Unsupervised Extractive Summarization of Emotion Triggers

Tiberiu Sosea, Hongli Zhan, Junyi Jessy Li, and Cornelia Caragea

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UIC COMPUTER SCIENCE

THE UNIVERSITY OF TEXAS AT AUSTIN

Motivation

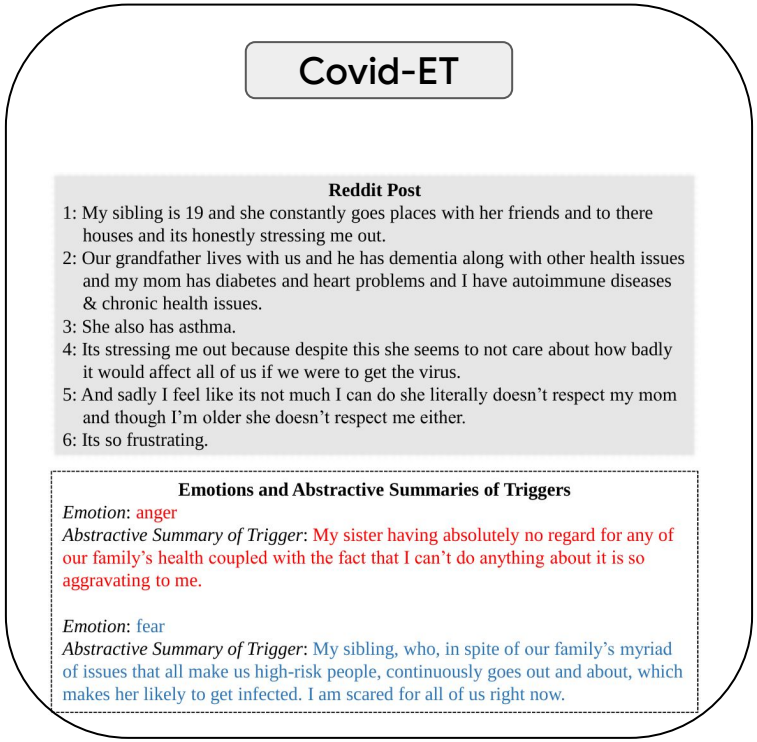
Covid-19 stirs people's emotions, and many take to social medias to share their feelings

Revealing "Why does the writer feel [emotion]?" is important yet remains unexplored

- *Understanding language plays a central role in clinical psychological diagnosis (Pennebaker et al., 2003).*
- *While emotion detection is a well-established task, few have studied what leads to these emotions in the scope of the text concerned in a data-driven manner.*
- *Generic summaries tend not to be informative if users are concerned with specific emotions expressed [Zhan et al., 2022].*

Prior Work

Previous work [Zhan et al., 2022] introduced Covid-ET, a dataset annotated with emotions and an abstractive summary of triggers that lead to expressed emotions in text.



