

Bias Beacon

Automated Journalism Bias Detection



Thought Exercise

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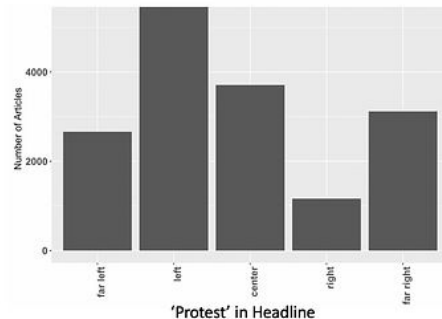
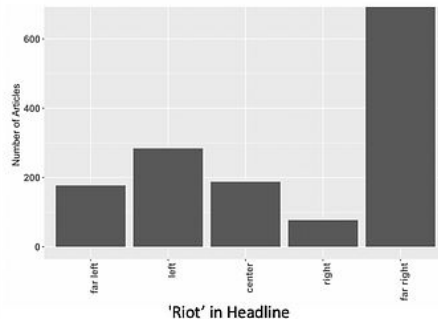
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How many of you have read something that you consider 'biased'?

House crashes into Ferrari F355 GTS



Articles with 'Riot's Vs 'Protest's in Headline



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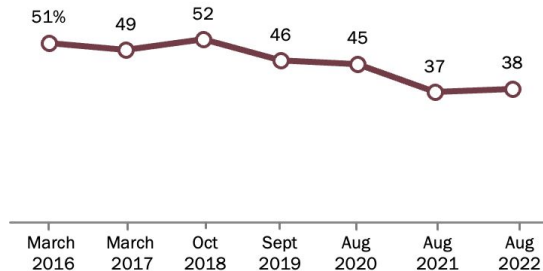
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How many of you have read something that you consider 'biased'?

- **What is Happening:**
 - Nearly Half (46%) of all Americans think the media is very biased. (Pew/Knight)
 - This directly leads to a loss of engagement and trust

The share of U.S. adults who say they closely follow the news has decreased in recent years

*% of U.S. adults who say they follow the news **all or most of the time***



Source: Survey of U.S. adults conducted July 18-Aug. 21, 2022. For dates of other surveys, refer to the topline.

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Problem Definition & Impact

The Problem: Media bias has become a crisis, causing people to lose trust in media.

Gallup: Plurality (38%) of U.S. Adults do not trust the media, and steadily declining...

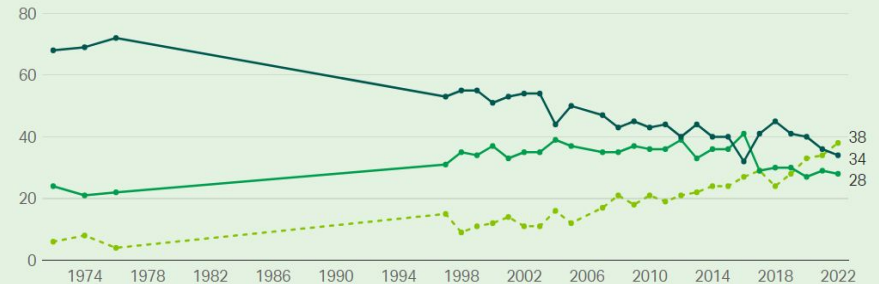
What is the Impact?

- Loss of trust in democratic institutions:
 - Political Polarization (Roscini 2022)
 - AI-driven misinformation 'biggest short-term threat to global economy' (WEF)
- Inefficient allocation of resources:
 - Large financial impacts, cost of fighting misinformation: ~\$78 billion

Americans' Trust in Mass Media, 1972-2022

In general, how much trust and confidence do you have in the mass media -- such as newspapers, TV and radio -- when it comes to reporting the news fully, accurately and fairly -- a great deal, a fair amount, not very much or none at all?

— % Great deal/Fair amount — % Not very much — % None at all



Get the data • Download image

GALLUP

Related Works

Bias has been measured before... but statically.

In academia:

- Several studies documenting and measuring bias
 - Machine-learning media bias ([MIT](#))

In industry:

- Websites that measure bias and fact checks.
 - AllSides, PolitiFact, Snopes, Ad Fontes, etc.

