13. Data Science and Machine Learning

TL;DR Data Science and Machine Learning

- Data science nice, but big volume, patterns not obvious: use machines.
- AI good on other side, e.g. deepfakes; also for detection etcetc - Pablo's talk on AI/ML and disinfo.

Data science

Data science is a process. There are many versions of this process, but it basically goes from identifying and asking a set of business questions, to attempting to answer them by finding and cleaning datasets, building models based on them, and using those models to understand part of the world and/or predict what might happen next in it, then explain that the people who need to make decisions based on your findings.

The start and end of data science is all about people: we need to think in terms of end-users, questions and problems.

Disinformation Modelling at Scale

There's a lot of academic work on modelling disinformation at scale. Some of the models used include:

- automated fact checking
- cascade and time-based models
- social network analysis: Pablo is keen on scale-free networks for this

Tactical data science

Working from the data we have instead is instructive and can teach us things about the disinformation environment, but that's not tactical data science. Most of the work so far hasn't been tactical. At speed, this becomes a threat intelligence nerd fight, that looks very similar to the other threat intelligence nerd fights: disinformation creators vs disinformation defenders.

A lot of what we do is detective work, where the algorithms and tools are there to assist us. This has a lot in common with data forensics, threat intelligence work and OSINT.

Where and how to look for examples

"tactical data science" is the work you do in the moment, chasing disinformation incidents and campaigns as they happen. There's a lot of literature out there on disinformation algorithm design, which is nice, useful in some circumstances \(e.g. as a dayjob\), but not helpful to people faced with "social media is happening, work out how to reduce harm". There's a lot there of the "there's a dataset, let's see what we can do with it" persuasion.

Places to look for ideas in this field include:

- Trained amateurs - sites like towards data science \(lots of student projects\), github, medium.
- Academics - known research groups, paper repositories, conference outputs
- Adjacent groups
- Student projects - yes, it's students, but they're usually supervised in latest techniques, keen to try them out online, and willing to write up their code.

Good search terms include "computational propaganda", "misinformation", "disinformation". This is where the data science comes in...

Machine Learning

Disinformation analysis has changed a lot since 2016 when a search on \#qanon, and some simple checks would find you botnets and a disinformation campaign. There are people who are good at disinformation data science (Eliot Alderson, Conspirador Norteno etc), and there's been a lot of academic money in this area recently. This section covers useful tricks, processes and tools.

In the League, we also do many things by hand, but are working on ways to speed them up, and automating the parts that make sense (this will probably never be a fully-automated activity, but we can support and get a lot of load off disinformation analysts) as we validate process.

This chapter is about tackling the three Vs (volume, velocity, variety) with machine learning, automating the work that's too large, coming in too quickly or across too many channels for the team to concentrate on them all. There is no magic "plug in this algorithm and disinfo will go away" system: the big idea here is that the humans and algorithms can work together - e.g. this is augmented intelligence that lets the people focus on what they're good at, not a replacement for people.

One of the reasons we shift work from humans to algorithms is make sifting through the data and highlighting potential patterns in it more efficient; another is that disinformation artefacts (images, text etc) are often difficult to handle, and we want to reduce exposure to them as much as possible. If we can cluster artifacts so that instead of looking at 100 near-identical images, a human can view and classify one copy of that image, the reduction of stress on the humans is worth is.

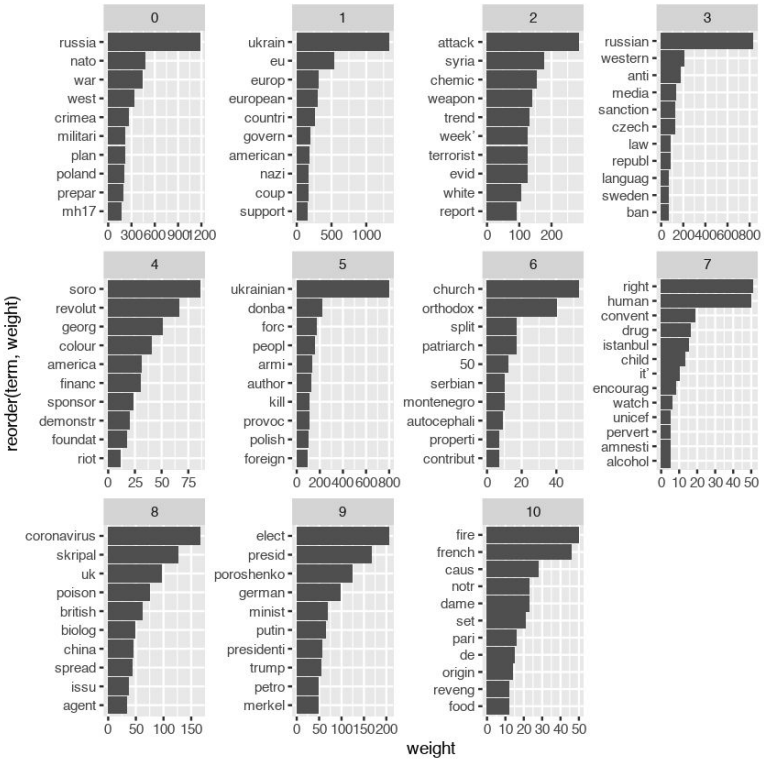
Looking for more: Google search "disinformation 'data science"' - lot of posing. Found data science sites' articles on disinformation. Github searches for "disinformation" and

