ISDS
INSTITUTE OF INTERACTIVE SYSTEMS AND DATA SCIENCE

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Framing in Polarized Online Media

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MOTIVATION

In an increasingly polarized world, understanding the framing of messages in online (social) media and their relation to **public opinion** is crucial.

Previous studies on **polarization** primarily focused on the network topology of online social networks (see the thesis of Garimella, 2018), while the analysis of content relied on simplistic comparisons (e.g., in terms of sentiment or word frequencies). Moreover, how online content relates to public opinion is an emergent, yet still understudied topic (see special issue by Stier et al., 2020).

We fill this gap by expanding upon **text-based** methods to identify the **framing** of texts and relate them to public opinion.

RESEARCH QUESTIONS

RQ1 Whether and how to observe the polarization in public opinion using social media messages?

Main challenge: representativeness and data volume differences.

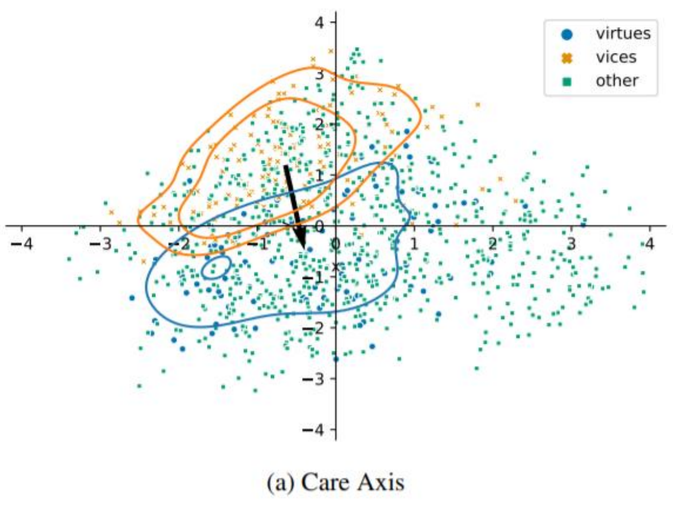
RQ2 How to differentiate the framing of online media using text representations in an unsupervised and interpretable manner?

Main challenge: evaluation and generalizability.

METHODOLOGY

Representative surveys on opinions regarding polarized topics are conducted by the Sociology department of the University of Graz (Route 63). The statistics (e.g., bimodality coefficient) of responses will be related to the sentiment of Twitter messages both for individual survey respondents and Twittersphere [1].

However, sentiment analysis does not capture more nuanced details for text analysis. Herein, we focus on framing by leveraging **embedding-based** methods and **pre-trained language models** in an unsupervised fashion.



(a) Care Axis

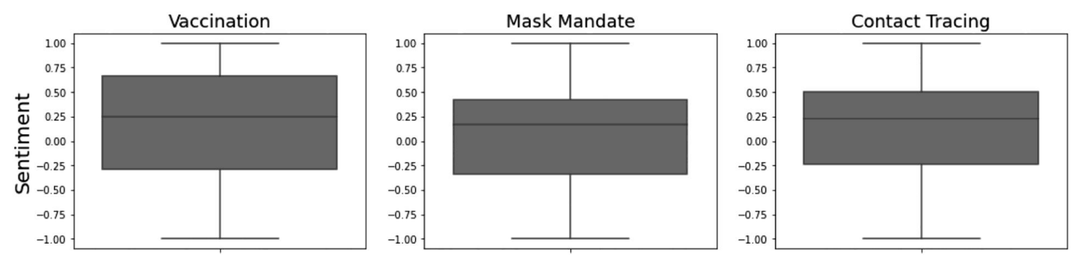
FrameAxis by Kwak et al. (2021) captures the framing bias and intensity along a **predefined axis**. For instance, it can be applied to **moral values** such as care vs harm. Moral words will be assigned to the axis poles. The alignment of a text is measured by projecting words onto the axis.

Many recent transformer-based models allow the extraction of valuable information such as topics (e.g., BERTopic), roles (e.g., SRL BERT), and summaries (e.g., BART). Abstract meaning representations (AMR) combine multiple tasks.

Using these approaches should capture more **semantic** information, such as the predominant **narratives** to differentiate between corpora. Considering the framing in terms of narrative information would benefit the analysis of conspiracy theories.

RESULTS

- We find that the survey responses, agree with the sentiment on Twitter regarding **COVID-19 prevention measures** [1].
- Polarization is more pronounced in survey data.
- Data showed that **vaccination** is the most polarized prevention measure (compared to mask-wearing and contact tracing) in the DACH region in the Summer of 2020.



