Modeling Deviant Cyber Behaviors: Bots, Trolls, And Information Operations

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The Crowd

- Gustav Le Bon (1895), *The Crowd: A Study of the Popular Mind*

- Expressed skepticism about the shift from an agrarian society to city living. Le Bon wrote, the urban crowd is marked by “impulsiveness, irritability, incapacity to reason” and “the exaggeration of the sentiments.” A man on his own “may be a cultivated individual,” but “in a crowd, he is a barbarian.”

- Now, we have *Virtual/online mobs*
Vicious “Online” Mobs

How WhatsApp Fuels Fake News and Violence in India

By the time police arrived in the hamlet of Rainpada on July 1, 2018, the village council office was the scene of a massacre.
Online Deviant Groups

Terrorist & Extremist Groups

Deviant Hackers Networks (DHNs)

Anti-NATO Propagandist

Internet Trolls

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The 206 cases in January and February already surpass annual totals for most of the past decade.

IFRC Europe Regional Director, Simon Missiri, said, “vaccine refusal is an increasingly worrying trend worldwide.”
Health & Wellness Misinformation

"Statins cause Cancer!"

Pink salt will “regulate your blood sugar and sleep cycle.”
Misinformation in Agriculture

Numerous fake reports of contaminated turkey in Walmart before Thanksgiving 2015. Within hours several hundred claims were reported on Twitter. Walmart ignored it as a hoax. Many of the claims came from accounts linked to a pro-Kremlin propaganda agency charged by Special Counsel Robert Mueller’s office.
Misinformation in Disasters

During Hurricane Sandy in 2012, the following rumors were floating on social media.

- Sharks swimming through waterlogged suburban neighborhoods,
- Statue of Liberty engulfed in ominous clouds, and
- Floor of the New York Stock Exchange flooded.


During Hurricane Harvey in 2017, again the “shark on highway” hoax went viral.

“Shark on Highway” Hoax during Disasters

During crises events, misinformation is rampant. One of the most commonly spread hoaxes is “shark on highways”. Timeline below illustrates this hoax as it is propagated during various hurricanes in the U.S.

Original image was published in Africa Geographic magazine in September 2005.

Used as hoax during Hurricane Irene in 2011, Hurricane Sandy in 2012, Houston Flood in 2015, Hurricane Matthew in 2016, and finally in our collected datasets for Hurricane Harvey, Hurricane Irma, and Hurricane Maria in 2017.

A simple analysis about “shark on highways” using Google Trends shows the following... (next slide)
Shark Hoax over Time

Interest in the hoax, “shark on highways” has grown significantly over time. Illustrated below is the interest volume in the shark hoax over 2004 - 2017 period. Interestingly, spikes align with weather events, starting from Ernesto (2006) to Harvey (2017). Bigger spikes in the trend are observed in the recent years.
Computational (AI) Propaganda

New AI fake text generator may be too dangerous to release, say creators

The Elon Musk-backed nonprofit company OpenAI declines to release research publicly for fear of misuse

The creators of a revolutionary AI system that can write news stories and words of fiction - dubbed "deepfakes for text" - have taken the unusual step of not releasing their research publicly, for fear of potential misuse.

OpenAI, an nonprofit research company backed by Elon Musk, Reid Hoffman, Sam Altman, and others, says its new AI model, called GPT2 is so good and the risk of malicious use so high that it is breaking from its normal practice of releasing the full research to the public in order to allow more time to discuss the ramifications of the technological breakthrough.

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Fake text:
https://www.youtube.com/watch?v=XMJ8VxgUzTc

Fake images:
https://thispersondoesnotexist.com/

Fake videos:
https://www.youtube.com/watch?v=cQ54GDm1eL0
Manipulation & Monetization

• Many people trust news that comes from their friend circle on social media channels
  o 34% Americans trust the information from social media (Pew Research Center, 2016).
  o 14% Americans consider social media as the most important source of information (the National Bureau of Economic Research (NBER), 2017).

