Fact Checking and Information Retrieval

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School of Information
The University of Texas at Austin

Lab: ir.ischool.utexas.edu
@mattlease
Slides: slideshare.net/mattlease
Information Retrieval & Crowdsourcing Lab

http://ir.ischool.utexas.edu

- Improve accuracy of AI prediction models
- Develop effective human-in-the-loop systems
- Design HCI methods for fast, accurate human work
What’s an Information School?

“The place where people & technology meet”

~ Wobbrock et al., 2009

“iSchools” now exist at over 100 universities around the world
Good Systems: an 8-year, $10M UT Austin Grand Challenge

**Goal:** Design a future of Artificial Intelligence (AI) technologies to meet society’s needs and values.

http://goodsystems.utexas.edu
Good Systems: Disinformation Team

https://sites.google.com/view/ut-misinformation-ai/
Eureka is a searchable database supporting undergraduate participation in research and creative activity across The University of Texas at Austin. Students can find faculty members who regularly work on a given topic using the "Faculty" search, or browse a listing of posted research assistantships with the "Projects" search.

https://eureka.utexas.edu/
Information Literacy


“Though we may know how to find the information we need, we must also know how to evaluate it. Over the past decade, we have seen a crisis of authenticity emerge. We now live in a world where anyone can publish an opinion or perspective, true or not, and have that opinion amplified...”

Matt Lease (University of Texas at Austin)
Number of people using social media platforms

Estimates correspond to monthly active users (MAUs). Facebook, for example, measures MAUs as users that have logged in during the past 30 days. See source for more details.

Source: Statista and TNW (2019)
The Need for Content Moderation

YouTube videos removed
These figures are for the fourth quarter of 2019, the most recent available data.

5,887,021 videos removed
- Spam, misleading or scams: 52%
- Child safety: 15.8%
- Nudity or sexual: 14.1%
- Violent or graphic: 9.8%
- Other: 5.2%
- Harmful or dangerous: 3.1%

Facebook removals other than fake accounts and spam*
First quarter of 2020, in millions.

- Adult nudity and sexual activity: 39.5
- Violent and graphic content: 25.5
- Dangerous organizations: terrorism and organized hate: 11
- Hate speech: 9.6
- Drugs and firearms: 9.3
- Child nudity and sexual exploitation of children: 8.6
- Bullying and harassment: 2.3
- Suicide and self-injury: 1.7

*Includes some content that is covered but not removed.
TYPES OF INFORMATION DISORDER

FALSENESS

Misinformation
Unintentional mistakes such as inaccurate photo captions, dates, statistics, translations, or when satire is taken seriously.

Disinformation
Fabricated or deliberately manipulated audio/visual content. Intentionally created conspiracy theories or rumours.

Malinformation
Deliberate publication of private information for personal or corporate rather than public interest, such as revenge porn. Deliberate change of context, date or time of genuine content.

INTENT TO HARM

FIRST DRAFT

https://medium.com/1st-draft/information-disorder-part-3-useful-graphics-2446c7dbb485
Table 1. Comparison Between Concepts Related to Fake News

<table>
<thead>
<tr>
<th>Concept</th>
<th>Authenticity</th>
<th>Intention</th>
<th>News?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deceptive news</td>
<td>Non-factual</td>
<td>Mislead</td>
<td>Yes</td>
</tr>
<tr>
<td>False news</td>
<td>Non-factual</td>
<td>Undefined</td>
<td>Yes</td>
</tr>
<tr>
<td>Satire news</td>
<td>Non-unified$^2$</td>
<td>Entertain</td>
<td>Yes</td>
</tr>
<tr>
<td>Disinformation</td>
<td>Non-factual</td>
<td>Mislead</td>
<td>Undefined</td>
</tr>
<tr>
<td>Misinformation</td>
<td>Non-factual</td>
<td>Undefined</td>
<td>Undefined</td>
</tr>
<tr>
<td>Cherry-picking</td>
<td>Commonly factual</td>
<td>Mislead</td>
<td>Undefined</td>
</tr>
<tr>
<td>Clickbait</td>
<td>Undefined</td>
<td>Mislead</td>
<td>Undefined</td>
</tr>
<tr>
<td>Rumor</td>
<td>Undefined</td>
<td>Undefined</td>
<td>Undefined</td>
</tr>
</tbody>
</table>
The FAKE NEWS media ... is not my enemy, it is the enemy of the American People!

