

ClaimBuster:

The First-ever End-to-end Fact-Checking System

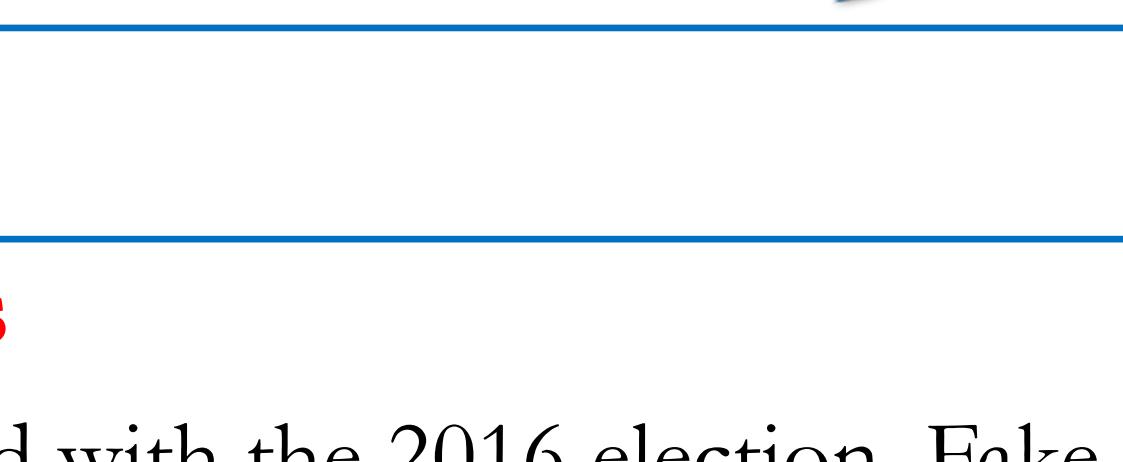
Naeemul Hassan¹ Gensheng Zhang² Fatma Arslan² Josue Caraballo² Damian Jimenez² Siddhant Gawsane² Shohedul Hasan² Minumol Joseph² Aaditya Kulkarni² Anil Kumar Nayak² Vikas Sable² Chengkai Li² Mark Tremayne³



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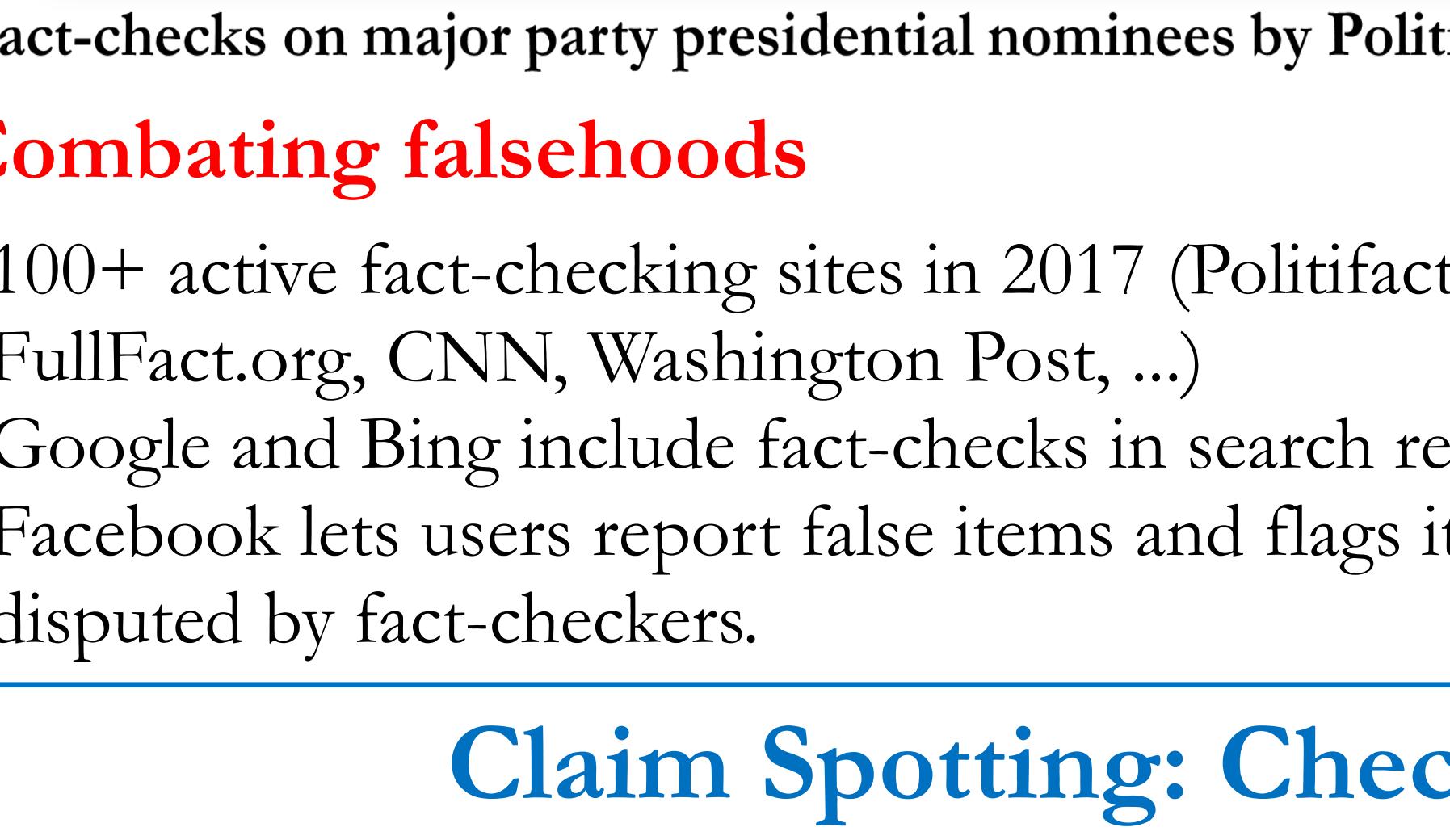
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The Quest to Automate Fact-checking

