Fake News, Social Media, and Bots

Nitin Agarwal, Ph.D.
Maulden-Entergy Endowed Chair Professor
Collaboratorium for Social Media and Online Behavioral Studies (COSMOS)
University of Arkansas – Little Rock
nxagarwal@ualr.edu
Outline

• Research @ COSMOS?
• Fake News – Why and How?
• Bots – What and How?
• Methods and Tools
• Looking ahead
Mobilization And Collective Action

Flash Mob in a shopping mall

Saudi Women’s Right to Drive protest

Autism Awareness Campaign

2011 Arab Spring Social Movement

NSF-funded 4-year study ($750,000) on advancing understanding of cyber-collective actions
Health Informatics

NSF-funded 3-year study ($1,000,000) on Big Data approach to address health disparities in the southern U.S.
Influence Operations

Several multi-year DoD funded studies totaling worth over $10 million

Agarwal, COSMOS, UALR

5
Fake News Examples
• Examples of crowdsourcing efforts
  • Stopfake.org
  • Snopes
  • Euvsdisinfo

• Severely limited and easily outnumbered by the vast troll armies
Many people trust news that comes from their friends circle on social media channels

- 34% Americans trust the information they get from social media (Pew Research Center, 2016).
- 14% Americans consider social media as the most important source of information (the National Bureau of Economic Research (NBER), 2017).

Why does it matter?
Fake News Factories – The Business Model

• 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, using the English-language firm Quick Follow Now.

Source: Cyber security firm Trend Micro, 2017
Motivation to Study the Blogosphere

- Blogosphere gives citizens the power and freedom to express their opinion, frame narratives more effectively than any other social media platform.
- Because blogs:
  - Have no characters limit.
  - Have no censorship.
  - And provide digital town halls.

Technorati, 2011
Cross-Media Dissemination

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 by 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.
Data Collection Methodology

Metadata Extraction using Cyber Forensics
Metadata Extraction – Cyber Forensics
Metadata Extraction – Cyber Forensics
Cross Media Affiliations

Founder of @nomilservice

Founder of @warresistant

affiliated to No Military Service Facebook page
Bridge Bloggers

Blog in Spanish

Same Blog in English

Blogger’s Google Plus Profile
Models for Influence Assessment

\[ I(p) \propto w_{comm} \gamma_p + \text{InfluenceFlow}(p) \]

\[ I(p) = w(\lambda) \times (w_{comm} \gamma_p + \text{InfluenceFlow}(p)) \]

Modeling Powerful Coordinating Groups (Focal Structures)
Tools Developed

Blogtrackers (blogtrackers.host.ualr.edu)

Focal Structures Analysis (focalstructures.net)

Scraawl (scraawl.com)
Case Study 1: 2014 Ukraine-Russia Conflict

• Graham W. Phillips is a British journalist and blogger.
• He went to Ukraine to cover the voice of Ukrainians during Euromaidan.
• He reported that Ukrainians are “happy” with the previous pro-Russian government of Ukraine.
• He used Vlogging to cover the events.
• His Vlogs made him an influential blogger & an enemy to the current Ukrainian government so they banned him from entering Ukraine for three years.
• Once he was banned from entering Ukraine he went to Russia instead of going back to England.
Coordinating Structures in Ukraine-Russia Conflict Blogosphere

- Blogs were identified using TweetTracker, an online tool developed by Arizona State University, by finding the sites that have been tweeted and retweeted the most during the conflict and have propaganda messages.
- Those sites are manually classified as blogs or non-blogs.
- Blogs are then further subdivided into categories of:
  - Ukraine focused blogs
  - News blogs
  - Non-Ukraine focused blogs.
- Web Content Extractor, or WCE, is used to crawl through each of the identified sites.
- We obtained 18,000 blog posts from 26 different blog sites.

A tiny sample of blog network for Russia-Ukraine conflict.

**Nodes** represent blogs and **Edges** represent link between blogs (out-links).

The structure with **blue nodes** is identified as a focal/coordinating structure.

Although RT.COM is the most central node, the triad “Graham Phillips – Russian News Agency – Voice of Russia” is a more influential coordinating structure for information dissemination.
Case Study 2: The 2015 Trident Juncture Exercise

We identified the most influential posts using Blogtrackers that happened to have a lot of propaganda and a clear call for civil unrest against NATO forces.