- Trump

Feb. 17, 2017

“Fake news” outperformed real news on Facebook in the 2016 U.S. elections

“Fake news” has led to violence

Seeing the term “fake news” prompts confusion about real news

Efforts to reduce “fake news” are not always successful
Report On The Investigation Into Russian Interference In The 2016 Presidential Election

Volume I of II

Special Counsel Robert S. Mueller, III

Submitted Pursuant to 28 C.F.R. § 600.8(c)

Washington, D.C.

March 2019
Mis/Disinformation: a long history

“Truthiness is tearing apart our country... It used to be, everyone was entitled to their own opinion, but not their own facts. But that’s not the case anymore.”

– Stephen Colbert (Jan. 25, 2006)

“You furnish the pictures and I’ll furnish the war.”
– William Randolph Hearst (Jan. 25, 1898)
How can we help people separate fact from fiction on social media?
Fact-checking

Greg Abbott stated on April 11, 2021 in an interview:

Texas “could be very close to herd immunity.”
Professional Fact-Checking

TikTok posts
stated on July 26, 2021 in a TikTok post
There is a “0.05% chance of dying from COVID.”
By Gabrielle Settles • August 13, 2021

Ken Paxton
stated on August 7, 2021 in an interview
The Biden administration is “not even testing these people” being released by Border Patrol into the U.S.
By Brandon Mulder • August 13, 2021

Facebook posts
stated on August 10, 2021 in a Facebook post
Says Gen. David H. Berger said, “No mandatory vaccinations for my Marines.”
By Ciara O’Rourke • August 12, 2021

High quality, but how do we scale up?

Matt Lease (University of Texas at Austin)
More scalable, but how do we maintain professional quality?
How about AI?
Automated Fact-Checking

Exploring how artificial intelligence technologies could be leveraged to combat fake news.

High scalability, but how do we maintain professional quality?
Claim Verification, Given Evidence

Given a claim:

Facebook Shut Down an AI Experiment Because Chatbots Developed Their Own Language.

and relevant article headlines:

No, Facebook Did Not Panic and Shut Down an AI Program That Was Getting Dangerously Smart.

source: gizmodo.com

Predict headline stance: For Against Observing
Predict claim veracity: False True Unknown
Automated Fact-Checking

A Survey on Automated Fact-Checking

Detect check-worthy claim → Retrieve documents related to the claim → Select the most relevant sentences from the documents → Predict the veracity of the claim → Extract an explanation for the veracity prediction

Figure 1: Pipeline for automated fact-checking with the explanation sub-task.

Kotonya, Neema, Toni, Francesca, Explainable Automated Fact-Checking: A Survey
Fig. 1. Information verification pipeline. Our tasks cover all four steps. (Box 1 maps to task 1 whereas boxes 3–4 map to task 2 of the 2018 and 2019 editions [10,29].)
<table>
<thead>
<tr>
<th>Domain</th>
<th>%</th>
<th>Politifact Rank</th>
<th>Bing Rank</th>
<th>Domain</th>
<th>%</th>
<th>Politifact Rank</th>
<th>Bing Rank</th>
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<td>11</td>
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<td>docs.google.com</td>
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<td><a href="http://www.whitehouse.gov">www.whitehouse.gov</a></td>
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<td>218</td>
<td><a href="http://www.whitehouse.gov">www.whitehouse.gov</a></td>
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<td><a href="http://www.facebook.com">www.facebook.com</a></td>
<td>1.1%</td>
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<td>alt.coxnewsweb.com</td>
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<td>36</td>
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<td>17</td>
<td>475</td>
<td><a href="http://www.bls.gov">www.bls.gov</a></td>
<td>0.3%</td>
<td>37</td>
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<td>18</td>
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<td><a href="http://www.cdc.gov">www.cdc.gov</a></td>
<td>0.3%</td>
<td>38</td>
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<td>19</td>
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<td><a href="http://www.congress.gov">www.congress.gov</a></td>
<td>0.3%</td>
<td>39</td>
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<tr>
<td>abcnews.go.com</td>
<td>0.5%</td>
<td>20</td>
<td>14</td>
<td>abcnews.go.com</td>
<td>0.3%</td>
<td>40</td>
<td>10</td>
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</tbody>
</table>

