

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



¹Department of Computer and Information Science, University of Mississippi

²Department of Computer Science and Engineering, University of Texas at Arlington

³Department of Communication, University of Texas at Arlington



The Quest to Automate Fact-checking

Politicians make false and misleading claims

National security threats

- Russian government interfered with the 2016 election. Fake-news websites and bots used.
- Pizzagate: conspiracy theory led to shooting

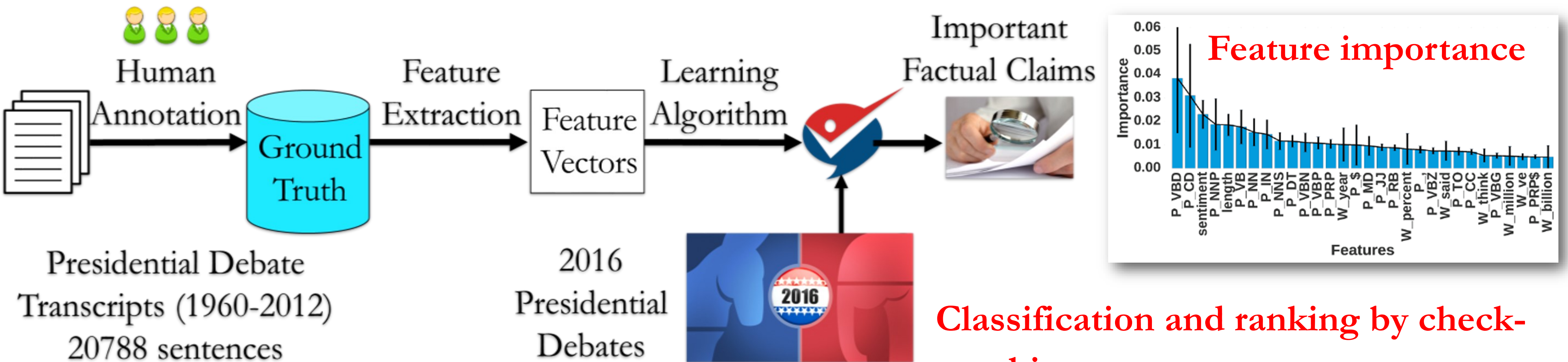
Fake-news floods social media (“filter bubbles” and “echo chambers”)

- 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 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

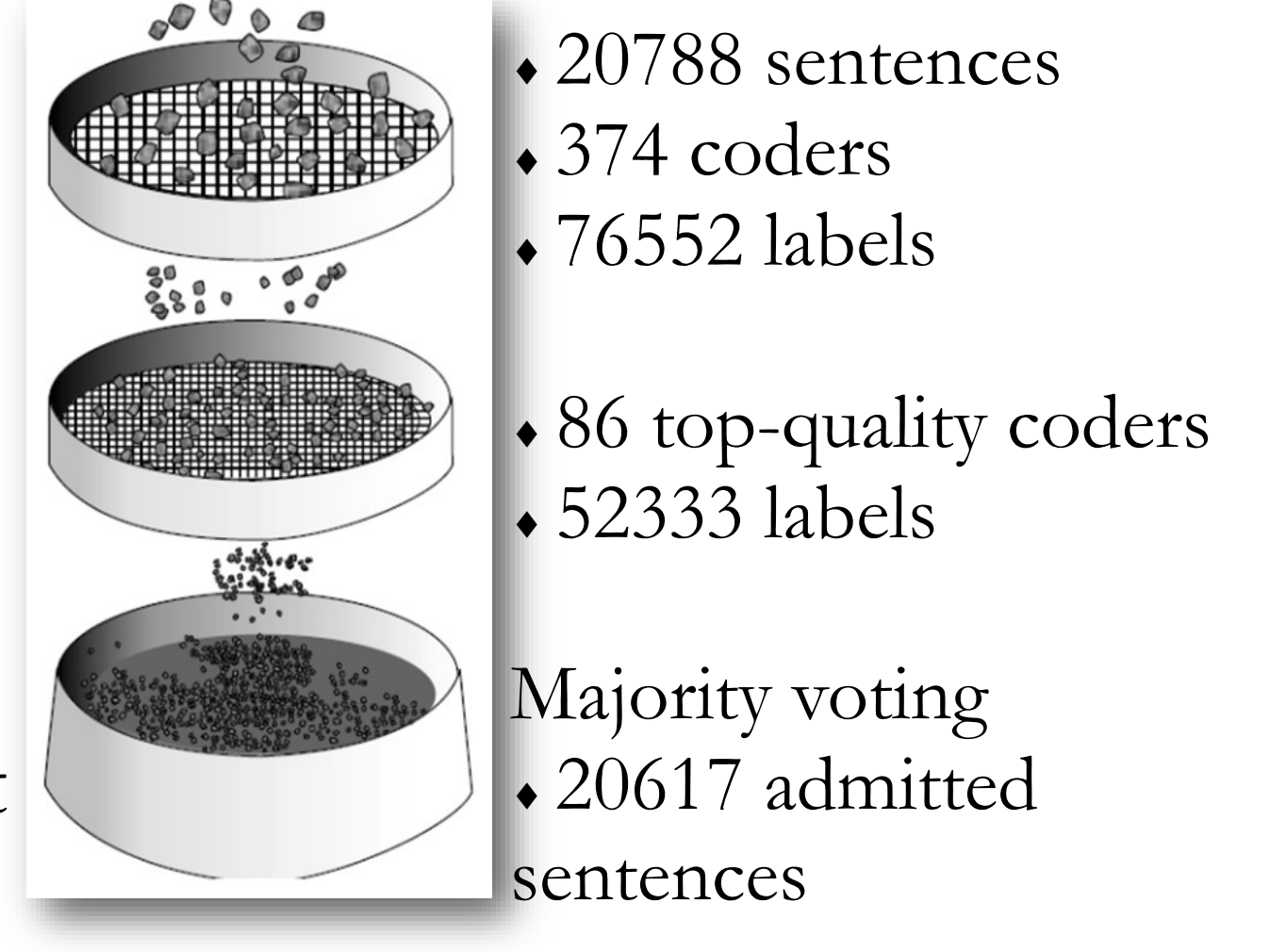
Classification and ranking by check-worthiness