"misinformation" found hundreds of repos. Searching student sites like Towards Data Science for "fake news", disinformation, misinformation can be useful because they're scanning recent work.

AI Overview

<Fixit: drop in Pablo's AI talk>

Text Analysis



co-occurrance graph for text clusters in EuVsDisinfo (Gabe)

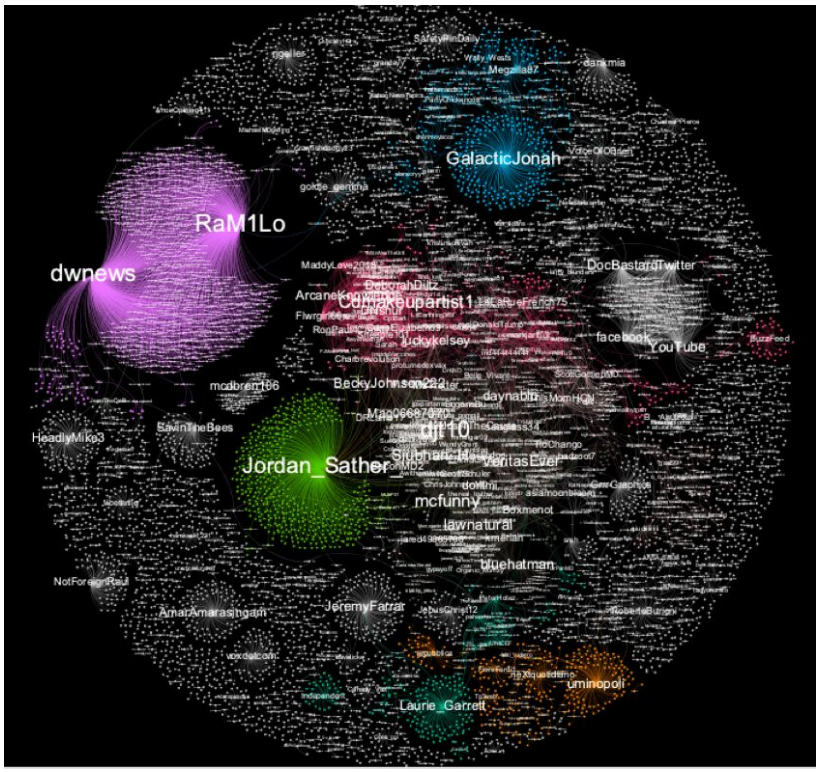
Text-based algorithm needs include:

- Find themes

- Classify to narratives
- Cluster text to narratives
- Search for similar text/narratives

Narrative detection and analysis: Topic modelling.

Network Analysis



Gephi visualisation around a Twitter hashtag

Network algorithm needs include:

- Finding super-spreaders
- Finding rumor origins
- Uncover new artefacts
- Track movement over time

Image, Video and Audio Analysis Needs

Image/Audio algorithm needs include:

- Cluster images
- Search for similar images
- Detect shallowfakes

Whilst we've seen deepfakes being used for things like fake profile pictures, most of our image/video etc needs have been more mundane: searching for reused and/or mistagged images, finding images that have been crudely doctored (shallowfakes), and clustering sets of near-identical images to make then faster to sift through with less exposure of potentially-harmful material to the people checking through them.

PS a lot of the examples are in Python and Pandas - you don't escape from learning these Python Data Science Handbook

Further reading

- https://www.europarl.europa.eu/RegData/etudes/STUD/2019/624278/EPRS_STU%282019%29624278_EN.pdf
- Attention is All They Need: Combatting Social Media Information Operations With Neural Language Models - Fireeye on text generation and detection
- https://www.cnn.com/2019/05/23/politics/doctored-video-pelosi/index.html
- https://www.analyticsvidhya.com/blog/2017/09/common-machine-learning-algorithms/