Table 2. Sources cited by Politifact vs. sources retrieved by Bing (at the domain level). Col-
<table>
<thead>
<tr>
<th>Example</th>
<th>Verdict</th>
<th>Difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Midtown crime is up by 30 percent the last quarter. [Crime, Florida, Rick Baker]</td>
<td>Unjudgable.</td>
<td>Mostly False</td>
</tr>
<tr>
<td>a [therealdeal.com] Manhattan leasing strong in Q3; Midtown market stratifies ...</td>
<td></td>
<td>Which midtown?</td>
</tr>
<tr>
<td>b [<a href="http://www.news-leader.com">www.news-leader.com</a>] Springfield police say a spike in stolen cars led to a 2 percent increase in crime in the third quarter of 2016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 There are more members of the U.S. Senate than the number of WI families who would benefit from GOP estate tax break. [Taxes, Wisconsin, Tammy Baldwin]</td>
<td>Hard. Poor</td>
<td>Mostly False</td>
</tr>
<tr>
<td>[<a href="https://www.politifact.com/factchecks/2015/may/20/tammy-baldwin/are-there-more-us-senators-wisconsin-residents-who/">https://www.politifact.com/factchecks/2015/may/20/tammy-baldwin/are-there-more-us-senators-wisconsin-residents-who/</a>]</td>
<td></td>
<td>source support.</td>
</tr>
<tr>
<td>a [politicalticker.blogs.cnn.com] The candidates for Senate in Wisconsin stuck to their talking points in an animated debate Monday night...</td>
<td>True</td>
<td>Lots of search</td>
</tr>
<tr>
<td>b [<a href="http://www.dailypress.com">www.dailypress.com</a>] The Senate ... voted for a new tax break benefiting companies that shifted headquarters to foreign countries, but move back and invest in ...</td>
<td></td>
<td>results but none</td>
</tr>
<tr>
<td>3 Mark Pocan’s proposal to eliminate the U.S. Immigration and Customs Enforcement (ICE) would &quot;eliminate border enforcement. [Immigration, Legal issues, Crime, Regulation, Wisconsin, Leah vukmir]</td>
<td>Easy. Well</td>
<td>Mostly False</td>
</tr>
<tr>
<td>[<a href="https://www.politifact.com/factchecks/2018/jul/13/leah-vukmir/gop-us-senate-hopeful-leah-vukmir-s-pants-fire-clai/">https://www.politifact.com/factchecks/2018/jul/13/leah-vukmir/gop-us-senate-hopeful-leah-vukmir-s-pants-fire-clai/</a>]</td>
<td></td>
<td>supported by</td>
</tr>
<tr>
<td>a [<a href="http://www.wz.com">www.wz.com</a>] And it was split into three separate agencies: Legal immigration processing went on Fire to US Citizenship and Immigration Services, border enforcement went to Customs and Border Protection, and interior enforcement went to ICE.</td>
<td></td>
<td>trustworthy sources.</td>
</tr>
<tr>
<td>b [news.yahoo.com] Haggman said his reply is to point out that ICE is an internal enforcement agency and its absence wouldn’t affect border security.</td>
<td></td>
<td>Claim directly</td>
</tr>
</tbody>
</table>