![Graph showing the percentage of Americans who trust the information they get from different sources. The graph indicates that 82% trust local news, 77% trust friends and family, 76% trust national news, and 34% trust social media.](image)
Manipulation & Monetization

• Running a fake-news campaign is cheap:
  o For $55,000 you could discredit a journalist;
  o For $200,000 you might instigate a street protest.
  o For $30 an 800-word fake news article, written by Chinese content marketer Xiezuobang
  o For $621 a video appears in YouTube’s main page for two minutes, created by Russian firm SMOService
  o For $25 to have 2,500 Twitter followers all retweet a link for you

Source: Cyber security firm Trend Micro, 2017
Hysteria Propagation

- Shawn Dawson, a prominent YouTuber released a 104-min documentary with bizarre hypotheses
  - Popular children’s TV shows contain subliminal messages urging children to commit suicide
  - Recent string of deadly wildfires in California was set on purpose – to collect insurance or to test “directed energy weapon” by the military
  - Chuck E. Cheese recycles customers’ uneaten pizza slices into new pizzas
- Over 30 million views in just one month
Radicalization and Recruitment

ISIS Twitter Recruitment Network

Top ISIS Twitter Actors’ Geolocation Map
Ongoing Efforts

• Actively tracking anti-West, anti-EU, anti-NATO propaganda
• Participated in various NATO exercises to assist public affairs and social media monitoring

• Monitored groups like ISIS
• Monitoring disinformation campaigns in the Asia Pacific region
• Monitoring 2019 Canadian Elections
Trends in Disinformation Campaigns

• Cross platform orchestration
  • Growing use of niche platforms

• Communities and coordination
  • Blogger communities
  • Blog farms
  • Flash mob style coordination

• Algorithmic manipulation
Cross-Platform Orchestration

A YouTube channel with several Anti-NATO propaganda videos. The channel is called, “ANTI NATO”.

A blog using YouTube video to spread anti-NATO propaganda suggesting NATO’s troops obstructing Russian operations in Syria thereby helping ISIS.

A blog using YouTube video to spread anti-NATO propaganda by suggesting NATO is waging war against Syrian refugees.
Why Blogs?

- Afford power and freedom to express opinion, frame narratives more effectively than any other social media platform
- No character limit
- No censorship
- Provide digital town halls
Cyber Forensic Analysis

Cyber forensic analysis helps extracting metadata, such as,
- Web traffic tracker codes (Google Analytics IDs)
- Email addresses
- IP address
- Contact details e.g., phone number
- Names under which the domain is registered
- Other digital/social presence e.g., Twitter handles, YouTube links, Facebook profile, other blogs, etc.
Cross Media Campaign Network

@nomilservice

@warresistant

affiliated to

No Military Service Facebook page

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“US will provide weapons to NATO Commandos to attack Ukrainian separatists.”
Communities & Coordination

Pro-Duterte blogging community

Coordination among bloggers detected

Suspicious sources referenced
Coordinated Clickbait (a.k.a. Blog Farms)

- Blog farms identified based on web traffic tracker codes
- Fabricate perception of a viral content
- Hypertargeting
- Search engine manipulation by traffic amplification
- Financing the operation

“At least six Swedish sites have received financial backing through advertising revenue from a Russian- and Ukrainian-owned auto-parts business based in Berlin, whose online sales network oddly contains buried digital links to a range of far-right and other socially divisive content.”

NYTimes, August 10, 2019
Coordinated YouTubers - APAC

• These channels have similar/same video content
• Have similar/same robotic voice narration
• Appear in each others subscribed lists
• Suggested by YouTube as related channels
Coordinated YouTubers - APAC

- Different channels
- Similar/Same titles
- Same audio
- Same Robotic narration
- Different video playback

https://www.youtube.com/watch?v=OM5vaF2kzPA
https://www.youtube.com/watch?v=e5WvJHG6aB4
Comment mobs were observed indicating signs of algorithmic manipulation

Exploiting biases of the recommendation algorithms
Youtubers Conducting Botnet Operated Twitter Campaigns

YouTube channel named “Golden Tengu TV” also has a Twitter account.

Tweets from its Twitter account are merely links to its YouTube videos, posted in a robotic style.

People who like these tweets (such as @Blackdo52395065, @nLqLGPh8F7jiHG9) are also robots.

It is a small botnet.
Algorithmic Manipulation

“Hot News” a prominent channel disseminating videos related “South China Sea” conflict.

Videos have robotic voice/narration
Key Coordinating Groups - Collective Action Theory Based Model

P1. \[ \text{Importance(Im)} \to \text{Interest(I)} \]
\[ \text{Interest(I)} \to \text{Importance(Im)} \]
\[ \therefore \text{Importance(Im)} \leftrightarrow \text{Interest(I)} \]

P2. \[ \text{Utility(U)} \to \text{Interest(I)} \]

P3. \[ \text{Utility(U)} \to \text{Power(P)} \]

P4. \[ \text{Power(P)} \to \text{Importance(Im)} \]
\[ \text{Importance(Im)} \to \text{Power(P)} \]
\[ \therefore \text{Power(P)} \leftrightarrow \text{Importance(Im)} \]