The most influential post is written in Italian language. We used Google Translation service to find the post to be highly propaganda-riddled.
AGITPROP - Astroturfing

The camp program: TODAY October 11, 2015 EVENT Antimilitarist TO 18 IN CAGLIARI. CONCENTRATION PIAZZA D'ARMI. THE CAMP IS LOCATED IN THE FORMER QUARRY OF MONTE URPINU (NEAR THE URBAN GARDENS) VIA RAFFA GARZIA. For visitors REMAINS THE APPOINTMENT this morning on October 9, UP TO 11 IN PIAZZA DEL CARMINE. Friday, October 9: From 9 to 11 reception in the square of the carmine - the opening of the camp in the former quarry at Monte Urpinu - afternoon initiatives in the city '21.00 dinner - Assembly of the camp Saturday, October 10 10:00 meeting on the prospects for anti-militarist struggle and against the Trident Juncture - PRESENTATION OF THE NEW CALENDAR OF EXERCISES IN SARDINIA following dinner Sunday, October 11 Morning conclusive Assembly Afternoon parade The program potra 'vary due to weather issues, because of the cops or contingency. PORT TENT, SLEEPING BAG, FLAT AND SERVERS. THE LOCATION OF THE CAMP WILL PUBLISHED TOMORROW MORNING, THEN Meet RECEPTION II CAMPING Antimilitarist FIGHT - AROUND CAGLIARI 9-10-11 October 2015 Out of the mobilization against the Capo Frasca polygon of 13 September 2016, initiatives and actions directed against the military presence in Sardinia have multiplied and diversified to try to jam the mechanism of the war. Cuts of networks, slowing the means and blocking exercises have taken the "necessary severity" to the conduct of military activities. Thanks to its experience and in the wake of the procession of 11 June 2015 in Decimomannu, as No Bases Network here or elsewhere we decided to call for the second weekend of October an anti-militarist struggle camping. These three days they want to continue and refine the forms of struggle practiced until now, with the aim of sabotaging the military and everything revolves around us. For this we would like active participation and contribution by all and all, then it can be a starting point for a reproducibility of the practices in their contexts and territories. The campground also wants to act as a springboard for international mobilization, called for the second half of October, against the exercise Trident Juncture 2015. With this exercise, NATO intends to test its intervention force in the short term, to prepare for the increasingly Possible conflict on Middle East fronts, North African and Russian. 30000 men, hundreds of vehicles, aircraft and ships will fire in Sardinia, Sicily, Spain and Portugal. For this exercise, the largest since 2002, NATO once again a tribute in terms of pollution, resource exploitation and militarization of the territories to train for war. As it has been for the exercises of Aries brigade, the brigade of Aosta and STAREX, we can not make ourselves complicit in all of this, do not let them rest assured. Proposal mobilization against the Trident DOWNLOAD INFORMATION MEMORANDUM ON TRIDENT Juncture 2015.

As it has been for the exercises of Aries brigade, the brigade of Aosta and STAREX, we can not make ourselves complicit in all of this, do not let them rest assured.

NATO once again a tribute in terms of pollution, resource exploitation and militarization of the territories to train for war.

For this we would like active participation and contribution by all and all, then it can be a starting point for a reproducibility of the practices in their contexts and territories. The campground also wants to act as a springboard for international mobilization, called for the second half of October, against the exercise Trident Juncture 2015.
Case Study 3: The 2016 Anakonda Exercise

The post mocks and ridicules the exercise, by comparing it with the Nicki Minaj’s raunchy music video titled “anaconda”. Here are some excerpts: "This raises the question of what buns the NATO make so hot that they can get out the Anaconda” “using its forked tongue” "A fine example of cross-media-fuck” and many others.
Biased or Offensive Contents

Most influential blog during Anakonda 2016 exercise period was marucha.wordpress.com.

• The blog is ridiculing Polish government’s policy on accepting refugees.
• And further calls US Army participation in Anakonda exercise as INVASION.

Judeo-Ukrainian T.Sakiewicz Organizes More In "Imieniu Polish Community" In The Adventurous Washington said

2016-06-06 (Monday) @ 8:29:46 p.m.

the so-called. "Polish newspaper club" in Washington CONTRACT Judeo-Ukrainian T.Sakiewicz banderowską hired by the secret police and the CIA organized Jewish propaganda roundup UKROW Polish speakers living in the US, so that you may gather June 11, 2016, in Washington pm. 14:30 to 16:00 before the Jewish Melina "white house" and its manifestation of "supported" ALLEGEDLY on behalf "of the entire Polish community" INVASION 14 thousand soldiers -zabijaków US Army on Poland!

