

Exploration of Framing Biases in Polarized Online Content Consumption

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Abstract

The study of framing bias on the Web is crucial in our digital age, as the framing of information can influence human behavior and decision on critical issues such as health or politics. Traditional frame analysis requires a curated set of frames derived from manual content analysis by domain experts. In this work, we introduce a frame analysis approach based on pretrained Transformer models that let us capture frames in an exploratory manner beyond predefined frames. In our experiments on two public online news and social media datasets, we show that our approach lets us identify underexplored conceptualizations, such as that health-related content is framed in terms of beliefs for conspiracy media, while mainstream media is instead concerned with science. We anticipate our work to be a starting point for further research on exploratory computational framing analysis using pretrained Transformers.

RQ 2: Categorization

How can the extracted frames be categorized for specific contexts, e.g., health-related topics?

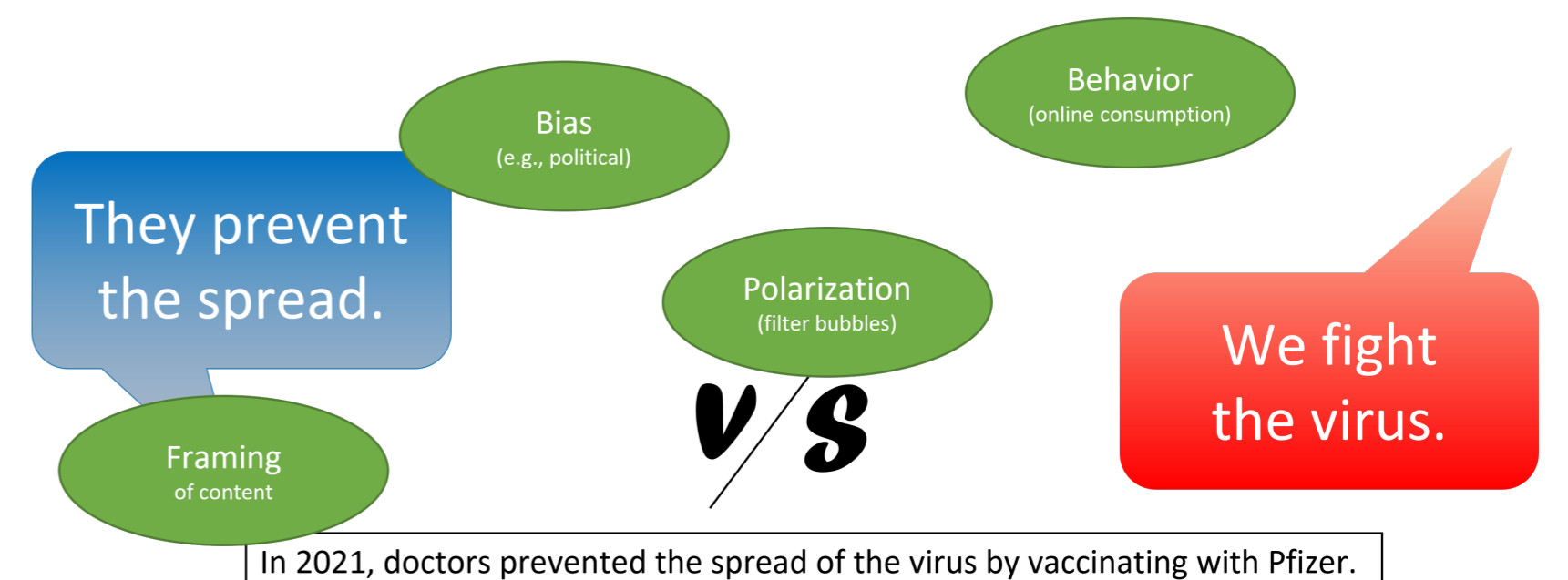


Figure 1: Motivational Example of Framing and related effects.

RQ 1: Extraction

How can we extract frames from polarized Web content without prior conceptualization?

RQ 3: Consumption

What is the relationship between frames and viewpoint diversity in Web content consumption?