Market Opportunity / Target Users

- 86% of adults get their news from a digital source (Pew)
- Total estimated daily circulation of newspapers (both print and digital) is over 20 million.

AllSides Media Bias Chart™

Ratings based on online, U.S. political content only – not TV, print, or radio.
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](#) for balanced news and over 1,400 rated sources.

AllSides does not own the rights to third party logos.

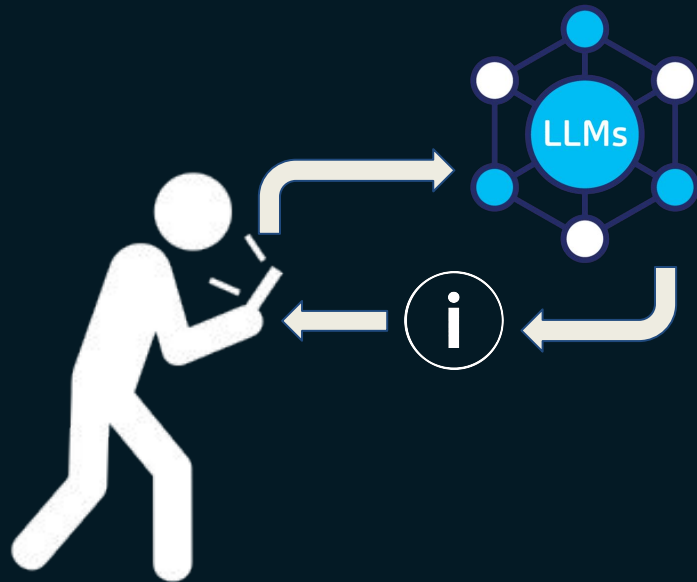
Version 9.2

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Our Solution

Our Solution Differs:

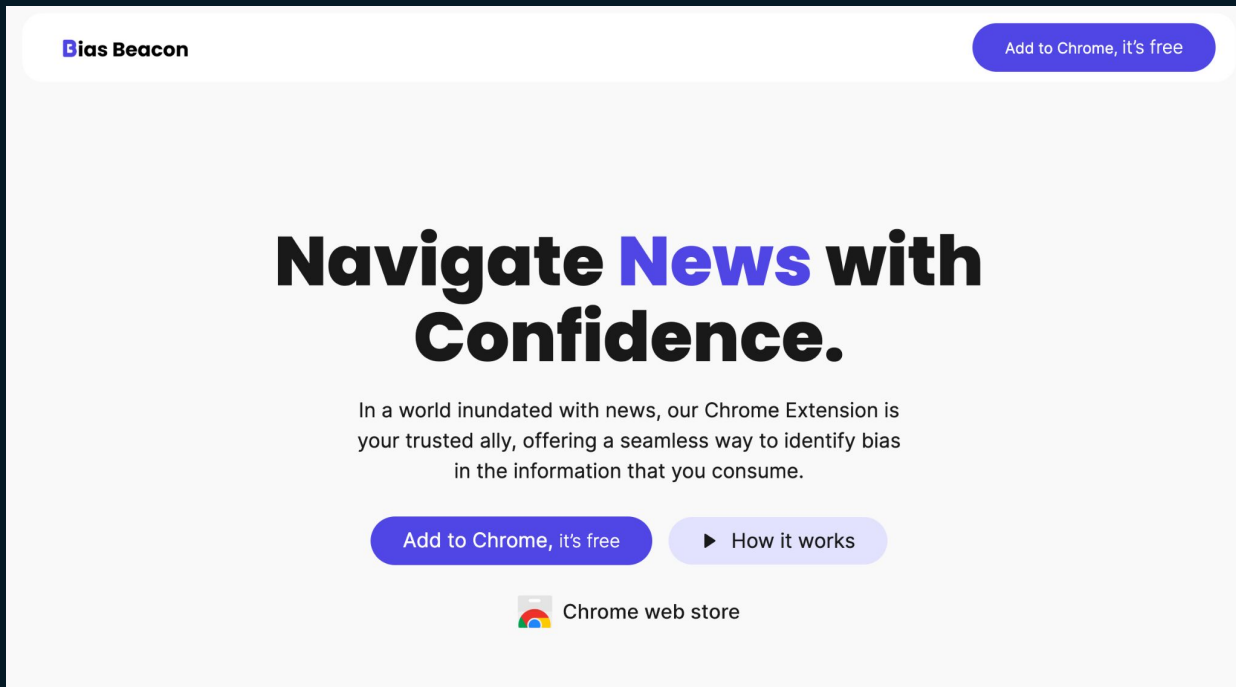
- Automates bias detection
 - Removes the need to manually seek out bias rankings
- Provides content-level real-time bias detection
 - Does not make organizational-level assessments (i.e. “The New York Times is...”)
 - Users no longer have to wait for an article to be fact-checked
- Set-and-forget... download once
- Native to the most popular media landscape:
Digital media



