TOWARDS AI-DRIVEN PREDICTION OF TERRORISM RISK BASED ON THE ANALYSIS OF LOCALIZED WEB NEWS

➔ **Abstract**

- A framework utilizing machine learning (ML) and deep learning (DL) is proposed to predict the likelihood of terrorist incidents in specific regions using news data from the Global Database of Events, Language, and Tone (GDELT) and historical incident data from the Global Terrorism Database (GTD).

➔ **Framework Overview**:

- Utilizes the GDELT database, which aggregates news events globally, and the GTD, a detailed record of historical terrorism incidents, as ground-truth data.
- Combines machine learning and deep learning methods to enhance the prediction of terrorism likelihood within specific timeframes and locations.
- Introduces a novel feature selection methodology using Random Forest models to identify features with high predictive power from vast, heterogeneous news data.

➔ **Methodology**:

- **Data Collection**: Localized news articles related to socio-political instability are extracted.
- **Feature Selection**: Random Forest models rank the predictive power of individual features, retaining only those that significantly contribute to prediction accuracy.
- **Model Training**: Machine learning (e.g., Support Vector Machines) are employed to predict terrorism risks.
- **Evaluation Metrics**: The models are assessed using various scores.

➔ **Prediction Models**

- ML models: Logistic Regression (LR), Support Vector Machine (SVM), Random Forest (RF), and Hybrid Ensemble.

➔ **Case Study**:

- Focused on the United Kingdom, the framework demonstrated superior performance compared to baseline and traditional feature selection models.
- Highlighted specific socio-political indicators that could serve as early warnings for potential terrorism.

➔ **Key Contributions**:

- The framework outperformed previous approaches by selectively leveraging features relevant to terrorism prediction.
- It emphasized the importance of integrating localized news data with historical records for better prediction and resource allocation in counter-terrorism.

➔ **Implications**:

- Assists law enforcement and policymakers by providing actionable insights into regions with high terrorism risks.
- Facilitates proactive measures, including heightened surveillance and socio-political interventions, in vulnerable areas.

Predicting Terrorism: A Machine Learning Approach

This paper focuses on identifying predictive variables of terrorism and their implications for counter-terrorism policies using advanced machine learning methods.

- ➔ **Research Gaps Addressed**:
  - Traditional models fail to achieve high predictive accuracy due to reliance on linear assumptions and limited variables.
  - This study introduces non-linear ML techniques to better capture the complexity of terrorism predictors.
- ➔ **Methodology**:
  - **Data Sources**: Draws from GTD, World Development Indicators, and other socio-economic datasets.
  - **Algorithms Used**:
    - **Machine Learning Models**
      - Classical Models:
        - Ordinary Least Squares (OLS) Regression
        - Poisson Regression
      - Tree-Based Models:
        - Random Forests
        - Regression Models
  - **Feature Importance**:
    - Ranks variables like political instability, assassinations, and socio-economic disparities based on their contribution to predictive accuracy.
    - Examines non-linear effects and "tipping points" where certain factors significantly increase terrorism risk.
- ➔ **Findings**:
  - Political and economic instability are key predictors of terrorism.
  - Variables like democracy and economic institutions often interact in complex, non-linear ways to influence terrorism likelihood.
- ➔ **Policy Applications**:
  - The ranked list of predictive variables offers policymakers a guide to prioritize interventions.
  - Identifies "leverage points" where targeted actions (e.g., improving economic opportunities or reducing ethnic tensions) can mitigate terrorism risks effectively.

The Economic Costs of Conflict: A Case Study of the Basque Country

A comprehensive analysis of the long-term economic effects of terrorism, focusing on the Basque Country as a case study.

- ➔ **Historical Context:**
  - Explores the impact of terrorism on the Basque economy from the 1970s to the 1990s.
  - Terrorism included targeted violence, extortion, and large-scale disruptions.
- ➔ **Methodology:**
  - Synthetic Control Method:
    - Constructs a "synthetic Basque Country" using data from other Spanish regions to estimate what economic growth might have been without terrorism.
    - Matches pre-terrorism characteristics like GDP, investment ratios, and industrial share to create a comparable baseline.
- ➔ **Findings:**
  - Economic Decline:
    - The Basque Country's GDP was consistently 10% lower than the synthetic region during periods of intense terrorism.
    - Ceasefires briefly improved economic conditions, suggesting a direct link between terrorism cessation and economic recovery.
  - Sectoral Impact:
    - Industrial and investment-heavy sectors were most affected, as businesses relocated to safer regions.
  - Lagged Effects:
    - The economic impact of terrorism often manifested years after major attacks, emphasizing the need for long-term recovery strategies.
- ➔ **Broader Implications:**
  - Confirms that terrorism hinders economic growth by increasing uncertainty, deterring investment, and forcing capital flight.
  - Provides a model for other regions to estimate the economic costs of conflict and plan recovery measures.