Modeling Human Trafficking

Abstract: Human trafficking is modern day form of slavery. Child trafficking is a particularly tragic part of the large, lucrative criminal enterprise of human trafficking. In 2016, New York City's Administration for Children's Services identified 2,400 child sex trafficking victims in New York City and, in that same year, Texas identified about 79,000 child sex trafficking victims. In 2017, the National Center for Missing and Exploited Children (NCMEC) received more than 10.2 million reports of child exploitation. This number greatly exceeds the current national and global estimates for a recognized pandemic - Covid-19. Most of law enforcement's approach reflects a reactive effort to support the investigation and interdiction of human trafficking. A more proactive effort would be to disrupt human trafficking strategically with evidenced-based predictive models of how traffickers adapt and adopt new methods, tools and channels to market current grooming victims for preventative responses with resources and aid for them.

This project will explore data around human trafficking, public health data, and other publicly available data to understand trends around this issue. The project will attempt to understand how human trafficking cases can be predicted based on prior trends and new emerging data. The project will include data analysis, machine learning, visualization, statistics, mapping, and other analysis methods.

Text Analysis of Prosecuted Federal Crime Data

This project will analyze WestLaw text data and other publicly available datasets of prosecuted criminal crimes. The project will involve text analysis such as latent dirichlet allocation, as well as merging in other criminal datasets to identify trends around various types of crimes committed that are prosecuted at the federal level by crime type. Written text case findings are available, and additional attributes will be gathered from national and state crime databases. The project will look for trends among the cases from the judicial case findings that may not be readily apparent in publicly available crime statistics. The project will include text analysis, data analysis, machine learning, visualization, statistics, mapping, and other analysis methods.

Walk Through Metal Detector Detection Analysis

When utilizing metal detectors at a large venue such as a sports stadium, there are the competing objectives of accuracy of the patron screening and the speed of throughput. This research, carried out in collaboration with large sports venues, analyzes the patron screening method of walk-through metal detectors ("walk-throughs").

Statistical analysis of past experimental designs and data collection is the focus of the project, helping large venues better understand the performance of walk-throughs in real outdoor settings. Because of the number of experimental factors to be considered (type of item, location and height of object, orientation, speed of object passing through the machine, walk-through security setting, etc.), designing experiments require a sophisticated design tool called combinatorial experimental design. Experimental designs can focus on various questions, such as: does a walk-through catch each of the pre-specified prohibited test items; can multiple metal test objects can be hidden on a person and tested all at once in different height zones; how does human gait affect detection; what other detection challenges appear in the data collected in past experiments? This project will include design of experiments, statistics, visualization, exploratory data analysis.