Framing Analysis Approaches

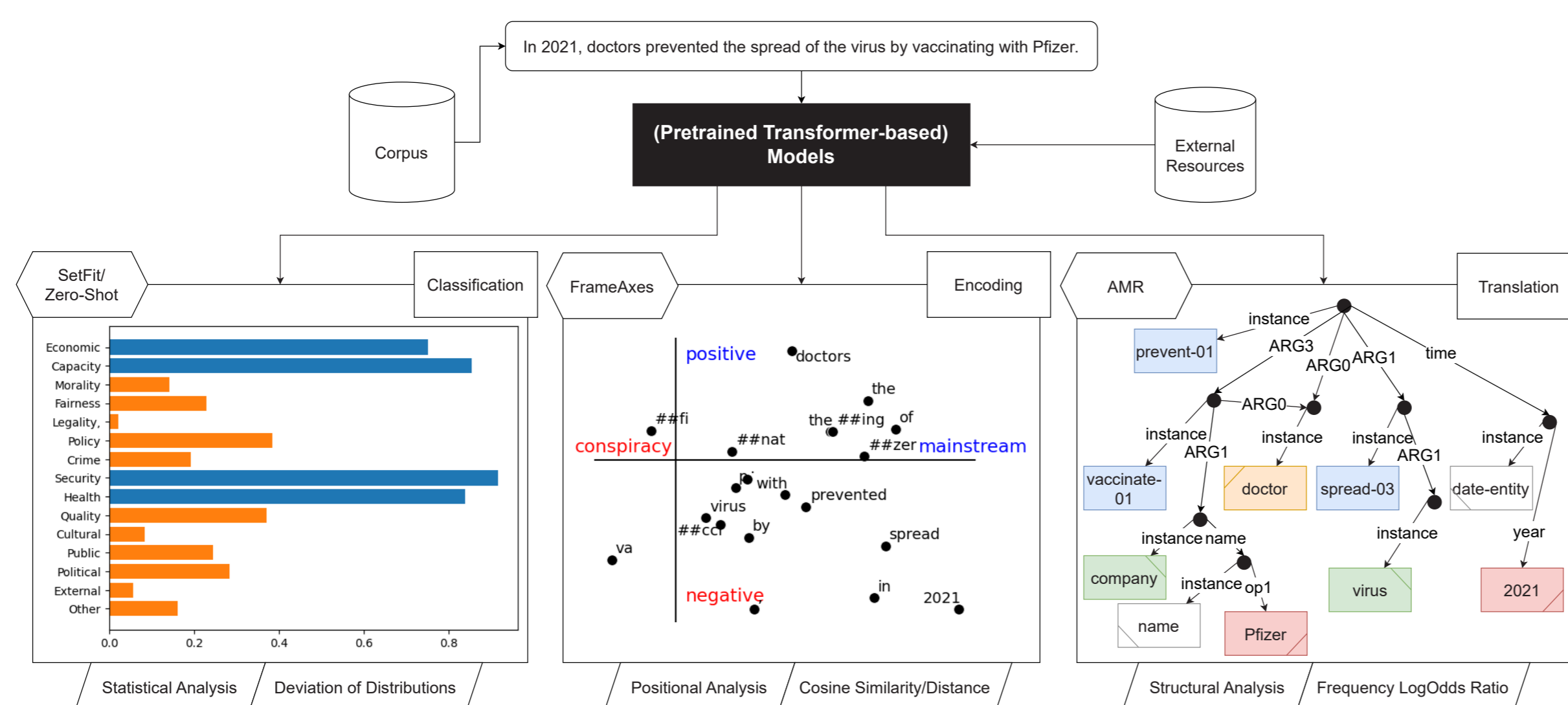


Figure 2: Overview of the three complementary approaches. Subfigures show the result of a transformation with each approach. In (a), a predefined set of labels is predicted, here in a zero-shot setting, and the label probabilities are plotted (blue for predicted labels with high probability). In (b), the tokens of the sentence are projected onto framing axes in 2-dimensional embedding space, where the axis poles are opposing each other (e.g., positive vs negative). In (c), the text is transformed into a semantic (rooted, directed, and acyclic) graph.

Problem

- Challenging Detection and Characterization
- Lack of (non-English) Data

Criteria	Classifier (a)	Embeddings (b)	Graph (c)
Unsupervised	×*	✓	✓
Exploratory	×	~	✓
Narratives	×	×	✓
Challenge	✓	×	×
Dimensions	scalar	n -D	irregular
Data Type	int/float	float	int
Aggregation	trivial	intuitive	challenging

Table 1: Summary of the comparison between the three sub-approaches. The complexity increases from left to right, but similarly increases in exploratory potential.

Methodology

- Mixed Methods-based Approach
- Web Data (LOCO, MIND)

Results

Framing Labels (SemEval'23¹):

- Multilingual news
- Multi-label loss and multi-stage training
- Spanish 1st place

Framing Dimensions (ICWSM'21²):

- Political Twitter data
- FrameAxis with word vectors
- COVID-19 moral dimensions

Framing Structure (In Preparation³):

- LOCO: conspiracy vs. mainstream news
- Abstract Meaning Representations
- Narrative framing of science vs. beliefs

Conclusion

- Framing → Multi-faceted
- Exploratory Analysis

Future work:

- Validation and Application
- Relate to Content Behavior

References

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- [2] Markus Reiter-Haas, Simone Kopeinik, and Elisabeth Lex. Studying moral-based differences in the framing of political tweets. In *ICWSM'21*, pages 1085–1089., 2021.
- [3] Markus Reiter-Haas, Beate Klösch, Markus Hadler, and Elisabeth Lex. Amr-based framing analysis of health-related narratives: Conspiracy versus mainstream media. *Manuscript submitted for publication*, 2023.