

Geo-semantic surveillance and profiling of abduction locations and risk hotspots using print media reports

Toyib Ogunremi, Olubayo Adekanbi, Anthony Soronnadi, David Akanji

Data Scientists Network

INTRODUCTION

Kidnapping is a significant social risk in Nigeria which often lack adequate intervention due to underreporting of cases by the public due to fear of retaliation from suspected perpetrators or involvement of security operatives.



Figure 1. Nigeria kidnapping Crisis(Al Jazeera)

This area is also under-explored by researchers due to the unavailability of open-source local crime data. In response, we have developed a data-driven solution by generating a reliable dataset of crime locations and entities in Nigeria. We have therefore generated insight into the spatio-temporal dynamics of kidnapping occurrences nationwide.

METHODOLOGY

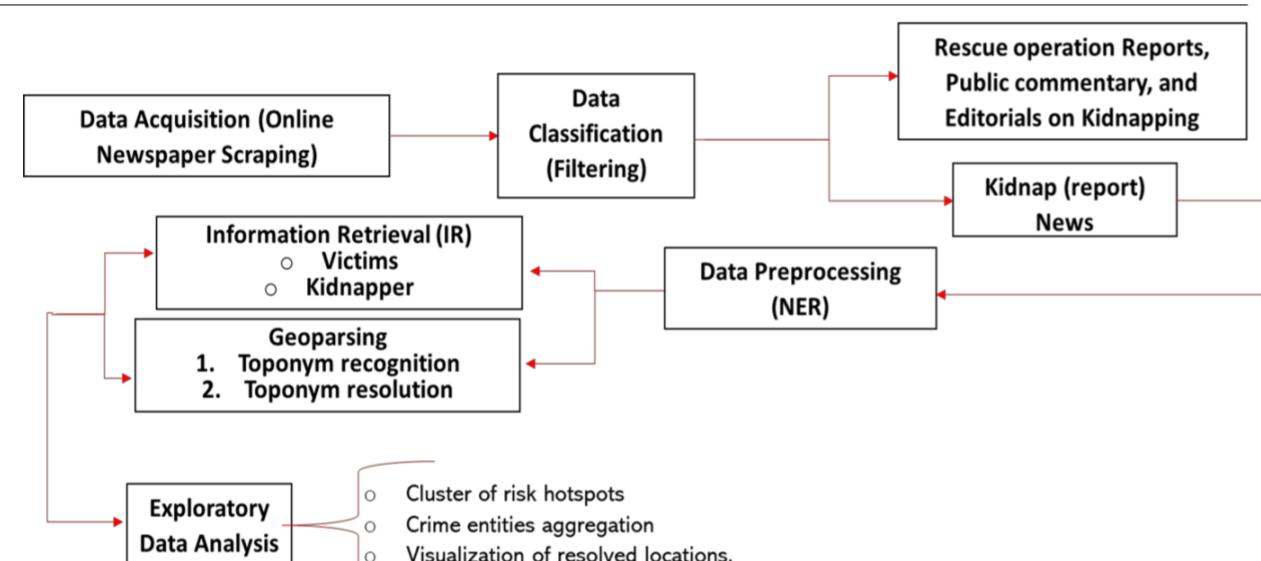


Figure 2. Methodology workflow



Figure 3. Newspaper headline on Kidnapping

Entity Recognition & Semantic Analysis

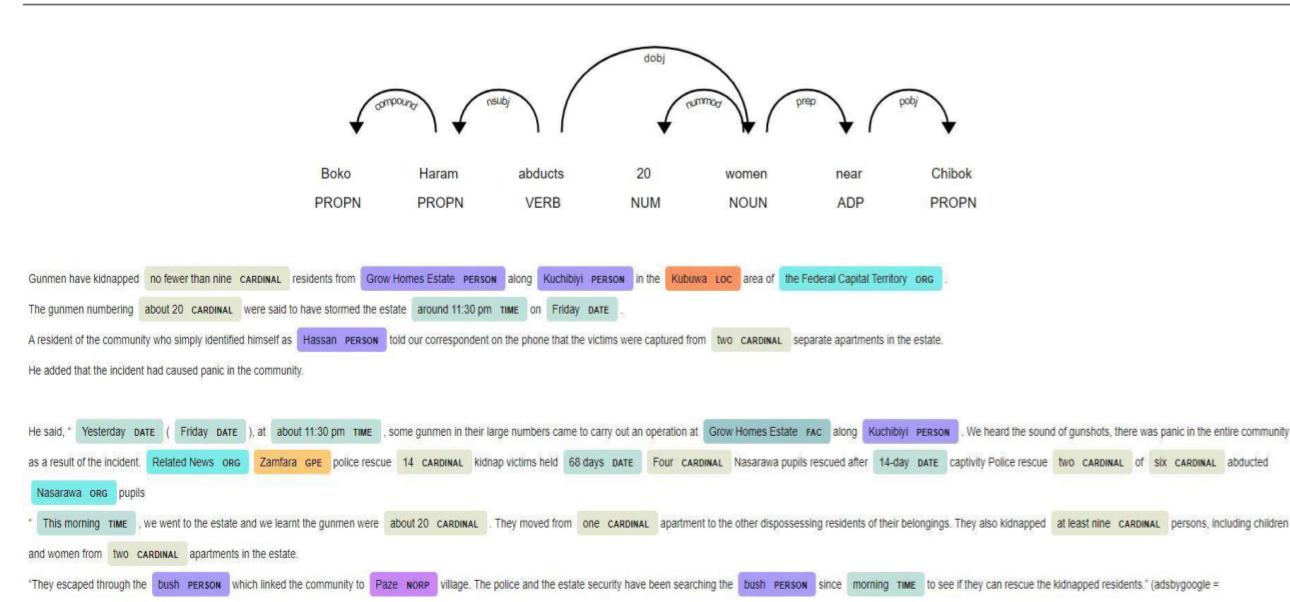


Figure 4: Process of Entity recognition and Semantic Analysis

publish_date	headline	victims	kidnapper	address	Latitude, Longitude
5/9/2023	Bandits kidnap 40 Kaduna worshippers, nine emirâ€™s children	40 Kaduna worshippers, nine emirâ€™s children	Bandits	Chikun, Kaduna, Nigeria	10.2703859, 7.179026
4/7/2023	Gunmen kidnap Nasarawa ex-deputy governor, Gye-Wado	Nasarawa ex-deputy governor, Gye-Wado	Gunmen	960134, Wamba, Nasarawa, Nigeria	8.943208, 8.6023254
3/12/2023	Gunmen kidnap nine in Abuja estate	nine	Gunmen	Grow Home Estate, Bwari Area council, 901101, FCT, Nigeria	9.1921367, 3.8858955

