Determining Credibility in the News: Do We Need to Read?

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Outline

Introduction

Methodology

Results

Conclusions

Fake News Flavors

The New York Times.

NEW YORK, MONDAY, OCTOBER 31, 1938.

MEAD STANDS PAT AS A NEW DEALER IN BID FOR SENATE

Democratic Candidate Opposes Any Except Minor Changes in Labor and Security Laws

UPHOLDS THEORY OF TVA

Radio Listeners in Panic, Taking War Drama as Fact

Many Flee Homes to Escape 'Gas Raid From Mars'—Phone Calls Swamp Police at Broadcast of Wells Fantasy

OUSTED JEWS FIND REFUGE IN POLAND AFTER BORDER STAY

Exiles Go to Relatives' Homes or to Camps Maintained by Distribution Committee

REVEAL CRUELTY OF TRIP

ORIGINAL!

Facebook To Ban Fake News, Says Mark Zuckerberg While Eating Dolphin

Facebook will take measures to remove fake news stories from peoples' news feeds, Mark Zuckerberg announced this morning while consuming a live dolphin.

In 2016, the prevalence of political fact abuse – promulgated by the words of two polarizing presidential candidates and their passionate supporters – gave rise to a spreading of fake news with unprecedented impunity.

Fake news: Hillary Clinton is running a child sex ring out of a pizza shop.

Fake news: Democrats want to impose Islamic law in Florida.

Fake news: Thousands of people at a Donald Trump rally in Manhattan chanted, "We hate Muslims, we hate blacks, we want our great country back."

None of those stories – and there are so many more like them – is remotely true.

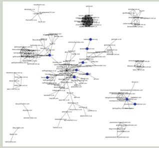
Fake News and the Modern Web

- *Motive*: Clickbait revenue streams and political campaign funding incentivizes low quality articles to attract readers
- *Means*: The democratization of online media allows anyone to setup a website and publish unadjudicated content
- *Opportunity*: Social media provides huge platforms for attracting clicks

Our Approach

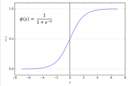
"Structural Method"

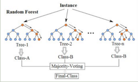
Probabilistic inference using a domain (publisher) web link network



"Content Model"

Traditional supervised learning classifiers using textual features





Conservative

Liberal

"Bias Detection"

Class label denotes political ideology

Credible

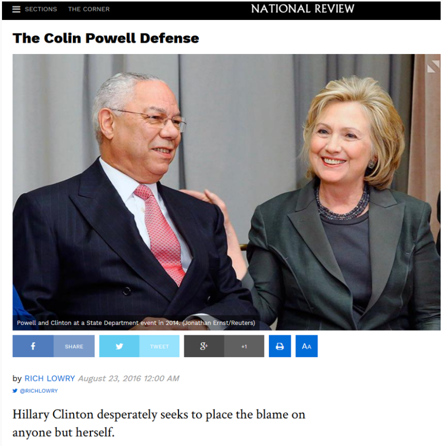
Non Credible

"Credibility Assessment"

Class label denotes source reputation

Bias Detection

Humans can pick up on nuanced but powerful signals of bias in terms of *semantics*, *sentiment (tone)* and *content*.



SECTIONS THE CORNER NATIONAL REVIEW

The Colin Powell Defense

Powell and Clinton at a State Department event in 2014. (Jonathan Ernst/Reuters)

SHARE TWEET +1 AA

by RICH LOWRY *August 23, 2016 12:00 AM*

@RICHLOWRY

Hillary Clinton desperately seeks to place the blame on anyone but herself.

WAR STORIES MILITARY ANALYSIS. JULY 6 2016 1:44 PM

The Hillary Clinton Email Scandal Was Totally Overblown

SLATE

We learned nothing new from the investigation or James Comey's statement.

By Fred Kaplan

Hillary Clinton in New York on March 9, 2015.

Lucas Jackson/Reuters

Content Model

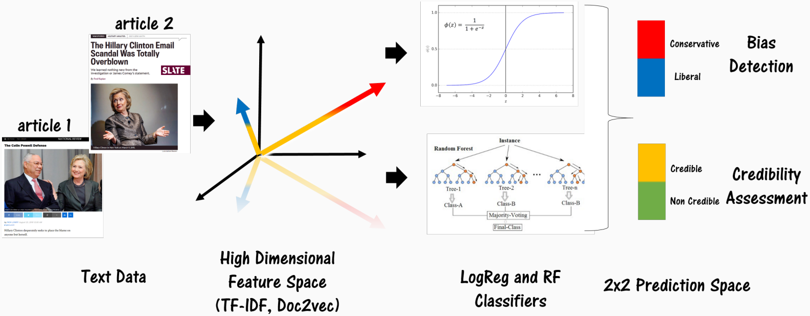


Figure 1: Content Model Pipeline

Credibility Assessment: Fake or Not Fake?

Oprah Stokes 2020 Rumors with Tweet: ‘Thanks for Your Vote’

September 29, 2017

f SHARE | TWEET

Could the United States go from a reality TV president to a daytime TV president? If Oprah Winfrey's recent Twitter activity is any indication, it's at least a possibility.

