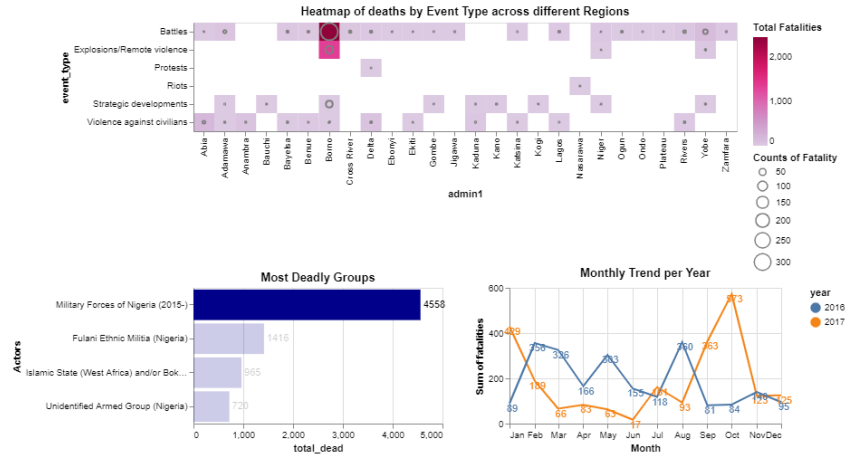
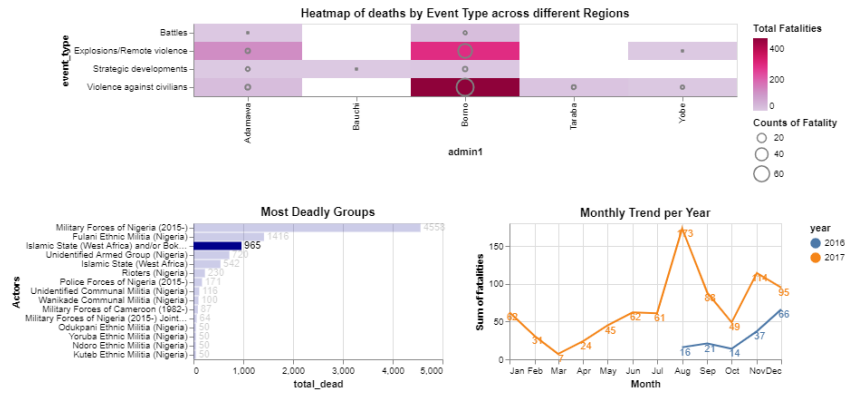Figure 10: Death Distribution By Military Forces Of Nigeria

Figure 11: Death Distribution By Boko Haram

4 Discussion and Conclusion

In most conflicts and violence experienced by countries, some parts are heavily affected than others. Same pattern is seen in this project as total fatalities caused by violence and conflicts in Nigeria were unevenly distributed. Majority of the death toll was seen in the northeast part of Nigeria. This part of the country witnessed most of the death due to battles, explosions/remote and violence against civilians. For reasons still to be known, Borno state turn out to be the most affected region as most of the top deadly actors like the Military forces of Nigeria, Fulani Ethnic, Militia Boko Haram etc all attacked large number of attacks leading to high fatalities rate in this region. The Borno region was of interest to many of the arm groups. For this reason Borno region could be map as a risk zone for incoming tourists. The fatality trend across the different months by year for the different actors did not really show a clear pattern. Most of the attacks were random so it will be difficult to predict when next arm groups will attack.

6

References

ABUL et al. (2018). "Conflict and violence in Nigeria. Results from the North East, North Central, and South South zones". In: *The World Bank*.

5   Appendix

All the codes used in this project is found in the following link. `https://github.com/ivombi/Data-visualisation.git`

Visit my blog for more visuals: `https://ivokubam.wixsite.com/website`