Politicians make false and misleading claims



Fact-checks on major party presidential nominees by PolitiFact

Combating falsehoods

- 100+ active fact-checking sites in 2017 (Politifact.com, FullFact.org, CNN, Washington Post, ...)
- Google and Bing include fact-checks in search results.
- Facebook lets users report false items and flags items disputed by fact-checkers.

National security threats

- Russian government interfered with the 2016 election. Fake-news websites and bots used.

- Pizzagate: conspiracy theory led to shooting

Fake-news floods social media (“filter bubbles” and “echo chambers”)

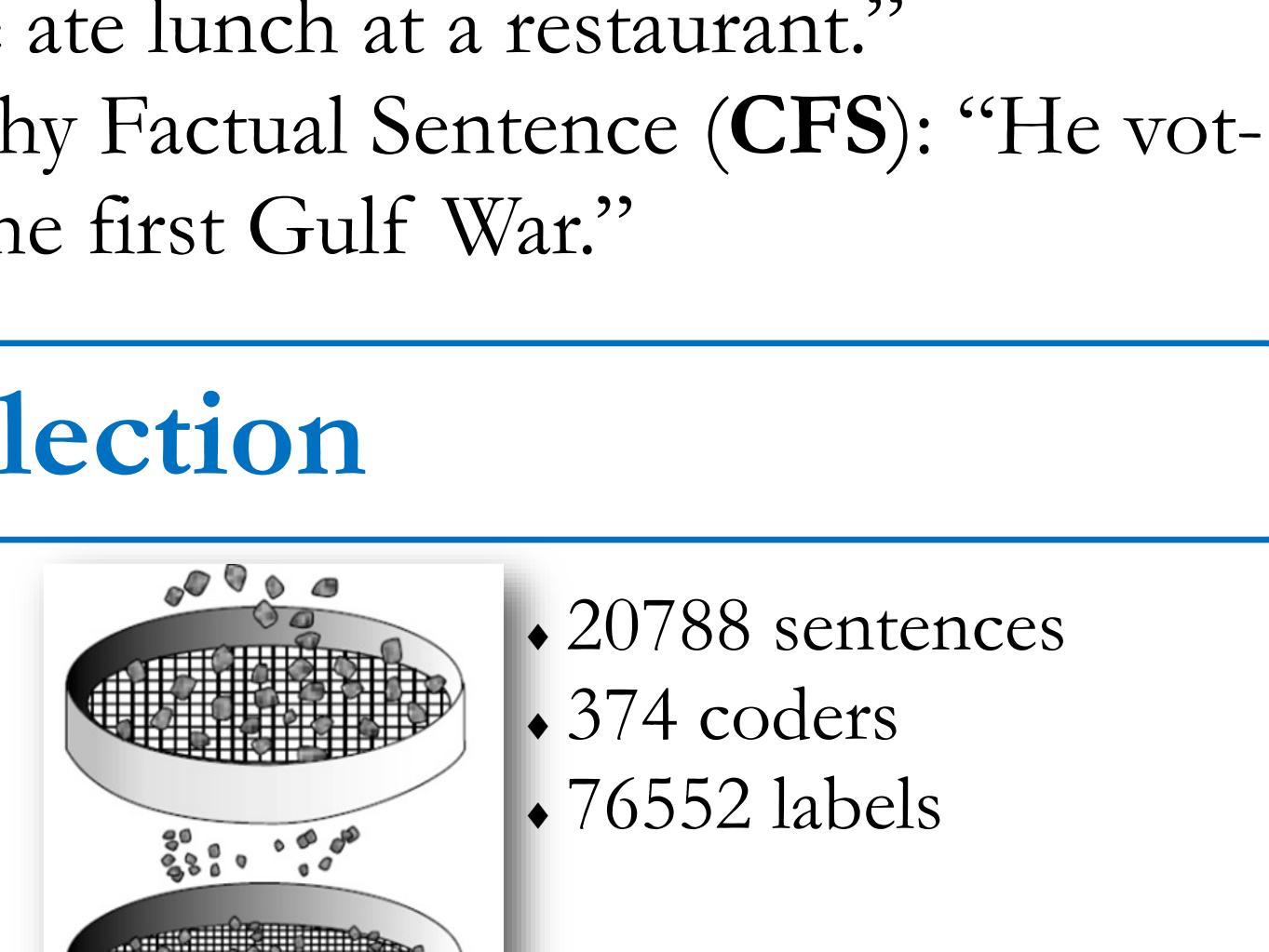
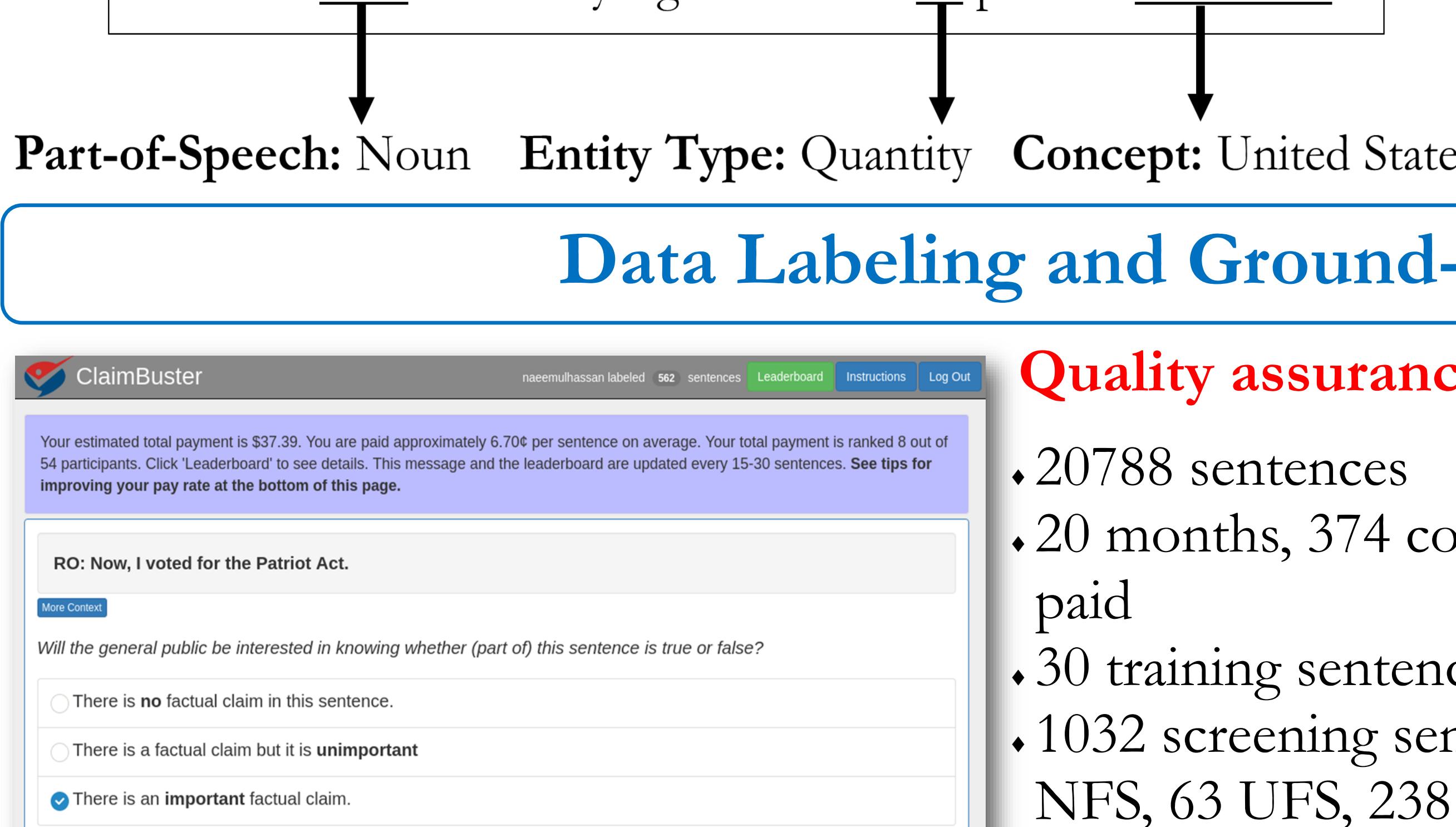
- Facebook trending topic algorithms promoted fake-news.
- A sample of 140,000 Twitter users in the battleground state of Michigan shared as many junk news items as professional news during the final ten days of the 2016 election.