The former queen of daytime television ignited rumors of a presidential bid after tweeting out a New York Post article that calls her the "Democrats' best hope" to beat President Donald Trump in 2020.

> *"Thanks for your VOTE of confidence!" Winfrey added, tagging the author of the piece:*

Oprah Winfrey @Oprah

@jpodhoretz Thanks for your VOTE of confidence!Democrats' best hope for 2020: Oprah I New York Post nypost.com/2017/09/27/dem…

6:49 PM - Sep 28, 2017

Democrats' best hope for 2020: Oprah

On Sunday night's "60 Minutes," a panel of Michigan voters spent 20 minutes discussing their political differences on screen. It was a moving

nypost.com

602 1,401 4,260

When words are not enough...

Source: HillaryDaily.com


Oprah Stokes 2020 Rum
for Your Vote'

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6:49 PM - Sep 28, 2017

Democrats' best hope for 2020: Oprah
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minutes discussing their political differences on screen. It was a moving
nypost.com

802 1,401 4,260

- New Book Reveals That Obama Pushed Hillary to Concede in 2016 Election
- 2016 Democratic Presidential Candidate Blasts Media for Being Against Trump "Right from the Beginning"
- Michelle Obama: If I Ran Against Trump I Would Have Beaten Him Easily!
- Kellyanne Conway Shuts Chelsea Clinton Down: "You Lost the Election"
- Former President Obama Spotted Partying in Caribbean with Billionaire
- Trump Admin Says Pakistan May Be Next Country He Includes in Ban

Structural Method

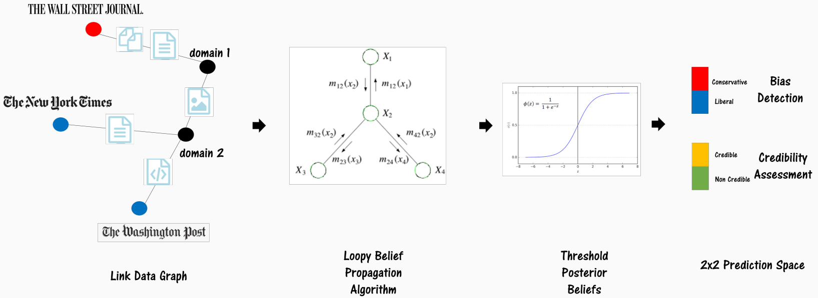


Figure 2: Structural Method Pipeline

Structural Method: Graph Creation

HTML Tag	Description
`<a>`	Mutually linked sites (text content)
`<link>`	Shared CSS (visual style)
`<script>`	Shared JavaScript files (user interaction)
`<img>`	Common images, logos, or icons (visual content)

Table 1: Link Types used in Graph Construction

- An undirected and unweighted graph was constructed using link structure from 19,786 domains (nodes) with 32,632 links (edges)

Structural Method: Belief Propagation

BP is an iterative semisupervised method based on:

- Node potential: $\phi(x_i)$ "*a priori* belief of node *i*'s assignment"
- Edge potential: $\psi(x_i, x_j)$
  "probability node j in class x_j given node i in class x_i"

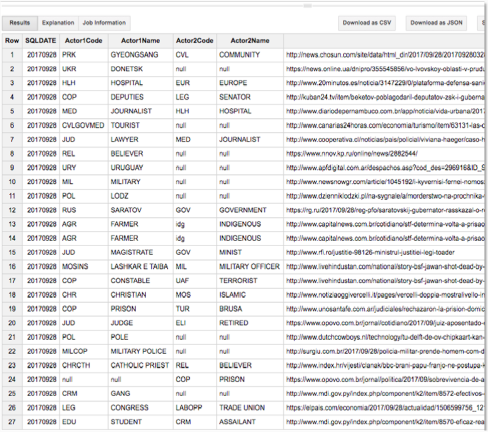
$\psi_{ij}(x_i, x_j)$	x_i	x_j
x_i	1-ϵ	ϵ
x_j	ϵ	1-ϵ

- Nodes pass messages: $m_{ij}(x_j)$ "node *i*'s belief about node *j* belonging to class x_i "
  $m_{ij}(x_j) \leftarrow \sum_{x_i \epsilon X} \phi(x_i)\psi_{ij}(x_i, x_j) \prod_{k \epsilon N(i)/j} m_{ki}(x_i)$
- Compute Posterior: $b_i(x_i)$ $b_i(x_i) = k\phi(x_i) \prod_{x_j \epsilon N(i)} m_{ji}(x_i)$

Experiments: The GDELT Database

Contains events extracted from online news sources and includes:

- two actors
- the action
- source url
- geographic information
- temporal information