Look here:

Typical Characteristics - Disinformation riddled blogs

- Effectiveness of each of the 8 criteria in identifying misinformation-riddled blog.
- The criteria are sorted in decreasing order of effectiveness.
- The smaller the gray bar the more effective the criterion is.
- Numbers on the colored bars indicate the number of blog sites identified as containing misinformation with a confidence of High, Medium, and Low.
Tracking the origins of the content on these blogs

Pattern 1: Reverse Image Search - The images were not unique for each article and not relevant with the context it was used for. The same image was reused with different narratives.

Pattern 2: The use of hashtags and links in blog posts serve as the vehicle connecting other social media channels.
Mix Media and Cross Media Dissemination Approaches

- Mix media information dissemination campaign refers to the use of multiple social media channels to diffuse a narrative.
- More precisely, the information campaign can be observed on multiple social media sites with text, images, audio and video content.
- The content may not be identical on the various social media channels, but it pertains to a particular information campaign.

- A cross-media information dissemination campaign orchestrates the use of specific media channels.
- More precisely, the information is hosted on a website (e.g., a blog site, video on a YouTube channel) and is widely distributed through other social media channels that provide established social network structures, such as Twitter, Facebook, etc.
Disinformation Campaign Coordination

- The above figure is a network of blogsites and shared hyperlinks.
- The network contains 21 blogs (red nodes) and 2321 hyperlinks (blue nodes).
- Size of a node is proportional to the number of shared hyperlinks (i.e., out-degree centrality).
- Edge thickness is proportional to the number of times a blogsite shared a hyperlink.

- The above figure is a network of blogs based on commonly shared hyperlinks.
- The network is fully connected, i.e., a clique, where every blog is connected with every other blog.
- This depicts massively coordinated information campaign.
What are Bots?

#BotSpot: Bots Boost NFL Divides
Identifying botnets amplifying #TakeAKnee and #BoycottNFL

#TakeAKnee

The Alt-Right and Antifa Are Waging a New Kind of Internet Warfare
Intelligence and surveillance powers that once belonged only to militaries and state spooks are now available to anyone with a high-speed internet connection.

Computational propaganda
Machine Driven Communications (MADCOMs)
Spotting Bots

RT @oeygienn: It's interesting #dotard how you say they should be fired when you #TakeAKnee everyday of your term, milking the clock.

RT @oeygienn: It's interesting #dotard how you say they should be fired when you #TakeAKnee everyday of your term, milking the clock.

RT @oeygienn: It's interesting #dotard how you say they should be fired when you #TakeAKnee everyday of your term, milking the clock.

RT @oeygienn: It's interesting #dotard how you say they should be fired when you #TakeAKnee everyday of your term, milking the clock.

RT @oeygienn: It's interesting #dotard how you say they should be fired when you #TakeAKnee everyday of your term, milking the clock.

RT @oeygienn: It's interesting #dotard how you say they should be fired when you #TakeAKnee everyday of your term, milking the clock.
What are Botnets?

Is this spontaneous crowd action or a computer-engineered “story push”?

Identical text plus identical “bit.ly” shortener.

Agarwal, COSMOS, UALR

SOTICS 2017, Athens, Greece
What are Botnets?

Time: correct for a spontaneous push from real-world audience

BUT: Europe Presse does not support a “push button” for Twitter or any social media platform.

The URL shortener would have to be initiated over and over, providing a different bit.ly address for each person.
What are Botnets?

Yes, they are all bots. Primarily commercial in nature. Most normally tweet in Spanish, on Spanish texts, to push commercial products. By one person / agency.

More accounts are created for commercial uses from 2010-2011

Commercial accounts for blogs and companies created. Focus on gay niche market.
Influence Bots on Darknet Marketplace

Vendors are selling social media bots for profit on the “Darknet”

- You can buy Twitter, Facebook, YouTube, Clientele, or Instagram bots from the darknet such as Hansa Market. Some botnets are also available for sale on standard Internet.

- These bots promise to deliver thousands of retweets, likes for your posts, thousands of followers, high quality views, channels subscribers, and thousands of Instagram likes. The cost of these bots within the price range of $1.79 - $6.48 USD.
How Botnets Change the Information Environment

Used by botnets to disseminate propaganda

**Misdirection:** The bot would tweet unrelated news that is happening somewhere else but mention a hashtag related to the crises

**Hashtag-Latching:** Strategically associating unrelated but popular or trending hashtags to target a broader, or in some cases a very specific audience. For example using the #WorldCup then include a URL of beheading video.

**Smoke Screening:** The bot would mention something about ISIS but not necessary related to the beheading. Similar techniques have been used in the Syrian Social Bot (SSB) to raise awareness of the Syrian civil war.