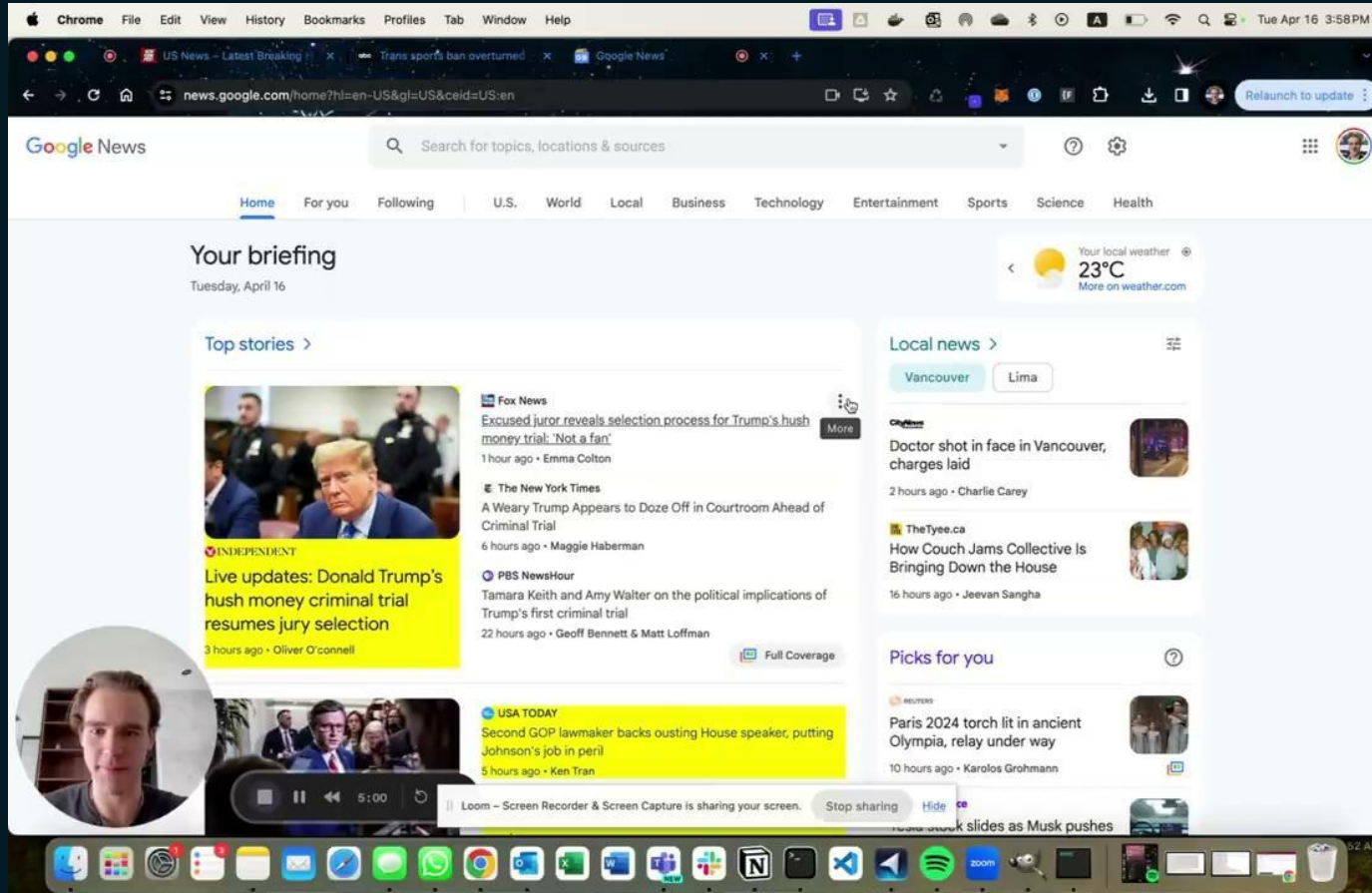
The Solution

A downloadable Google Chrome plugin that identifies biases and informs the readers.