Results | Explanation | Job Information | Download as CSV | Download as JSON

Row	SQLDATE	Actor1Code	Actor1Name	Actor2Code	Actor2Name	
1	20170928	PRK	GYEONGSANG	CVL	COMMUNITY	http://news.chosun.com/site/data/html_dir/2017/09/28/20170928032
2	20170928	UKR	DONETSK	null	null	https://news.online.ua/dnipro/355545856/vo-lvovskoy-oblasti-v-prudu
3	20170928	HLH	HOSPITAL	EUR	EUROPE	http://www.20minutos.es/noticia/3147229/0/plataforma-defensa-sani
4	20170928	COP	DEPUTIES	LEG	SENATOR	http://kuban24.tv/item/beketov-poblagodaril-deputatov-zsk-i-guberna
5	20170928	MED	JOURNALIST	HLH	HOSPITAL	http://www.diariodepernambuco.com.br/app/noticia/vida-urbana/201
6	20170928	CVLGOVMED	TOURIST	null	null	http://www.canarias24horas.com/economia/turismo/item/63131-las-c
7	20170928	JUD	LAWYER	MED	JOURNALIST	http://www.cooperativa.cl/noticias/pais/policial/viviana-haeger/caso-h
8	20170928	REL	BELIEVER	null	null	https://www.nnov.kp.ru/online/news/2882544/
9	20170928	URY	URUGUAY	null	null	http://www.apfdigital.com.ar/despachos.asp?cod_des=296916&ID_S
10	20170928	MIL	MILITARY	null	null	http://www.newsnowgr.com/article/1045192/i-kyvernisi-fernei-nomos
11	20170928	POL	LODZ	null	null	http://www.dzienniklodzki.pl/na-sygnale/a/morderstwo-na-prochnika-
12	20170928	RUS	SARATOV	GOV	GOVERNMENT	https://rg.ru/2017/09/28/reg-pfo/saratovskij-gubernator-rasskazal-o-r
13	20170928	AGR	FARMER	idg	INDIGENOUS	http://www.capitalnews.com.br/cotidiano/stf-determina-volta-a-prisao
14	20170928	AGR	FARMER	idg	INDIGENOUS	http://www.capitalnews.com.br/cotidiano/stf-determina-volta-a-prisao
15	20170928	JUD	MAGISTRATE	GOV	MINIST	http://www.rfi.ro/justitie-98126-ministrul-justitiei-legi-toader
16	20170928	MOSINS	LASHKAR E TAIBA	MIL	MILITARY OFFICER	http://www.livehindustan.com/national/story-bsf-jawan-shot-dead-by-
17	20170928	COP	CONSTABLE	UAF	TERRORIST	http://www.livehindustan.com/national/story-bsf-jawan-shot-dead-by-
18	20170928	CHR	CHRISTIAN	MOS	ISLAMIC	http://www.notiziaoggivercelli.it/pages/vercelli-doppia-mostralivello-in
19	20170928	COP	PRISON	TUR	BRUSA	http://www.unosantafe.com.ar/judiciales/rechazaron-la-prision-domic
20	20170928	JUD	JUDGE	ELI	RETIRED	https://www.opovo.com.br/jornal/cotidiano/2017/09/juiz-aposentado-
21	20170928	POL	POLE	null	null	http://www.dutchcowboys.nl/technology/tu-delft-de-ov-chipkaart-kan-
22	20170928	MILCOP	MILITARY POLICE	null	null	http://surgiu.com.br/2017/09/28/policia-militar-prende-homem-com-d
23	20170928	CHRCTH	CATHOLIC PRIEST	REL	BELIEVER	http://www.index.hr/vijesti/clanak/bbc-brani-papu-franjo-ne-postupa-k
24	20170928	null	null	COP	PRISON	https://www.opovo.com.br/jornal/politica/2017/09/sobrevivencia-de-a
25	20170928	CRM	GANG	null	null	http://www.mdi.gov.py/index.php/component/k2/item/8572-efectivos-
26	20170928	LEG	CONGRESS	LABOPP	TRADE UNION	https://elpais.com/economia/2017/09/28/actualidad/1506599756_12
27	20170928	EDU	STUDENT	CRM	ASSAILANT	http://www.mdi.gov.py/index.php/component/k2/item/8570-eficaz-rea

We augment GDELT with text and links from news sources

Experiments: Media Bias Fact Check

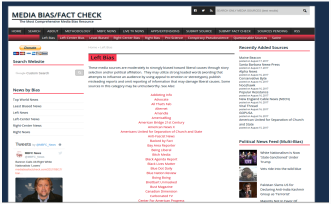


Figure 3: Volunteer run fact checking site `mediabiasfactcheck.com`

- Rubric based ratings for domains for 4 categories:
  - Biased wording/headlines
  - Factual/Sourcing
  - Story Choices
  - Political Affiliation/Endorsement
- Labels are converted to binary labels for classification

Results

- Content problem used textual information from 124,300 articles from 242 domains
- Structural problem used link information from 19,786 domains (nodes) and 32,632 links (edges)

Model	Bias	Credibility
Content	0.926	0.358
Structure	0.931	0.889

Table 2: Test Set AUC for Bias and Credibility problems. While content is sufficient to detect bias, structure is required to detect fake news.

Conclusions

- We can discover and combat propaganda with structural analysis of the web, which leverages informative features ignored in linguistic models
- Text based models are less effective for credibility because of changing topics of fake news
- Future research should focus on:
  - Combining article link structure with traditional NLP textual features
  - Current method is vulnerable to large connected components without any labels.
  - Extracting links from the text "according to AP"