- Moral values are associated with different political messages spread by the **US** and **Austrian politicians** via Twitter [2].
- Democrats tend to frame tweets in terms of care, while loyalty is a characteristic frame for republicans.
- We find that the followers of the Austrian governing conservative party leader emphasize care, which is a key message and moral frame in the party's COVID-19 campaign slogan.

Moral Frames		D	R
Bias	Care	2.505	3.791
	Fairness	2.130	1.115
	Authority	-0.385	2.343
	Loyalty	-1.419	-5.269
	Sanctity	0.476	2.102
Intensity	Care	**9.701**	-0.634
	Fairness	**4.376**	-8.154
	Authority	-3.453	-6.329
	Loyalty	0.166	**9.956**
	Sanctity	-2.967	**3.261**

(a) Moral frames in US politics. Democrats (D) and republicans (R) differ most in terms of frame intensities (in bold).

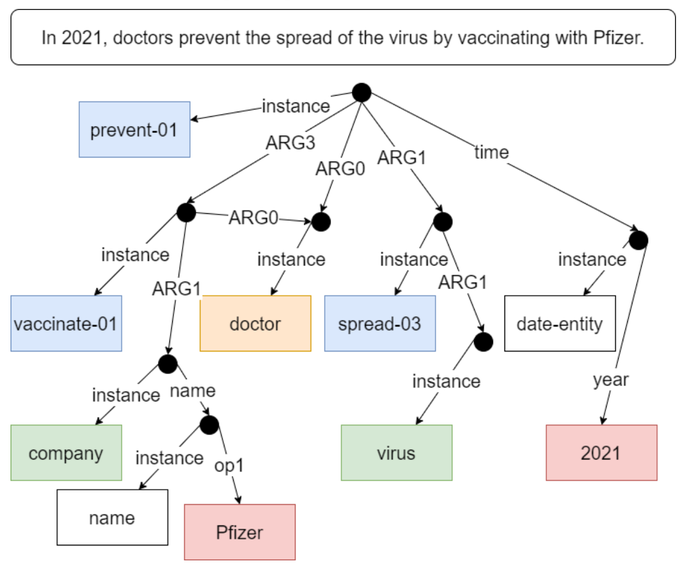
@BMeinl	@WKogler	@norbertghofer	@rendiwagner	@sebastiankurz
-0.788	-0.463	**-4.682**	2.141	**6.931**
-1.375	**12.494**	-9.165	2.408	**-13.408**
-0.035	**-1.078**	-0.366	**2.561**	-0.291
-0.078	-0.998	**2.627**	**-7.987**	0.649
-3.673	-0.457	**15.645**	-0.145	0.458
0.077	-0.039	0.001	-0.010	-0.011
0.072	-0.046	0.038	-0.066	0.018
0.008	0.002	-0.009	0.007	-0.003
0.003	0.003	-0.003	0.001	-0.009
0.104	-0.008	-0.023	-0.020	-0.034

(b) Moral frames in Austrian politics. Frame biases are distinct between the followers of the party leaders, whereas intensities are very small in comparison. Minimum and maximum of frame biases per moral are in bold. Frame bias in fairness exhibits the greatest difference.

DISCUSSION

- Our finding that polarization is similar between survey and Twitter data will be validated with another bigger study.
- Embeddings allow us to differentiate and quantify the framing of texts in terms of morals. We aim to include contextual information from pre-trained language models as an improvement.

AMR graphs provide a solid basis for advanced framing analysis. For instance, roles are easily identified. Our ongoing work deals with the transformation and aggregation of these representations to provide non-predefined text insights [3].



Our works should enable future research to reduce the media bias regarding its framing and thus depolarize public opinion.

REFERENCES

[1] **Reiter-Haas, M.,** Klösch, B., Hadler, M., & Lex, E. (2022). Polarization of Opinions on COVID-19 Measures: Integrating Twitter and Survey Data. Social Science Computer Review.

[2] **Reiter-Haas, M.,** Kopeinik, S., & Lex, E. (2021). Studying Moral-based Differences in the Framing of Political Tweets. Proceedings of the International AAAI Conference on Web and Social Media, 15(1), 1085-1089.

[3] **Reiter-Haas, M.,** Klösch, B., Hadler, M., & Lex, E. (2022). AMR-based Framing Analysis of COVID-19 Narratives: Conspiracy versus Mainstream Media. In Review.