**Thread-Jacking:** the change of topic in a “thread” of discussion in an open forum. For example using a hashtag of #ISIL but the tweet has a link to a US elections

**Four Strategies used to disseminate content.**

Information Maneuver Strategies
Case Studies

Coordination Structures in Botnets

• Social bot network disseminating Russian propaganda on Twitter during Crimean water crisis (2014).

• 118,601 relations were found among 588 users. We start with 1584 relations based on the “who follows whom”
Analyzing Structure-1 Network

- Analyzing structure-1 network, reveals dense connections among its members and inter-group connections with the other groups, viz., ‘Real Person-network’ and ‘structure-2’.

- Closer examination of the within group ties, reveals a mutually reciprocative relationship, suggesting the principles of ‘Follow Me and I Follow You’ (FMIFY) and ‘I Follow You, Follow Me’ (IFYFM) in practice - a well known practice by Twitter spammers for link farming or quickly gaining followers.

- Unlike ‘Real Person-network’, there is no single most central node in this network, indicating an absence of a hierarchical organization structure in ‘structure-1’ network → Characteristic property of a botnet

Agarwal, COSMOS, UALR
SOTICS 2017, Athens, Greece
Analyzing Structure-2 Network

- Analyzing structure-2 network, reveals dense connections among its members and inter-group connections with the other groups, viz., ‘Real Person-network’ and ‘structure-1’.

- Closer examination of the within group ties, reveal a mutually reciprocative relationship, suggesting the principles of ‘Follow Me and I Follow You’ (FMIFY) and ‘I Follow You, Follow Me’ (IFYFM) in practice - a well known practice by Twitter spammers for link farming or quickly gaining followers.

- Like the ‘structure-1’ network, there is no single most central node in this network, indicating an absence of a hierarchical organization structure in ‘structure-2’ network → Characteristic property of a botnet
Network Structures of Botnets

Two different bot behaviors observed in the propaganda dataset.
Core and Peripheral Bots acting together

Blue Nodes represent accounts

Size of a node represents outdegree of the node

Black edges represent tweets

Red edges represent retweets
"SFJZ 13 was only the first step of a process that will continue throughout this and next year with TRJE 15 on the path to full implementation of NATO's latest Command Structure."
Transforming to User-URL Graph

Transforming communication network to user-URL (bipartite) graph, enables detection of the ring-like coordination structure among the bots.

Each bot (green circle in the center) in this ‘ring-like’ coordination structure is tweeting/retweeting unusually high volume of URLs as seen here.

Agarwal, COSMOS, UALR

SOTICS 2017, Athens, Greece
Botnets Behavioral Evolution

Mutual reciprocity. *IFYFM & FMIFY*

No mutual reciprocity. Coordination in information network

Organizational hierarchy. Core & peripheral bots

**COORDINATION/BEHAVIOR COMPLEXITY**

Crimean Invasion 2014

Dragoon Ride 2015

Trident Juncture 2015

ISIS Propaganda 2016

Agarwal, COSMOS, UALR

SOTICS 2017, Athens, Greece
What Can be Done?

• DARPA Bot detection challenge 2016
• Bots fighting bots
• Honey pots

Over time, the encyclopedia’s software robots can become locked in combat, undoing each other’s edits and changing links, say researchers

Bot-on-bot wars raging on Wikipedia pages, 23-Feb-2017


Available at: [http://www.stratcomcoe.org/academic-journal-defence-strategic-communications-vol2](http://www.stratcomcoe.org/academic-journal-defence-strategic-communications-vol2)
Looking Ahead

• Strategies for misinformation propagation are rapidly evolving
• Cross-media dissemination strategies are widely adopted
• Automated AI programs (bots) quite intensively used
• Smarter information filtering algorithm (avoid information bubbles)
• Stronger media literacy programs (IREX, Ukraine)
Social Media Course

• Developed and taught a social media analysis course for NATO officers, sponsored by the NATO Strategic Communications Center of Excellence. 20-25 March 2017 in Riga, Latvia.

• Developed a technical demonstration and hands-on course on social media analysis for US CyberCommand’s CyberSchool, 3-6 August 2016. Preparations are currently underway to develop and teach this course to US information operations analysts at Ft Bragg in the 2017-2018 time frame.
2017 Challenge Problem 1st Place Award
Thomson Reuters - Authors: Armineh Nourbakhsh, Xiaomo Liu, Quanzhi Li, Sameena Shah
Title: Mapping the echo-chamber: Detecting and characterizing partisan networks on Twitter

Thank you!

nxagarwal@ualr.edu