P5. \[ \text{Power(P)} \to \text{Control(C)} \]
\[ \text{Control(C)} \to \text{Power(P)} \]
\[ \therefore \text{Power(P)} \leftrightarrow \text{Control(C)} \]

Model showing all the factors that help in determining the outcome of a collective action, i.e., Success or Failure.

\[ \therefore \text{Power(P)} = f(C,\text{Im}) \]
\[ \therefore \text{Importance(Im)} = f(\text{Interest}) \]
\[ \therefore \text{Interest(I)} = |\text{Outcome1} - \text{Outcome0}| \]
\[ \therefore \text{Power(P)} = f(C,|\text{Outcome1} - \text{Outcome0}|) \]

Or
\[ \therefore \text{Power(P)} = f(C,I) \]

*Published in SBP, SNAM, AAAI, CASON
Technologies Used

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Blogtrackers

• Blogtrackers is designed to explore the blogosphere and gain insights about events and how these events are perceived in the blogging community.
• Provides analyst with means to develop situation awareness.
• Extract insights like key influencers of the blogosphere.
• Comprehend trends and understand leading narratives
• Conduct sentiment analysis on a wide range of subjects.
• Identify any unusual patterns in blog postings.

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blogtrackers.host.ualr.edu/
YouTubeTracker

• YouTube is the second most popular website in the world with 5 billion videos watched every day. Yet little to no analysis is done. YouTubeTracker attempts to change that by providing the power of analytics into the hands of the users.

• With YouTubeTracker, a user can:
  • Visualize channel activity
  • Study networks of videos, channels, commenters, and more
  • Analyze content engagement trends
  • Identify influential actors/groups
  • Track content of interest
  • Detect inorganic behaviors (commenter mobs, etc.)

youtubetracker.host.ualr.edu/
Trident Juncture 2018 Data

Longitudinal Research over a 7 month period (MAY – NOV)

Data Collection 1

Data Collection 2

Data Collection 3

MAY/JUN 2018

JUL/SEP 2018

OCT-NOV 2018

2 weeks each

Re-Validate prior to LIVEX

YouTube Data
• 169,296 videos
• 4,070,030 comments

Blog Data
• 419 blogs identified from various sources (SME, keywords, geofence, Facebook, analysts)
• 46 blogs scraped consisting of 52,295 posts

Hungarian 27%
English 27%
Romanian 18%
Norwegian 7%
Italian 4%
Swedish 4%
French 3%
Other 10%
Blog Analysis – Posting Trend
Blog Analysis – Keyword Trend

War
NATO

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov

0 200 400 600 800 1000 1200 1400 1600

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Influential Posts

InfluenceFlow\( (p) = w_{in} \sum_{m=1}^{ki} I(p_m) - w_{out} \sum_{n=1}^{\theta} I(p_n) \)

\( I(p) \propto w_{com} I_p + \text{InfluenceFlow}(p) \)

\( I(p) = w(\lambda) \times (w_{com} + \text{InfluenceFlow}(p)) \)

iIndex\( (B) = \max(I(p)) \)

*Published in ASONAM, CASON, SNAM, AAAI*
Leading Anti-NATO Narratives

- Environmental Impact
- Disturbs Local Economy
- Mistreatment by NATO Troops
- Mocking/ridiculing NATO
- NATO is a joke – Not a real threat
- ‘Stop NATO’ Protests/Astroturfing
- Threatening Stability
- NATO poking ‘Russian Bear’
- NATO is aggressive
Anti-NATO Imagery
YouTube Content – Location Analysis

- Most of the content was published from the United States.
- Russian hosted content was mostly hostile.
YouTube Content – Target Audience

Target audience
• English
• Norwegian
• Russian
• Spanish
• German speaking populations
YouTube Content – Sentiment Analysis

• Exceptionally high negative sentiment reflected in the online commentary. Especially during the exercise period
TRJE 18 - Publications & Briefings

• NATO Joint Warfare Center, Stavanger, Norway

• Cover Story for Three Swords Magazine – publication in March 2019

• Two pieces covering LOE 2.0 and TRJE 18

• Panel member for NATO Sr. Military leaders private planning meeting at CoE, March 25, 2019
Social Media Training Course

- NATO Strategic Communications Center of Excellence. 25-29 March 2019.

- Marine Expeditionary Forces (2MEF). 28-31 August 2018 in CMU, Pittsburgh.

- NATO Strategic Communications Center of Excellence. 20-25 March 2017 in Riga, Latvia.

- US CyberCommand’s CyberSchool, 3-6 August 2016.


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• http://sbp-brims.org/
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• Office of Naval Research
Thank You!

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