CSCI 1800 Cybersecurity and International Relations

Social Media and Propaganda

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Outline

- Information Ecosystem
- Simple examples of information manipulation
- Information apocalypse scenarios
- Advanced AI technologies
- AI-supported impersonation
- Coping with the threat
- Politicization of information technology
- Coping with misuse of social media

Information Ecosystem

- Do social media prioritize clicks, shares, likes and ads over quality information?
  - Does this result in amplification of "fake news?"
- Has a critical threshold of addictive and toxic misinformation been reached?
  - Will faith in facts be lost on the altar of technology?
- Is technology addiction producing a loneliness epidemic?

Aviv Ovadya*

- In 2016 Aviv Ovadya “warned of an impending crisis of misinformation” in his Infocalypse talk!
- “We are so screwed it's beyond what most of us can imagine,” he said. “We were utterly screwed a year and a half ago and we're even more screwed now. And depending how far you look into the future it just gets worse.”

* https://www.buzzfeed.com/charliewarzel/the-terrifying-future-of-fake-news, 2/11/18

Impact of the Information Ecosystem

- Technology addiction identified in 1995 paper*
  - Clinical criteria for addiction:
    - Salience, Euphoria, Tolerance, Withdrawal symptoms, Conflict, Relapse
  - Signs and symptoms of technology addiction**
- The loneliness epidemic†
  - Nearly half of Americans say they are lonely! Global!
  - It makes people sick! Equivalent to 15 cigs/day!
  - Young people most at risk!
  - Amplified by social media

* https://www.academia.edu/751805/Griffiths_M.D._1995_._Technological_addictions._Clinical_Psychology_Forum_76_14-19
** https://www.psychologytoday.com/us/blog/modern-mentality/201802/could-you-be-addicted-technology
† https://theweek.com/articles/815518/epidemic-loneliness

Dangers of Information Ecosystem

- Social media tools coupled with AI allow us to
  - Enhance and distort reality
  - Create new realities
  - Launch influence campaigns
  - Amplify reactions, e.g. via trolls and bots
  - To do all of this at a distance
- Consequence:
  - Misinformation
  - Propaganda

Trolls and Bots

- New York Times video explaining trolls & bots (5:03):
  - https://www.nytimes.com/video/us/politics/100000005414346/how-russian-bots-and-trolls-invade-our-lives-and-elections.html

- Active measures involve the following seven steps*:
  1. Find cracks in public issues that can be used to exploit divisions
  2. Create the Big Lie
  3. Wrap the big lie around a truth
  4. Conceal your hand
  5. Find a useful idiot who will promote the Big Lie
  6. Deny, deny, deny
  7. Play the long game

* https://www.nytimes.com/2018/11/12/opinion/russia-meddling-disinformation-fake-news-elections.html

Examples of Artificial Outputs

- Changing audio in a video*
  - https://youtu.be/9Yq67CjDqvw (8:00)
  - Authors learn mouth shapes from speech
  - Superimpose shapes on stock footage
- Videos with full animated superimposed faces†
  - https://www.youtube.com/watch?v=ohmajJTcpNk (6:35)

* http://grail.cs.washington.edu/projects/AudioToObama/siggraph17_obama.pdf

† http://niessnerlab.org/projects/thies2016face.html

2016 Predictions of Aviv Ovadya*

- Many slick, easy-to-use, and powerful tools to manipulate perception and falsify reality coming
- These tools will provide the ability to distort truth at will and put core institutions at risk!
- Ovadya holds positions at U. Michigan Center for Social Media Responsibility and Columbia University Center for Digital Journalism.

* https://www.buzzfeed.com/charliewarzel/the-terrifying-future-of-fake-news

Ovadya's Disruptive Scenarios*

- Diplomacy manipulation
  - Create video with Kim Jung un declaring war
  - This would precipitate a diplomatic crisis
- Polity simulation
  - Create a fake grass roots campaign
  - Bombard offices of legislators with realistic pleas
- Laser (targeted) phishing
  - Spam users w. realistic fake messages from friends

* https://www.buzzfeed.com/charliewarzel/the-terrifying-future-of-fake-news

Assault on FCC Public Comment System*

- In '17 FCC solicited public input on net neutrality
  - Required under 1946 Administrative Procedure Act
- 23 million comments were received
  - More than all previous government feedback!
- Many comments generated by AI-driven bots.
  - Some fake, some not. Number fake is unknown
- Open platforms can be subverted by bots
  - Congress wants an investigation

* https://www.wired.com/story/bots-broke-fcc-public-comment-system/

Wired's Analysis of FCC Comments

- Helped by FiscalNote, it studies public comments on behalf of corporations.
- Large-scale analysis* estimates > 1 million fakes
- Small-scale analysis† of 39 Nicholas Thompson
  - 6 confirmed bots
  - 11 form letters
  - 3 real Nicholas Thompsons
  - 19 unknown source
- This analysis suggests > half of comments are fake

* https://www.wired.com/story/bots-broke-fcc-public-comment-system/

† https://www.wired.com/story/bots-form-letters-humans-fcc-net-neutrality-comments/

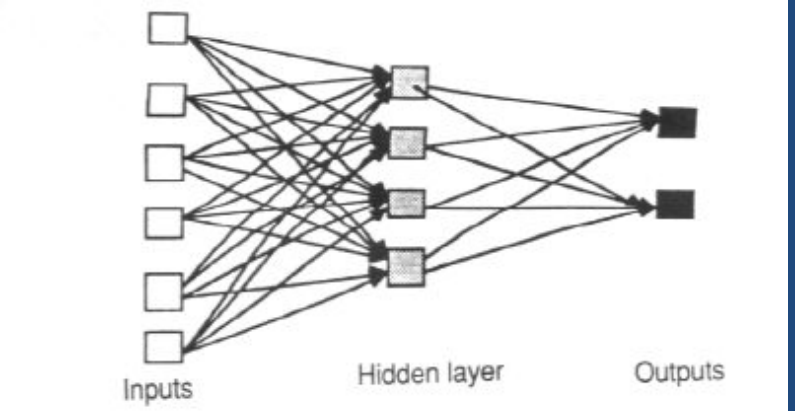
Audio Impersonation

- Realistic impersonation of individuals using Adobe's #VoCo
  - https://youtu.be/I3l4XLZ59iw (7:20)