Table 1. Sample generated dataset

RESULTS

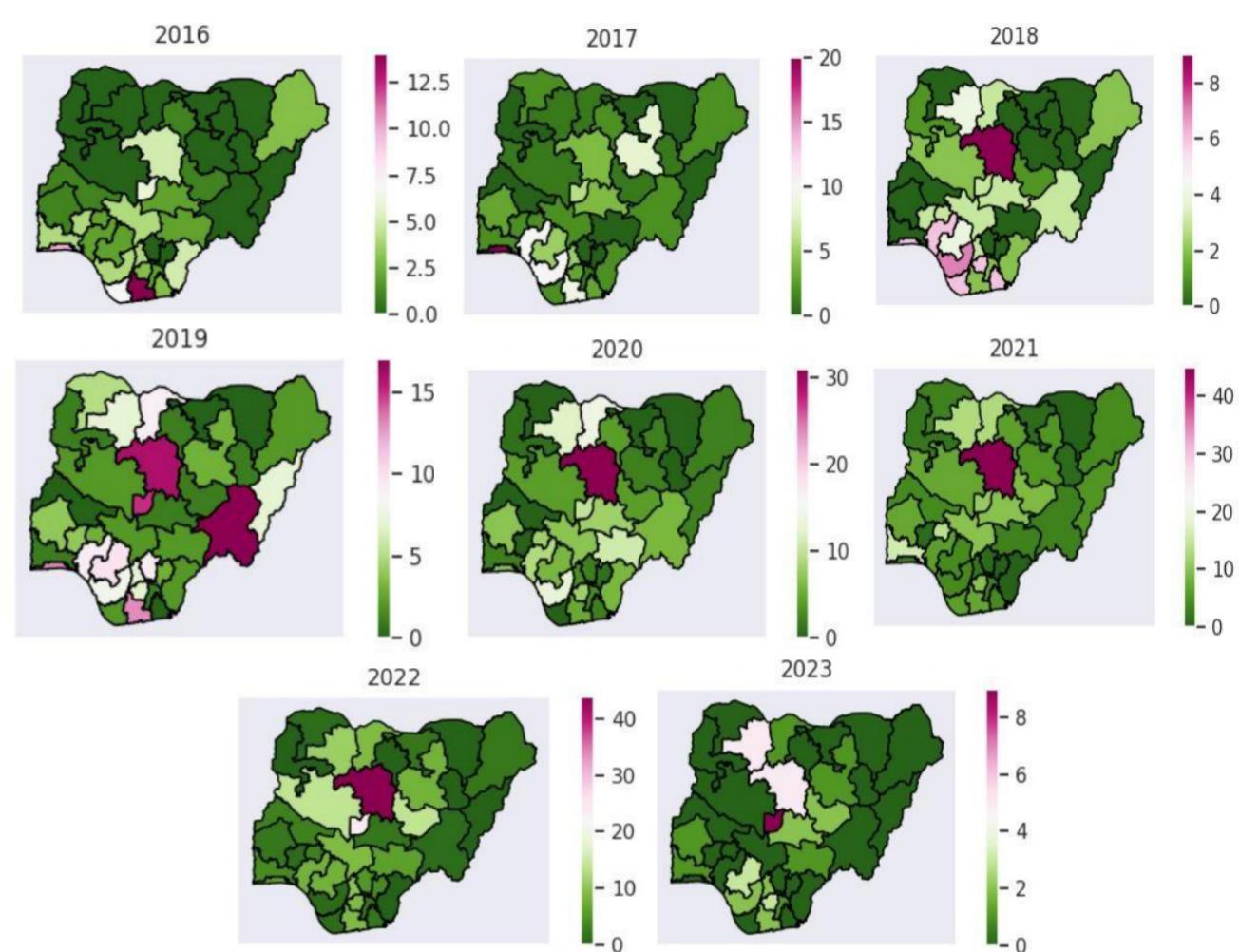


Figure 5. Periodic hotspots clusters

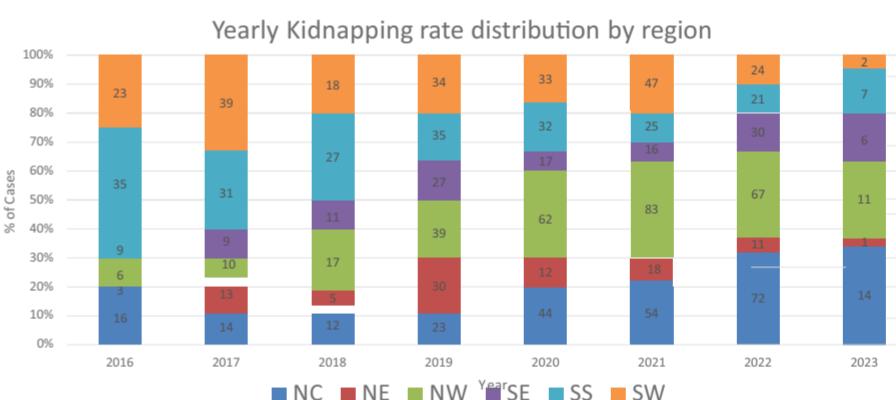


Figure 6. Regional distribution of cases over the last 7 years.

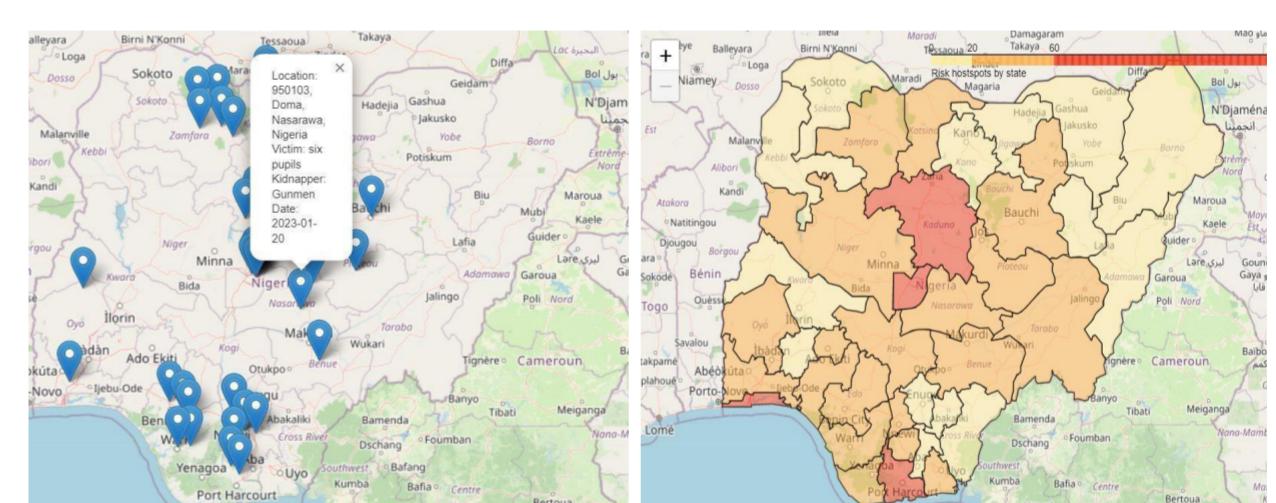


Fig7: Potential application in Surveillance systems and Dashboarding

CONCLUSION

Our analysis revealed the spatio temporal analysis of kidnapping cases in Nigeria, 2019 has most states affected, this can be attributed to the COVID-19 induced hardships. We observed that some state's high kidnapping rates could be attributed to factors such as overpopulation, politics, Religious intolerance and high cost of living, as noted in high-risk states like Kaduna, Lagos, Rivers, and Federal Capital Territory FCT.

This study gathered data from online newspaper report from Punch Newspaper, which has a cutoff of articles beyond 2016 on their website for the subject matter.

Future work will focus on improving feature extraction from newspaper articles beyond the syntactic entities to circumstances of crime events and other crime types like theft, rape, riot, murder etc. while also extending this surveillance technique to other major African languages like Hausa, Igbo and Yoruba which can finally be augmented with a speech to text pipeline to handle audio reported crimes.

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