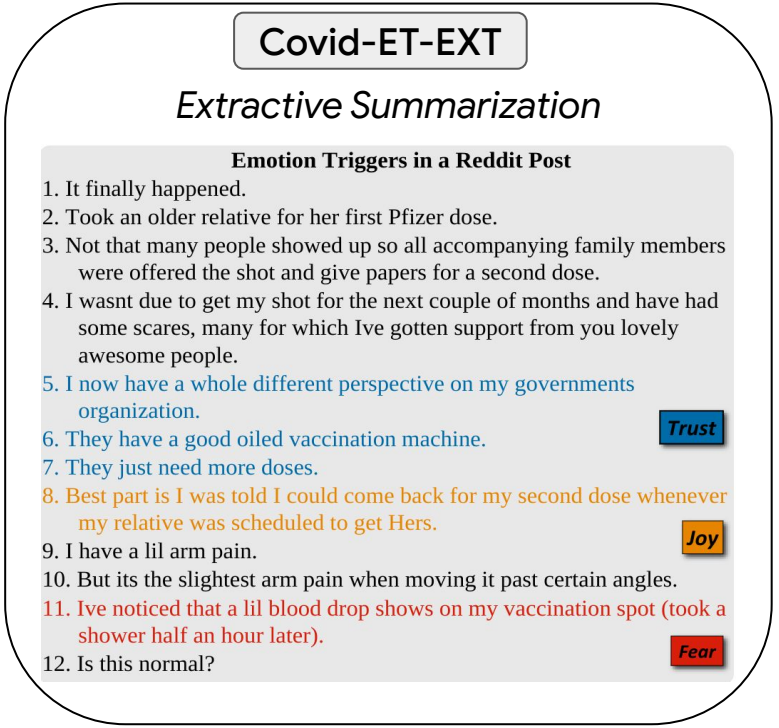
Motivation

However...

- *Obtaining timely and qualitative abstractive summaries is expensive and extremely time-consuming.*
- *As seen in Covid-ET, labeled data is necessary to attain good performance on our task and general summarization models struggle.*
- *Therefore, in time-sensitive, high-stake contexts, lack of data can block necessary responses.*

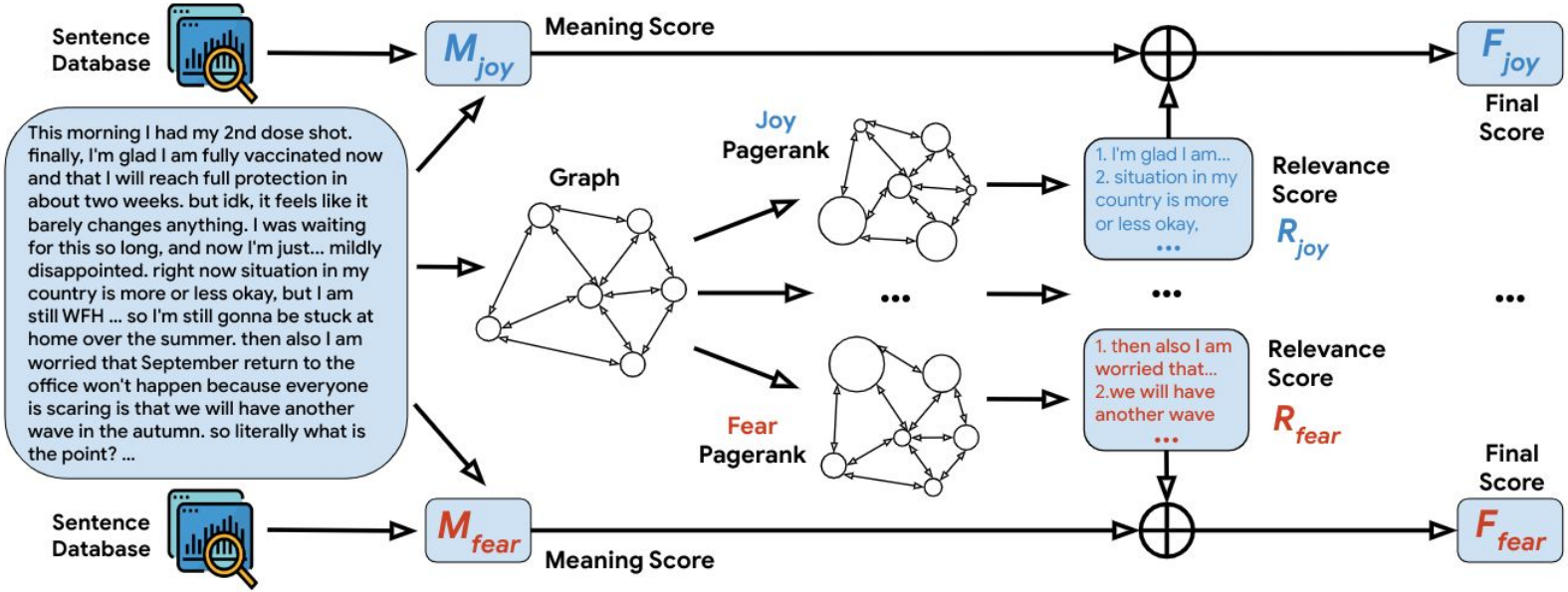
Covid-ET-EXT

We extend Covid-ET with extractive trigger summaries and turn to fully unsupervised extractive trigger summarization.