<http://politicalbots.org/?p=1064>

Lack of automated tools that assist fact-checkers

- “The Holy Grail”: fully automated fact-checking

Claim Spotting: Check-worthy Factual Claims Detection



Feature importance

Feature extraction and selection

Sentiment: 0.032 Words: state, legislature, 87, percent, democrat

I was in a state where my legislature was 87 percent Democrat.

Part-of-Speech: Noun Entity Type: Quantity Concept: United States

Classification and ranking by check-worthiness

- Non-Factual Sentence (NFS) (Opinions, beliefs, declarations): “But I think it’s time to talk about the future.”
- Unimportant Factual Sentence (UFS): “Two days ago we ate lunch at a restaurant.”
- Check-worthy Factual Sentence (CFS): “He voted against the first Gulf War.”

Data Labeling and Ground-Truth Collection

ClaimBuster

Your estimated total payment is \$37.28. You are paid approximately 6.70¢ per sentence on average. Your total payment is ranked 8 out of 54 participants. Click 'Leaderboard' to see details. This message and the leaderboard are updated every 15-30 sentences. See tips for improving your pay rate at the bottom of this page.

RO: Now, I voted for the Patriot Act.

Will the general public be interested in knowing whether (part of) this sentence is true or false?

There is no factual claim in this sentence.

There is a factual claim but it is unimportant.

There is an important factual claim.

Submit Stop the sentence Modify My Previous Response

Quality assurance

- 20788 sentences
- 20 months, 374 coders, ~\$4,000 paid
- 30 training sentences
- 1032 screening sentences (731 NFS, 63 UFS, 238 CFS) to detect spammers & low-quality coders



- 20788 sentences
- 374 coders
- 76552 labels
- 86 top-quality coders
- 52333 labels
- Majority voting
- 20617 admitted sentences

Coding website

bit.ly/claimbusters



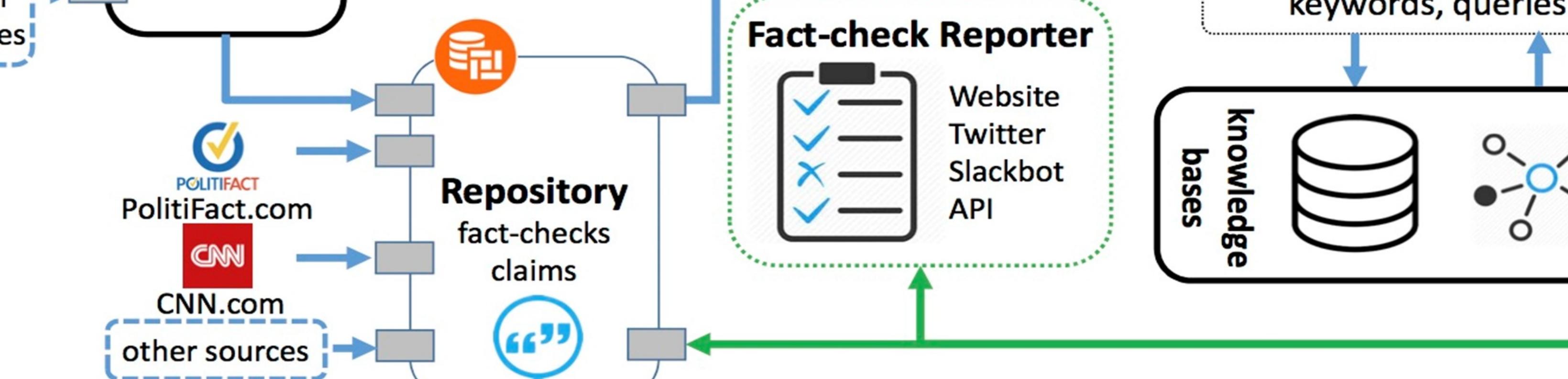
	Count	Percentage
NFS	13671	66.31
UFS	2097	10.17
CFS	4849	23.52