4 Premeditation, in murder cases like the Oscar Pistorius case, can be formed in the twinkling of an eye. [Criminal justice, Legal issues, Crime, Nancy grace]
a [Fox News Transcript] in law school they teach premeditation can be formed in an instant, people think you have to plan it out in advance. the reality is here this was an emotional crime.
b [User comment] In other words, the killer had to have formed the present intention of killing her while not in the heat of passion or rage, and carried out the killing with the specific intention of killing her. Nateyes is right that it can happen in a matter of minutes. at least under US law, but there has to be some time to reflect and the very specific state of mind of planning and intending to kill.
c [dutoitattorneys.com] In a recent High Court ruling in the matter of State v Raath, the full bench of the Cape High Court found that where a father forced his son to remove a firearm from the safe so that he could kill the son’s mother was not sufficient to constitute premeditated murder and it is with that in mind that we are of the view that there is no premeditation at this stage present in Oscar Pistorius’ matter.

5 When President Abraham Lincoln signed his Emancipation Proclamation, “there were over 300,000 slaveholders who were fighting in the Union army.” [History, Chuck Baldwin]
a [American Studies Journal] Eventually 184,000 black soldiers fought for the Union army and contributed significantly to the victory of the North. Reports of atrocities among black Union soldiers had shocked Lincoln, and he subsequently issued the General Order No. 232 on July 30, 1863 as an Order of Retaliation that clearly reflected his stance towards the status of African American soldiers
b [International Studies Review] [T]he number of actual slaveholders in the South of the Union does not amount to more than 300,000, a narrow oligarchy that is confronted with many millions of so-called poor whites...

CORE ELEMENTS OF AUTOMATED FACT-CHECKING

verification
- checking against existing fact-checks
- checking against authoritative sources
- unstructured (e.g., credibility scoring)

identification
- monitoring media & political sources
- identifying factual statements
- prioritising claims to check

correction
- flagging repeated falsehoods
- providing contextual data
- publishing new fact-checks

Lucas, Graves, Understanding the Promise and Limits of Automated Fact-Checking
Global Disinformation Index

THE INDEX
We provide a non-partisan, trusted and independent rating of disinformation risks for news sites.

Read our methodology
All ratings are based on online content only — not TV, print, or radio content. Ratings do not reflect accuracy or credibility; they reflect perspective only.

AllSides Media Bias Ratings™ are based on multi-partisan, scientific analysis. Visit AllSides.com to view hundreds of media bias ratings.
MemeBrowser (Ryu et al., ACM HyperText’12)
Google expands fact-checking effort to all searches worldwide

Is an online claim true or not? Google hopes special callouts for fact-checking articles will help searchers get the right answers or better make their own decisions.

Search Engine Land
Danny Sullivan, April 7, 2017
Flagging content

“Disputed by 3rd Party Fact-Checkers”

Not always effective, red flag can attract attention
Tessa Lyons, a Facebook News Feed product manager: “...putting a strong image, like a red flag, next to an article may actually entrench deeply held beliefs — the opposite effect to what we intended.”
Slowing spread by slowing action
Providing related articles

Related Articles from Fact-Checking Organizations

Works in some situations, better if it also includes a description of the fact-checking organization.
Questions for Search Engines

• How do we balance search results which match existing beliefs vs. challenging users with alternative views?

• If people choose news outlets in part due to political leaning, could vertical search engines rank & filter results to match audience views?

• How do we frame, measure, and address potential harm of search results (e.g. “alternative” facts), be they errors or intended diversity?

• How do we evaluate information gain alongside potential varying severity of harm to some number of users?
AI Trained on Decades of Food Research - Making Brand-New Foods

An AI System Spontaneously Develops Baby-Like Ability to

AI can learn real-world skills from

AI is now better at predicting mortality than human doctors

A new AI acquired humanlike ‘number sense’ on its own

Here Comes the World’s First AI-Generated Whisky
Human Help Wanted: Why AI Is Terrible at Content Moderation

AI's frequent failure to understand context means that, for now, monitoring user-generated content on the web will remain a cat-and-mouse game that requires plenty of human labor.