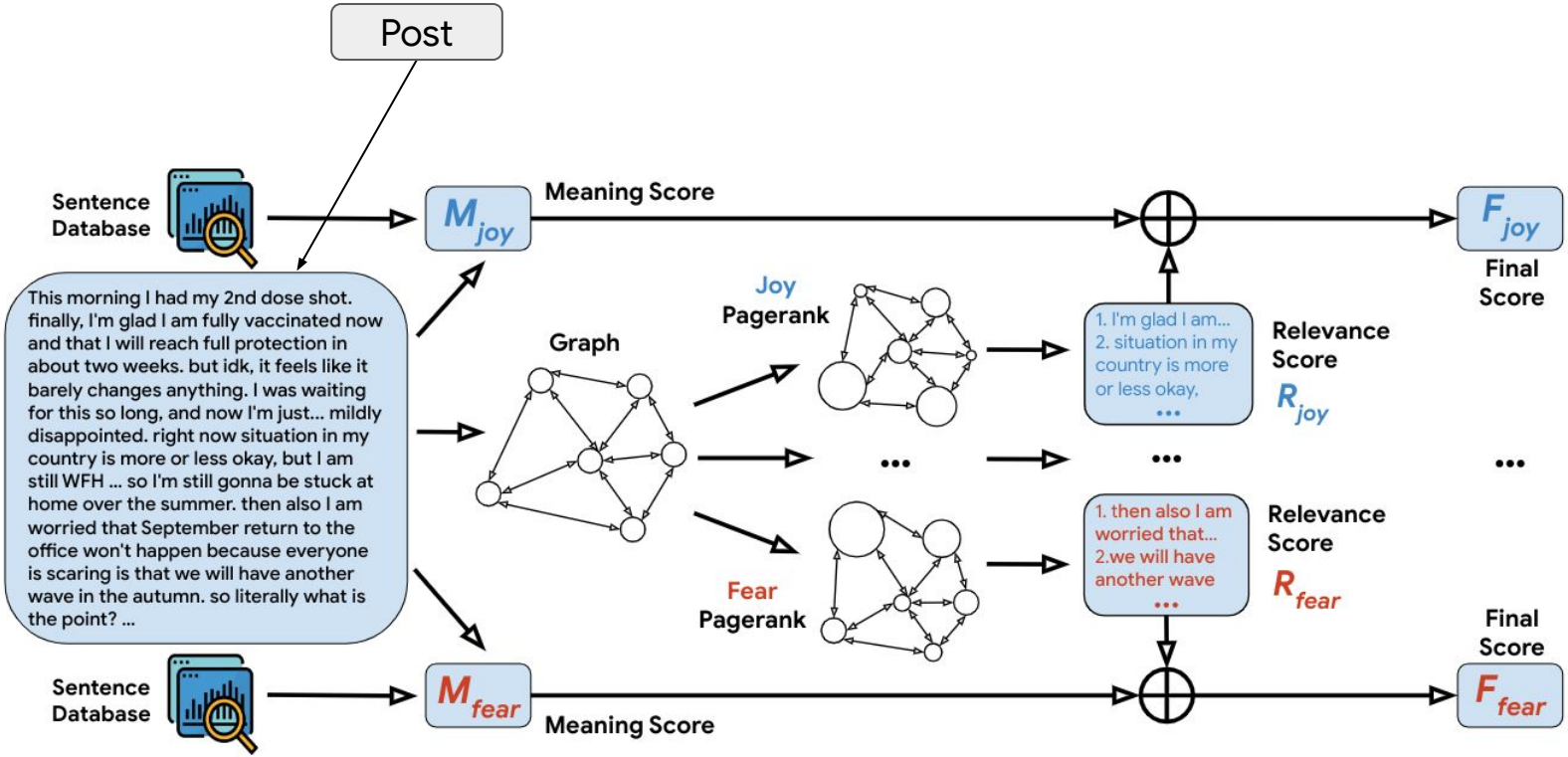


Emotion-aware Pagerank

To model the new task, we introduce *Fully unsupervised Emotion Detection and Extractive Trigger Summarization*, and propose *Emotion-aware Pagerank (EAP)*