Classification and Ranking Accuracy

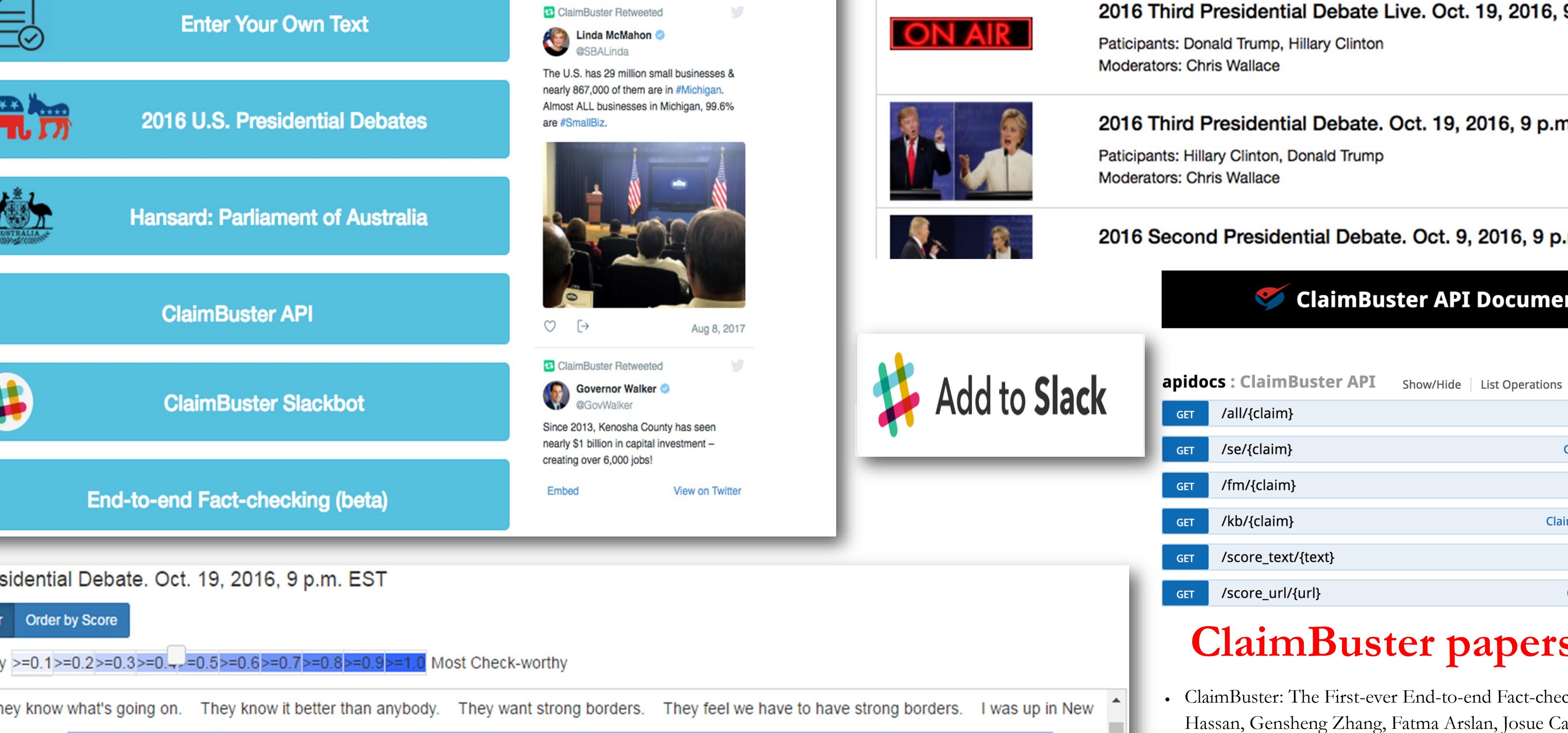
algorithm	features	p_NFS	p_UFS	p_CFS	p_wavg	r_NFS	r_UFS	r_CFS	r_wavg	f_NFS	f_UFS	f_CFS	f_wavg
RFC	W	0.755	0.125	0.638	0.692	0.965	0.004	0.235	0.745	0.848	0.008	0.343	0.685
NBC	W	0.788	0	0.816	0.747	0.983	0	0.385	0.791	0.875	0	0.522	0.744
SVM	W	0.871	0.426	0.723	0.811	0.925	0.227	0.667	0.826	0.897	0.296	0.694	0.816
RFC	W_P	0.772	0.358	0.701	0.731	0.968	0.011	0.312	0.764	0.859	0.02	0.43	0.713
NBC	W_P	0.799	0	0.805	0.753	0.979	0	0.44	0.8	0.88	0	0.569	0.758
SVM	W_P	0.873	0.43	0.724	0.813	0.925	0.24	0.671	0.827	0.898	0.307	0.696	0.818
RFC	W_P_ET	0.77	0.238	0.665	0.715	0.964	0.008	0.298	0.758	0.856	0.016	0.411	0.706
NBC	W_P_ET	0.803	0	0.791	0.752	0.976	0	0.455	0.801	0.881	0	0.577	0.76
SVM	W_P_ET	0.873	0.427	0.723	0.813	0.925	0.24	0.67	0.827	0.898	0.307	0.695	0.817