- 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.”

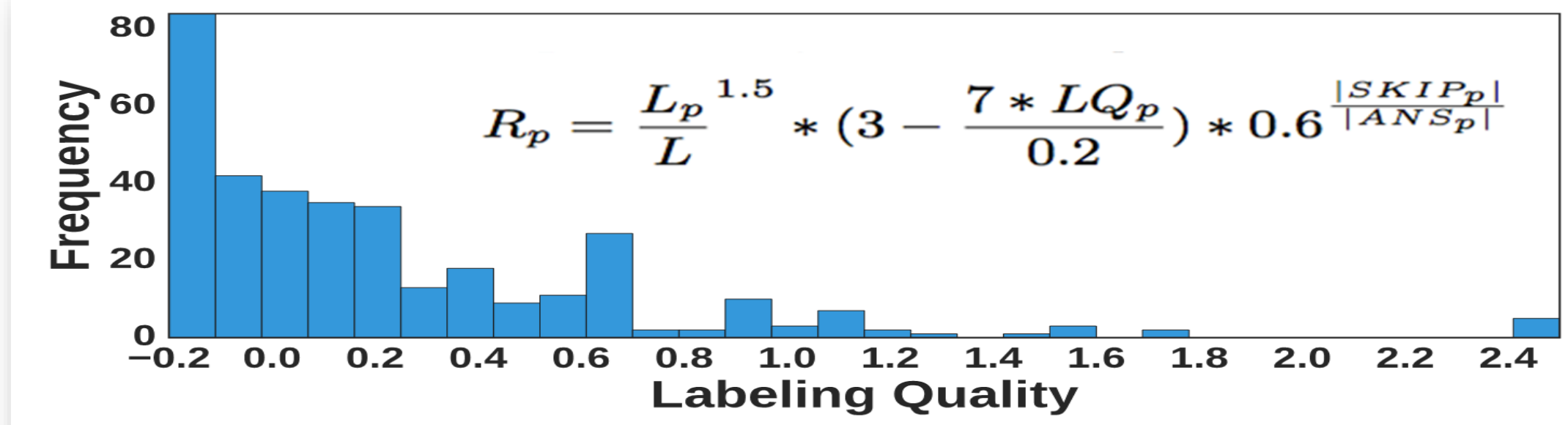
Data Labeling and Ground-Truth Collection

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



Coder quality



Coding website

bit.ly/claimbusters



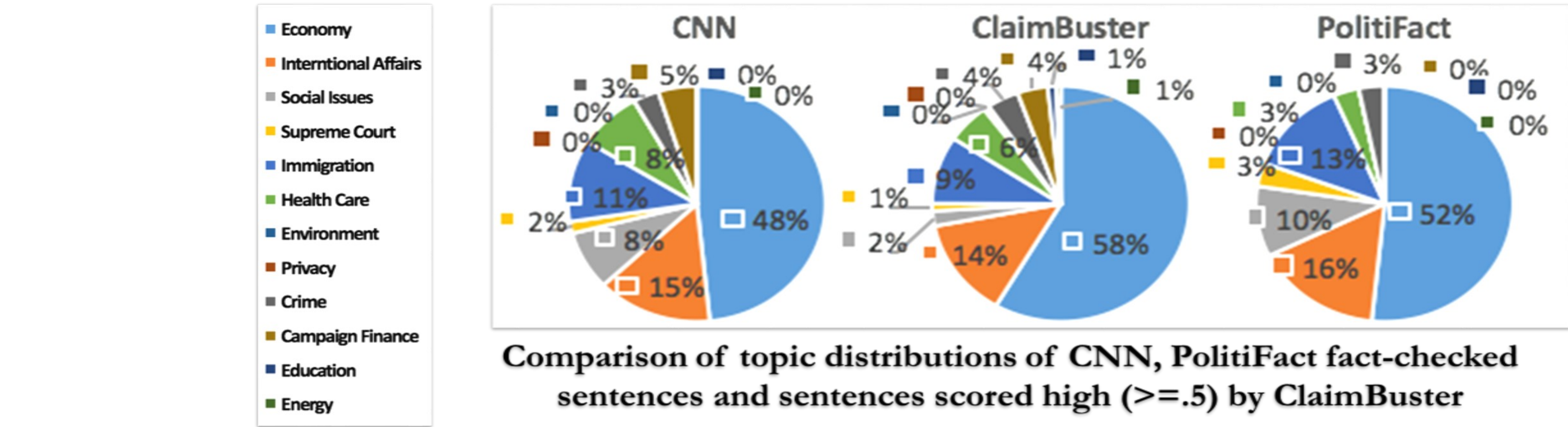
	Count	Percentage
NFS	13671	66.31
UFS	2097	10.17
CFS	4849	23.52