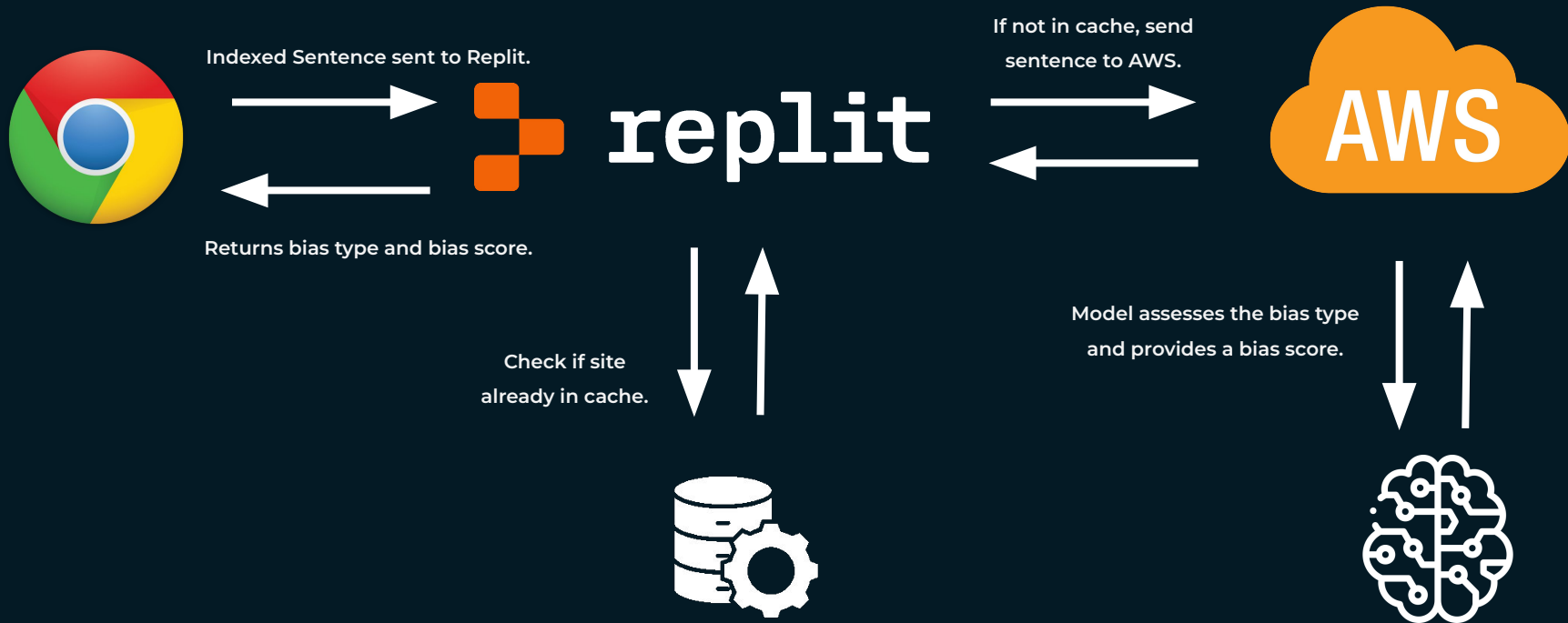
- **Our Goal:** Inform readers to increase literacy / awareness, improve transparency



