PREDICTING THE FALL OF A REGION: A SPATIO-TEMPORAL ANALYSIS OF RUSSIA-BACKED SEPARATISTS IN THE DONBASS

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AGENDA

• Background
• Models
• Goals and Objectives
• Methodology
• Project Timeline
• Anticipated Results
BACKGROUND – UKRAINE

- Second largest European country and covers approximately 600,000 square kilometers
- Population of 43 million
BACKGROUND – EVENTS

- Russia annexed Crimea in 2014 and annexed Donetsk and Luhansk in 2022
- Russia’s proxy forces of the Donetsk and Luhansk Peoples Republic continue to pose a threat to the security of Ukraine and Europe
- The conflict has caused thousands of deaths and approximately one-and-a-half million people to flee the region
- The military actions caused a sharp decline in the industrial output of the region between 2014-2016

The composition of the DPR military consists of mercenaries from Russia as well as locals from the region of Donbass

Tactics of conducting operation for the seizure of administrative buildings showed the excellent combat training of the people’s militia of Donbass
BACKGROUND – CURRENT STATUS

- There is an ongoing war in the Donbass
- Russia currently controls the most Eastern part of Ukraine
- Since the area was already controlled prior to the invasion, does it offer any strategic significance?
BACKGROUND – WHY THIS CASE

• Predictive analysis for future conflicts

• Questions to be answered by research through a geospatial story:
  • What strategic significance does the Donbass area of Ukraine provide to Russia?
  • How does the occupation of the Donbass assist with Russia’s military?
  • Does the geography of the Donbass provide more than the bordering region of Russia?
  • What short- and long-term implications does occupying the Donbass give to Russia?
  • What is the political objective by partially occupying a country prior to a war? (May be beyond the scope)
MODELS

*Random Forest Method* – combines the output of multiple decision trees to reach a single result

*Kernal Density* – used to analyze the spatio-temporal variation of attacks in the Donbass
MODELS

- Global Terrorism Database
  - Social elements
    - Ethnic Power Relations
    - Major drug regions
    - Population density
    - Nighttime light
  - Natural elements
    - Average precipitation
    - Average temperature
    - Temperature anomaly
    - Drought index
    - Multihazard frequency
  - Geographical elements
    - Topography
    - Urban accessibility
    - Distance to a major navigable lake
    - Distance to an ice-free ocean
    - Distance to a major navigable river

- Events Database
  - Training set
  - Test set

- Geo Database
  - Feature dimension

- RF Classifier
  - All data
  - Tree

- Potential terrorist attacks risk on the IndoChina Peninsula

Tools: C++, R, ArcGIS
DATA

ACLED provides historical context of:

• Battles
• Violence against civilians
• Explosions/Remote Violence
• Riots
• Protests
• Strategic Developments

The World Bank provides historical context of:

• Labor force
• Population – gender
• Migrant stock
DATA

The Humanitarian Data Exchange provides historical context of:

- IDPs
- Refugees
- Food security
- Acute malnutrition
- Poverty Rate
- GIS data (administrative boundaries)
WORKFLOW

Case Study of the effects of DPR /LPR on Ukraine

Databases
- World Bank
- Armed Conflict Data

Hierarchy

Articles
- Tactics

Reporting
Administrative boundaries

GIS demographic layers

Attack Data

Predictive Analysis
GOALS AND OBJECTIVES

• Can this be used to predict future conflicts and evacuate areas prior to a conflict

• Can policymakers use this when assisting another nation

• ArcGIS outputs of predictive analysis using spatial statistic tools
ANTICIPATED RESULTS

Hypothesis 1: The area’s immediately surrounding the Donbass with similar socio-economic variables, and robust infrastructure will be high risk for possible conflict.

Hypothesis 2: Ukraine’s large cities such as Kiev and Lviv will be the hotspots for possible predictive conflict.
POSSIBLE VENUES/TIMELINE

- March- April 2023
  - Data analysis
  - Compile results

- May 2023
  - Present Results

- Geospatial World Forum
  - 2-5 May, The Netherlands

- FOSS4G 2023
  - 26 June – 2 July, 2023
REFERENCES