Classification and Ranking Accuracy

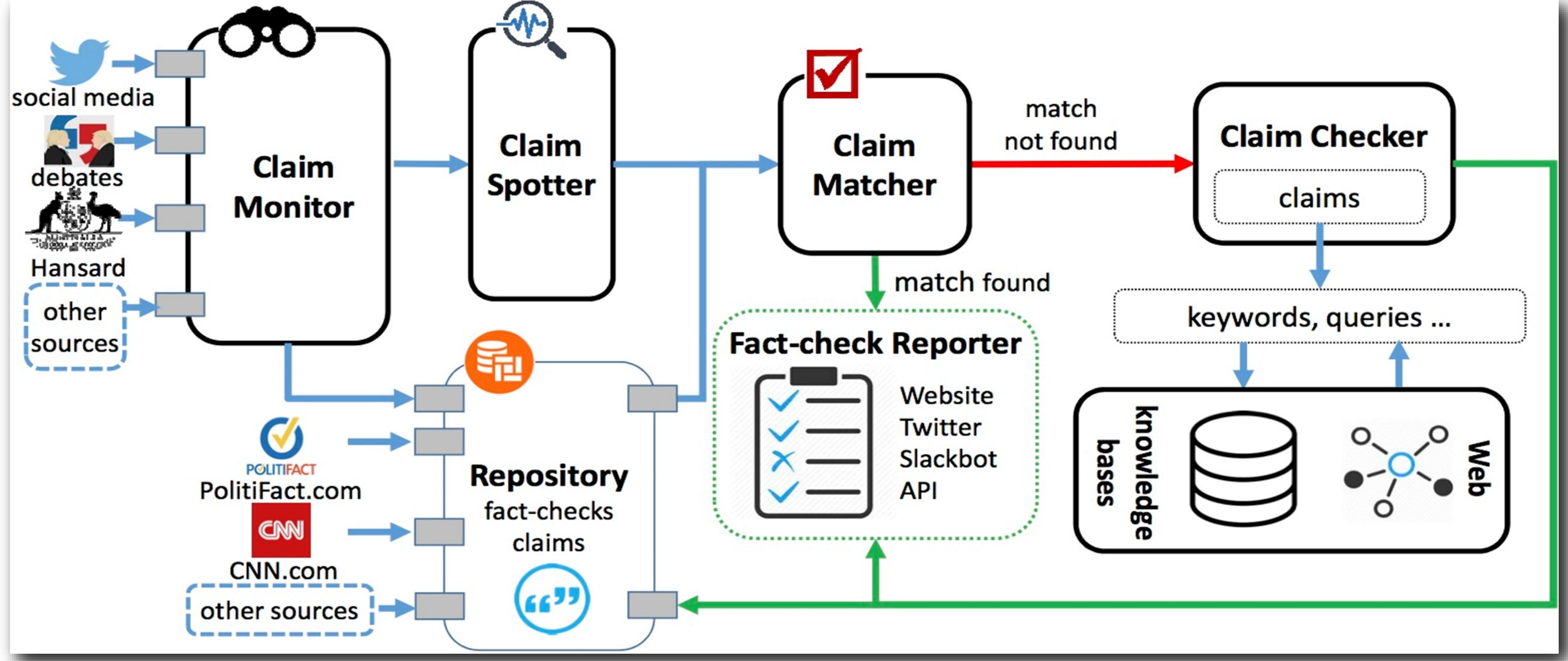
algorithm	features	p_NFS	p_UFS	p_CFS	p_wavg	r_NFS	r_UFS	r_CFS	r_wavg	f_NFS	f_UFS	f_CFS	f_wavg
RFC	W	0.755	0.125	0.638	0.692	0.965	0.004	0.235	0.745	0.848	0.008	0.343	0.685
NBC	W	0.788	0	0.816	0.747	0.983	0	0.385	0.791	0.875	0	0.522	0.744
SVM	W	0.871	0.426	0.723	0.811	0.925	0.227	0.667	0.826	0.897	0.296	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 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



Funded by