The Solution



System Architecture



The Solution



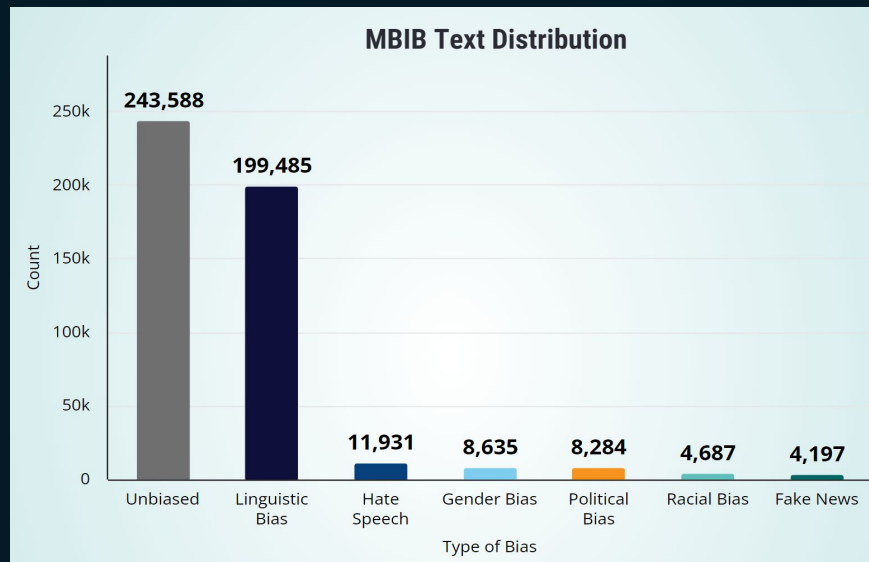
Bias highlighted.



No bias detected.

Dataset Exploration - MBIB Dataset

- Media Bias Identification Benchmark[MBIB]
- Data contains 480,000+ articles, blog posts, Wikipedia articles, etc manually labeled into 6 types of bias
 - Collected from 22 different data sources
 - Mixture of individual sentences and paragraphs consisting of sentences
 - Token length varied from 10 tokens(sentences) to 400 tokens(paragraphs)
- Data cleaning to correct grammar and remove article formatting, such as beginning with BREAKING, RT, NEWS



Dataset Exploration Cont.

Text Examples

Fake News: *"In the United States alone we lose more than 3,000 people a day to cancer."*

Gender Bias: *"I'm just not that into dudes giving me manicures, I like the ladies"*

- Bad labeling: *"but thats because of african americans are uneducated and live in poverty"*

Linguistic Bias: *"Surprisingly scott seems to admit that this theory is the truth of the matter further admitting that he had even blocked making this decision out of his memory to preserve the fallacy in his own mind and prevent others from discovering his secret."*

Racial Bias: *"I think the jews are a intelligent yet sometimes frugal and well adjusted people."*

Political Bias: *"Nevertheless President Falwell eagerly uses his national platform to advocate for Donald Trump. While he occasionally clarifies that supporting Trump is not the official position of Liberty University, he knows it is his title of president of the largest Christian university in the world that gives him political credentials."*

Hate Speech: *"All americans are bad just like all muslims are terrorist and all black people are criminals."*

