Identifying Human Trafficking

Josh DuFault, Saeideh Shahrokh, Anna Harvey, Jared Dunnmon, Greg DeAngelo, Mike Cafarella, Chris Ré

jdufault@stanford.edu, saeideh.shahrokh@accenture.com, anna.harvey@nyu, jdunnmon@stanford.edu, gregory.deangelo@gmail.com, michjc@umich.edu, chrismre@cs.stanford.edu
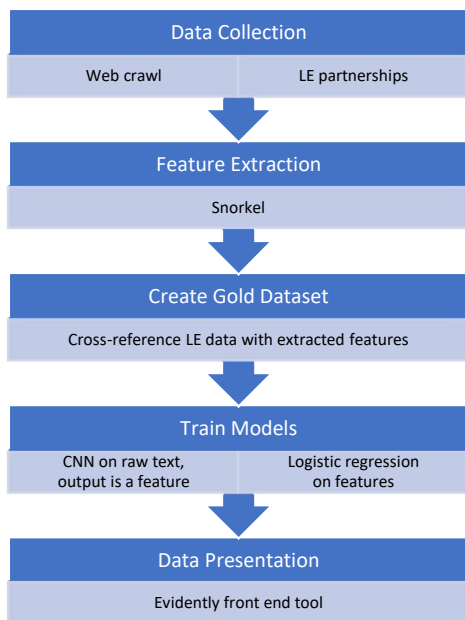
Objective

- Use data programming and machine learning methods to identify sex trafficking victims from online sex ads.

Data Sources

- Approximately 1.6 billion online sex ads.

- Over 60 thousand phone numbers identified by law enforcement (LE) as associated with sex trafficking.

Pipeline

Data Collection	
Web crawl	LE partnerships

Feature Extraction
Snorkel

Create Gold Dataset
Cross-reference LE data with extracted features

Train Models	
CNN on raw text, output is a feature	Logistic regression on features

Data Presentation
Evidently front end tool

Department of Justice Presentation

Technology

- Most data tools rely on table-like **structured databases**
- A bank's database might look something like this:

Name	Address	DOB	Balance
Mike Cafarella	Ann Arbor, MI	1/1/01	100.00
Anna Harvey	New York, NY	2/1/01	200.00
Greg DeAngelo	Claremont, CA	3/1/01	300.00
…	…	…	…

- In contrast, most webpages and sex ads are **unstructured text**

!!!! SWEET ASHLEY !!!! for a LIMITED TIME Only !!!!! - 27
Posted: Thursday, September 12, 2013 12:03 AM

Reply

Hello i'm Ashley and I am 100% real and would Love to make your dreams come true Pic's are 100% real and current, cant wait to meet you.
So call ▇▇▇▇▇ for the time of your life, Outcalls only
Poster's age: 27

- Location: St. Augustine, St Augustine
- Post ID: 5350879 staugustine

Information Extraction

- We would prefer to have a **structured** version of the crawled ads:

Phone	City	State	Rate	Service	Age	…
904-555-1212	St. Augustine	FL	N/A	outcall	27	…
212-555-1212	New York	NY	200/hour	incall	22	…
…	…	…	…	…	…	…

- Recent developments in **information extraction** research allow us to recover a high-fidelity **structured database** from text
- Good information extraction recovers textual claims *accurately* and *completely*, despite variation in natural language, slang, word choice, etc.
- Past methods were either low-accuracy or incomplete, yielding databases that contained errors, or that missed facts in the source text
- Hard-to-use and exotic tools sometimes exist to hide low-quality extraction
- Our methods: funded by DARPA Memex, grew up at Stanford, formed basis of Apple-acquired startup

Slides from the presentation given to an assembly of U.S. District Attorneys.

Trial Run

The Evidently tool showing an example analyst work flow to identify a sex trafficker.

Results

- Using a trial of 30 million ads, we identified 6 thousand ads associated with known sex trafficker identifiers.

- Our model correctly classified ads as trafficking/not trafficking with 94% accuracy.

- Several US Districts have expressed interest and we are preparing Evidently for a trial fielding in Connecticut.

Next Steps

- Integrate additional data sources: opioid clinic data, urban public school calendars, domestic violence calls.

- Obtain additional positive identifiers from LE.