By Ben Dickson  July 10, 2019
What happened when humans stopped managing social media content

As the coronavirus pandemic swept the world, social media giants like Facebook, Google and Twitter did what other companies did. They sent workers home — including the tens of thousands of people tasked with sifting through mountains of online material and weeding out hateful, illegal and sexually explicit content.

The COVID-driven experiment represented a real-world baptism of fire for something social media companies have long dreamed of: using machine-learning tools and artificial intelligence — not humans — to police posts on their platforms.

In their place, the companies turned to algorithms to do the job. It did not go well
Facebook sent thousands of content moderators home due to coronavirus—and its algorithms suffered.

During a company briefing today (Feb. 24), Facebook’s organic content policy manager Varun Reddy acknowledged that because a lot of human reviewers across the globe had to be sent home during the early months of the pandemic, the feedback loop for monitoring content was fractured. The AI learns from human moderators, he explained, adding that the reduction in human vetting volumes has changed “how effective the AI is over time,” he said.
The Myth of Automation

From the industrial revolution to today’s information revolution, technological advances have not reduced the use of human labor to deliver the “last mile” of required capabilities for practical adoption.

Frontier continually advances, yet always remains:

- Gray and Suri (2019) “ghost work”
- Ekbia and Nardi (2014) “heteromation”
- Irani and Silberman (2013) “invisible work”
Human Computation

“Software developers with innovative ideas for businesses and technologies are constrained by the limits of artificial intelligence… If software developers could programmatically access and incorporate human intelligence into their applications, a whole new class of innovative businesses and applications would be possible… people are freer to innovate because they can now imbue software with real human intelligence.”
Human-in-the-loop Approach
Human-in-the-loop Approach
Human-in-the-loop Approach
Human-in-the-loop Approach
Who is the human in-the-loop?

- **The user** (e.g., platform moderator, fact-checker, end-user, etc.)
  - Decision support systems (e.g., who gets a bank loan or parole)
  - Division of labor design for complementary roles / strengths
    - e.g., Google

- **Behind-the-scenes ”cloud” workers**
  - Crowdsourcing / human computation
Round Table at the CLEF-2020 CheckThat! Lab on September 22, 2020: David Corney, Full Fact

What do fact checkers want?

1. To know what is the most important claim to check today
2. To know when someone says something that they’ve already checked
3. To check claims as quickly as possible

Check-worthiness
Verified claim retrieval
Evidence retrieval / claim verification

IJCAI-2021: Automated Fact-Checking for Assisting Human Fact-Checkers. Preslav Nakov, David Corney, Maram Hasanain, Firoj Alam, Tamer Elsayed, Alberto Barrón-Cedeño, Paolo Papotti, Shaden Shaar, Giovanni Da San Martino

Automated Fact-Checking for Assisting Human Fact-Checkers
Explainable Fact-Checking

- **Goal**: Is “fact” vs. “fake” all that people want to know?
- **Trust**: Why trust a “black box” classifier?
- **Error**: How can we design intentionally for AI fallibility?
- **Bias**: How can we detect & mitigate bias (user or AI)?
- **Partnership**: How can we combine human intellect & experience with AI speed & scalability? (designing for *humans-in-the-loop*)
Believe it or not: Designing a Human-AI Partnership for Mixed-Initiative Fact-Checking

with An Thanh Nguyen (UT), Byron Wallace (Northeastern), & more!

Lab: ir.ischool.utexas.edu
@mattlease
Slides: slideshare.net/mattlease
Demo!

Claim Checker

Enter a Claim

Check Claim  Try A Random Claim

Example Claims:

Vice Media CEO Shane Smith paid 300,000 for a Las Vegas dinner
ISIS fighters were caught trying to enter the U.S. via the U.S.-Mexico border
A N.Y. high schooler earned 72 million in the stock market
But what about user bias?
CobWeb: A Research Prototype for Exploring User Bias in Political Fact-Checking

Anubrata Das, Kunjan Mehta and Matthew Lease

ACM SIGIR 2019 Workshop on Fair, Accountable, Confidential, Transparent, and Safe Information Retrieval (FACTS-IR). July 25, 2019
We introduce "political leaning" (bias) as a function of the *adjusted* reputation of the news sources.
We introduce “political leaning” (bias) as a function of the adjusted reputation of the news sources.
We introduce “political leaning” (bias) as a function of the adjusted reputation of the news sources.
We introduce "political leaning" (bias) as a function of the adjusted reputation of the news sources.
We introduce “political leaning” (bias) as a function of the adjusted reputation of the news sources.