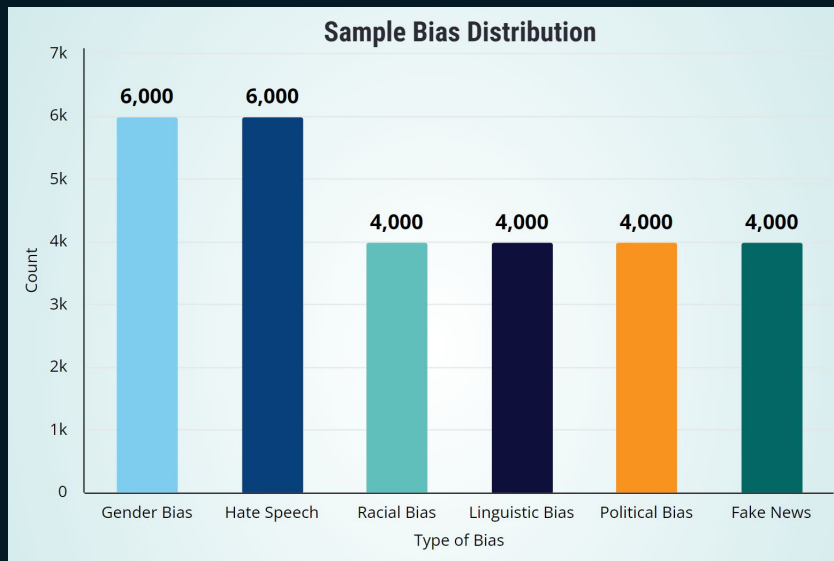
Initial Modeling



Bias Beacon

Initial Modeling Cont.

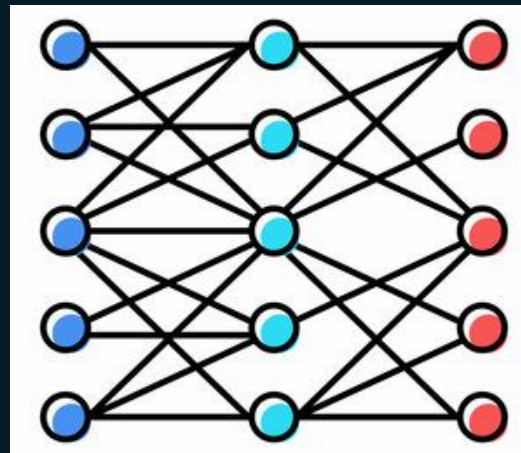
- Explored Neural Network architecture
- Sampled 28,000 texts for Neural Network model training
 - Used 60-20-20 train-validation-test split



Initial Modeling Results



Accuracy: 40.0%



Accuracy: 54.4%

Bias Beacon

Model Performance - BERT

- Accuracy
 - 69.2%
- Macro averaged F1
 - 72.1%

Bias Type	F1 Score
Gender Bias	43.7%
Racial Bias	45.7%
Linguistic Bias	95.1%
Hate Speech	60.5%
Political Bias	92.6%
Fake News	95.3%



Model Performance - Classifications

“im pretty sure most of the parents on dance moms are southern right wingers”

- Predicted as Racial Bias but in reality, it has tendencies of Gender Bias

“practicing jew here a lot of jews are conservative its just loud new york twitter jews who get the coverage any jew with a brain would never vote democrat”

- Predicted as Hate Speech but in reality, it is specifically Racial Bias

Discussion

Ethics:

- Altering media content is a sensitive topic: how do we know the altered version isn't biased itself?
- Essential to be mindful of how dataset was accumulated

Privacy:

- Several privacy concerns exist regarding plug-in installation:
 - A study showed 51% of all installed extensions were high risk and had the potential to cause extensive damage
- Developers of Chrome extensions in the Web Store need to certify their privacy practices and data use.



Conclusion and Lessons Learned

Closing Thoughts:

- As bias and disinformation increase, users will need tools to help navigate media content
 - With a large amount of news consumers and the low trust levels, there is a huge market for media bias detection tools
- Bias Beacon is a plug-in that users can install to understand bias in the headlines of articles read
 - It not only detected bias in headlines, but further specifies the type of bias detected

Lessons Learned:

- Important to consider end-user throughout the tool development process
 - Helpful to have initial assumptions challenged
 - Learned a lot about how plugins are developed
- If we had more time:
 - Refine Data, establish CI/CD pipeline
 - Improve unsupervised model
 - Mobile application

Thank you!

We'd be happy to answer any questions that you have.



Sources

- Pew:
 - <https://www.pewresearch.org/short-reads/2023/10/24/americans-are-following-the-news-less-closely-than-they-used-to/>
- Pew/Knight:
 - <https://knightfoundation.org/press/releases/gallup-knight-poll-americans-concerns-about-media-bias-deepen-even-as-they-see-it-as-vital-for-democracy/#:~:text=The%20results%20of%20the%202020,is%20most%20pronounced%20among%20Republicans.>
- Boston University:
 - https://sites.bu.edu/pardeeatlas/advancing-human-progress-initiative/back2school/how-the-american-media-landscape-is-polarizing-the-country/#_ftn5
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