



Criminal Investigations
and Network Analysis
A DHS CENTER OF EXCELLENCE
AT GEORGE MASON UNIVERSITY

Using Deep Learning to Extract and Analyze Dynamic Knowledge Graphs of Criminal Networks from Publicly Available Text

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Criminal Network Analysis Dynamic Patterns of Criminal Activity

SUMMARY

This goal of this project is to automate building and analyzing models of criminal networks from textual data in order to understand how they operate, how they change and adapt over time, and how to counteract them. To do this, the researchers will build on recent advances in natural language processing and deep learning to extract comprehensive and accurate knowledge graphs of the operations, behavior, and dynamics of different criminal networks from available text data. The research team will also mine the resulting networks to discover key components, identify changes, and develop approaches that will support DHS capabilities across components and combat illicit activity.

PROBLEM STATEMENT

Research investigating the operational structures and behaviors of criminal networks is a priority area for countering criminal activity. However, this area critically lacks methods that can automatically extract knowledge graphs from textual data and build accurate models of different types of criminal networks, their dynamic changes over time, and the interactions between them. These networks are very large, heterogeneous and complex, and are highly dynamic.

APPROACH

Using knowledge graph extractions from text, the team will individual actors and entities in a human smuggling network that facilitates movement into the United States. The team will map the smuggling network and identify geographical origins, routes, and destinations within the United States. The team will use advanced data analytics and network analysis to understand the processes and elements of the human smuggling phenomenon.

ANTICIPATED IMPACT FOR DHS

The anticipated impact of this research is relevant to DHS's 2020-2024 DHS Strategic Plan:

- Goal # 1: Counter Terrorism and Homeland Security Threats. Specifically, Objective 1.2: Detect and Disrupt Threats: Sub-Objective: 1.2.3 Prevent foreign threat actors from exploiting travel, trade, financial, and immigration systems for illicit purposes.
- Goal # 2: Secure U.S. Borders and Approaches. Specifically, Objective 2.2: Extend the Reach of U.S. Border Security; Sub-Objective: 2.2.1 Investigate, degrade, and dismantle transnational criminal organizations (TCO).

The primary DHS components whose mission this research will serve include the Customs and Border Protection (CBP), Homeland Security Investigations (HSI) Intelligence & Analysis (I&A), and Federal Law Enforcement Training Centers (FLETC).