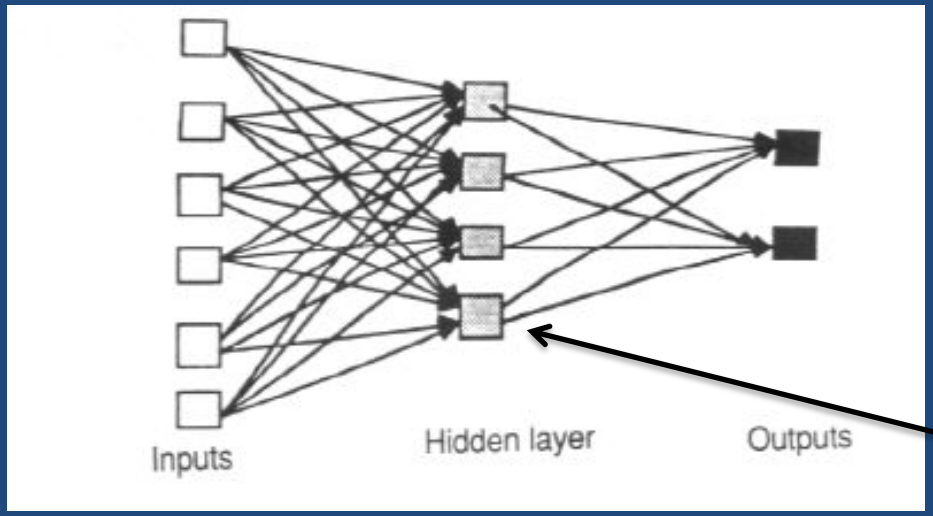
- What nefarious uses could be made of this technology?
- How can we protect ourselves?

Neural Networks

- Artificial neural networks (ANNs) trained to recognize various types of data, e.g. cats, words
- Inputs represented by bits, such as pixels for images or frequencies and intensities for audio.
- Outputs associated with categories



Neural Networks



- Node values are integers, edges have weights
- Values multiplied by weights, passed through non-linear function, giving integer outputs
- Weights adjusted to improve recognition
  - Adjustments made via backpropagation of errors

Generative Adversarial Networks (GANs)

- GANs are pairs of competing neural nets
  - One net generates examples
  - Second net evaluates the examples
- Competition drives each net to improve
  - E.g. counterfeiters versus police
- GANs were invented by Ian Goodfellow in 2014 to make machine-learning systems smarter
  - The method is unsupervised

Comments on the Threat

- Anyone could make it “appear as if anything happened, regardless of whether it did or not.”
  - Aviv Ovadaya*
- GANs have both “imagination and introspection” They could set news consumption back 100 years
  - Ian Goodfellow
- Computational propaganda is now a reality!

* https://www.buzzfeed.com/charliewarzel/the-terrifying-future-of-fake-news

What Do Technologies Put at Risk?

- Erosion of authenticity
- Integrity of official statements
- Electoral outcomes
- Potential breakdown of society

Politicization of Information Technologies

- Russians saw dangers.* In 1999 invited views on
  - "Advisability of developing international principles that would enhance the security of global information and telecommunications systems & help to combat information terrorism and criminality"
- Russians meddled in US 2016 elections†
  - Launched "blend of hacking, public disclosures of private emails, and use of bots, trolls, targeted advertising". In'16 Russia believed at war w. West**

* http://undocs.org/A/RES/53/70

† https://www.cfr.org/report/countering-russian-information-operations-age-social-media

** https://www.chathamhouse.org/sites/default/files/publications/research/2016-05-20-russian-state-mobilization-monaghan-2.pdf

Russian Motivation for Meddling*

- Goal is to weaken adversaries, i.e. neighbors, NATO and US, by any means
- Planted & spread false stories in 20th century
- Social media has made it easier & more effective
- French thwarted Russian attempt in May 2017
  - Law: can't report on campaigns in last 48 hours
  - Citizens largely get news via traditional outlets
- Russians tried to exploit NFL protests in 2017

* https://www.cfr.org/report/countering-russian-information-operations-age-social-media

Characteristics of Social Media

- Citizens reveal their social/political preferences
  - Profiles easily assembled and analyzed
  - Example: Cambridge Analytica
- Easy to target individuals and groups
  - Messages personalized or received from friends
  - Different groups can get contradictory messages
  - False reports can be inserted into genuine outlets
- Lies spread faster than truth*

* http://science.sciencemag.org/content/359/6380/1146.full

What Can Be Done About It?*

- Improve the tools for authenticating documents
  - Images & audio can cryptographically authenticated
- Identify authoritative sources and networks
  - Major news outlets have high standards
  - Use recognized trusted international sources
- Transparency and discussion are effective
  - Quantify impact of influence campaigns
  - Identify and publish sources of misinformation
- Regulation of exploitable social networks
  - Study effects of social networks on human psychology

* http://www.helsinkitimes.fi/finland/finland-news/domestic/13884-report-haglund-was-quick-to-pick-up-on-russia-s-information-campaigns.html
* https://www.cfr.org/report/countering-russian-information-operations-age-social-media

Review

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