k	P@k	AvgP	nDCG
10	1.000	1.000	1.000
25	1.000	1.000	1.000
50	0.980	0.995	0.987
100	0.943	0.979	0.956
200	0.916	0.955	0.931
300	0.848	0.937	0.874
400	0.764	0.915	0.801
500	0.679	0.897	0.827

Case Study: 2016 U.S. Presidential Election Debates



End-to-End Fact-Checking



ClaimBuster: Automated Live Fact-checking

Political Claim Taxonomy Data Collection Press Acknowledgement

Enter Your Own Text

2016 U.S. Presidential Debates

Hansard: Parliament of Australia

ClaimBuster API

Add to Slack

End-to-end Fact-checking (beta)

ClaimBuster: Automated Live Fact-checking

ON AIR

2016 Third Presidential Debate Live. Oct. 19, 2016, 9 p.m. EST

Participants: Donald Trump, Hillary Clinton
Moderators: Chris Wallace

2016 Second Presidential Debate. Oct. 9, 2016, 9 p.m. EST

ClaimBuster API Documentation

apidocs : ClaimBuster API

- GET /all/{claim}
- GET /se/{claim}
- GET /fm/{claim}
- GET /kb/{claim}
- GET /score_text/{text}
- GET /score_url/{url}

ClaimBuster papers

- ClaimBuster: The First-ever End-to-end Fact-checking System. Naeemul Hassan, Gensheng Zhang, Fatma Arslan, Josue Caraballo, Damian Jimenez, Siddhant Gawsane, Shohedul Hasan, Minumol Joseph, Aaditya Kulkarni, Anil Kumar Nayak, Vikas Sable, Chengkai Li, and Mark Tremayne. VLDB 2017, 1945-1948. Demonstration description.
- Toward Automated Fact-Checking: Detecting Check-worthy Factual Claims by ClaimBuster. Naeemul Hassan, Fatma Arslan, Chengkai Li, and Mark Tremayne. KDD 2017, pages 1803-1812.
- Comparing Automated Factual Claim Detection Against Judgments of Journalism Organizations. Naeemul Hassan, Mark Tremayne, Fatma Arslan, and Chengkai Li. 2016 Computation+Journalism Symposium.
- Detecting Check-worthy Factual Claims in Presidential Debates. Naeemul Hassan, Chengkai Li, Mark Tremayne. CIKM 2015, pages 1835-1838.
- The Quest to Automate Fact-Checking. Naeemul Hassan, Bill Adair, James Hamilton, Chengkai Li, Mark Tremayne, Jun Yang and Cong Yu. 2015 Computation+Journalism Symposium.

System

idir.uta.edu/claimbuster



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