Changing reputation scores changes the predicted correctness.

Changing reputation scores changes the overall political leaning.

A user can alter the source reputation.

We introduce “political leaning” (bias) as a function of the adjusted reputation of the news sources.
We introduce “political leaning” (bias) as a function of the adjusted reputation of the news sources. A user can alter the overall political leaning.
We introduce "political leaning" (bias) as a function of the adjusted reputation of the news sources. A user can alter the overall political leaning. Changing the overall political leaning changes the source reputations.
We introduce “political leaning” (bias) as a function of the adjusted reputation of the news sources.

A user can alter the overall political leaning.

Changing the overall political leaning changes the predicted correctness.

Changing the overall political leaning changes the source reputations.

Sources

Imaginary Source Bias

Stance

We introduce “political leaning” (bias) as a function of the adjusted reputation of the news sources.
Work by others...
Most U.S. COVID-19 vaccines go idle as New York, Florida move to penalize hospitals

NEW YORK (Reuters) - More than two-thirds of the 15 million coronavirus vaccines shipped within the United States have gone unused, U.S. health officials said on Monday, as the governors of New York and Florida vowed to penalize hospitals.

Zimbabwe enters Covid lockdown amid fears over crowded new year parties

© Provided by The Guardian Photograph: Tsangirayi Mukwazhi/AP. Parties and new year celebrations that attracted thousands of revellers with little social distancing or mask wearing have triggered panic and a strict 30-day lockdown.

https://github.com/nlkolluri/CoVerifi
CredEye

This week, a scientific research facility in Wyoming made a startling discovery that is certain to change the way millions of Americans look at the environmentalism movement. After they found conclusive evidence that solar panels not only convert the sun's energy into usable energy, but that they are also draining the sun of its own energy, possibly with catastrophic consequences far worse than global warming. Scientists at the Wyoming Institute of Technology, a privately-owned think tank located in Cheyenne, Wyoming, discovered that energy radiated from the sun isn't 
merely captured in solar panels, but that energy is directly physically drawn from the sun by those panels. In a process they refer to as forced photovoltaic drainage. Put into layman's terms, the solar panels capture the sun's energy, but pull on the sun over time, forcing more energy to be released than the sun is actually producing. What claims in a scientific white paper published on Wednesday: Imagine a waterfall dumping water.

Seeing Things from a Different Angle: Discovering Diverse Perspectives about Claims

Fakta

Figure 2: Screenshot of FAKTA for a document retrieved for the claim “ISIS infiltrates the United States.”

http://verifi.herokuapp.com/
Found 30 arguments (15 pro; 15 con) in 8 documents (classified 119 sentences in 2.3 s)

**PRO**

- documents.worldbank.org / Feb 13, 2016

This will aid the international community’s efforts to help those developing countries most vulnerable to climate change meet adaptation costs. 99.69%

- documents.worldbank.org / Feb 8, 2016

Disaster risk management implies addressing the underlying social, economic and environmental vulnerabilities and thereby reduce the probability of a disaster occurring. 99.68%

**CON**

- documents.worldbank.org / Feb 8, 2016

Indeed, in many countries, these existing mechanisms are already insufficient of the current level of vulnerability. 99.29%

- abcnews.go.com / Feb 11, 2016

Disasters are associated with extreme events. 99.26%

Botometer
An OSoMe project (bot•o•meter)

Botometer (formerly BotOrNot) checks the activity of a Twitter account and gives it a score. Higher scores mean more bot-like activity.
Thank you!

We thank our many talented crowd workers for their contributions to our research!