Summarizing Emotion Triggers



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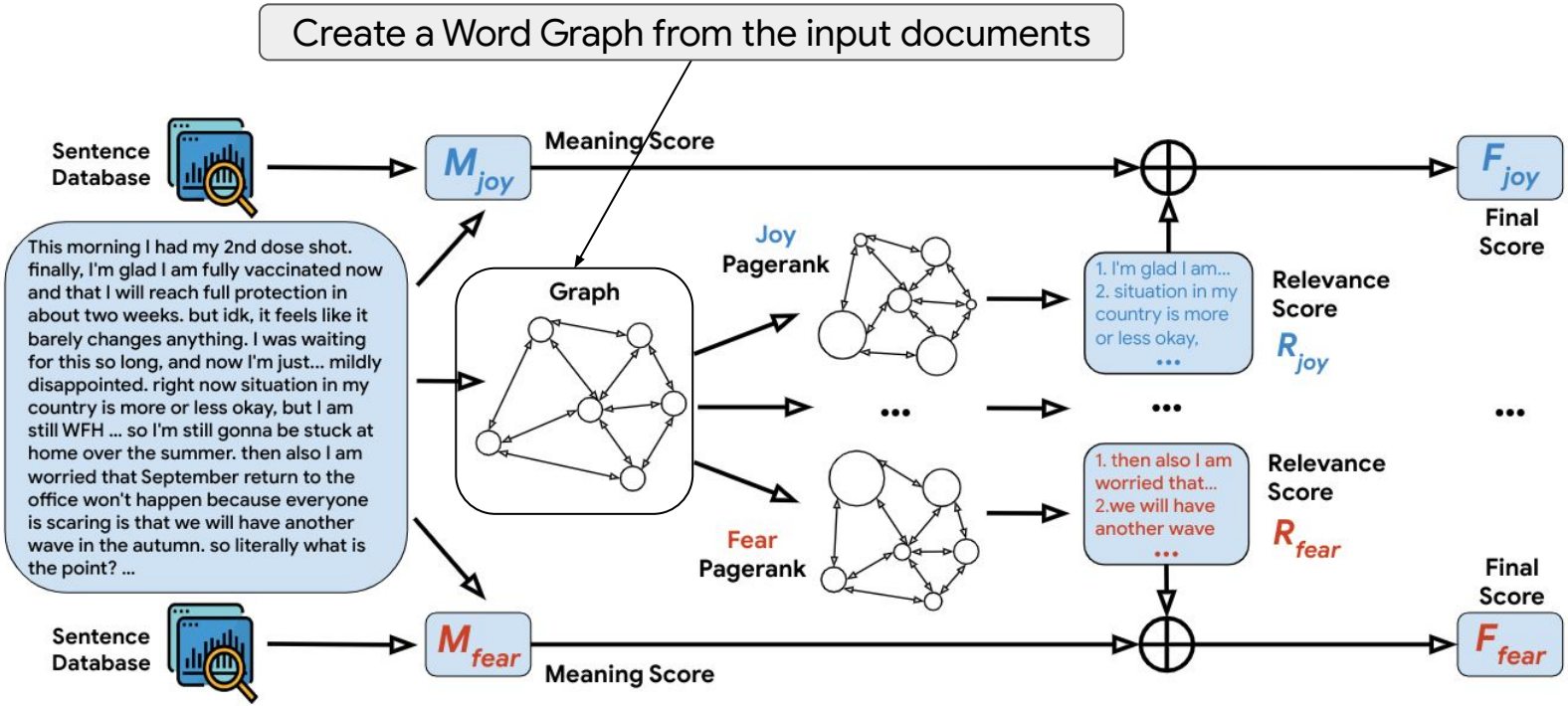

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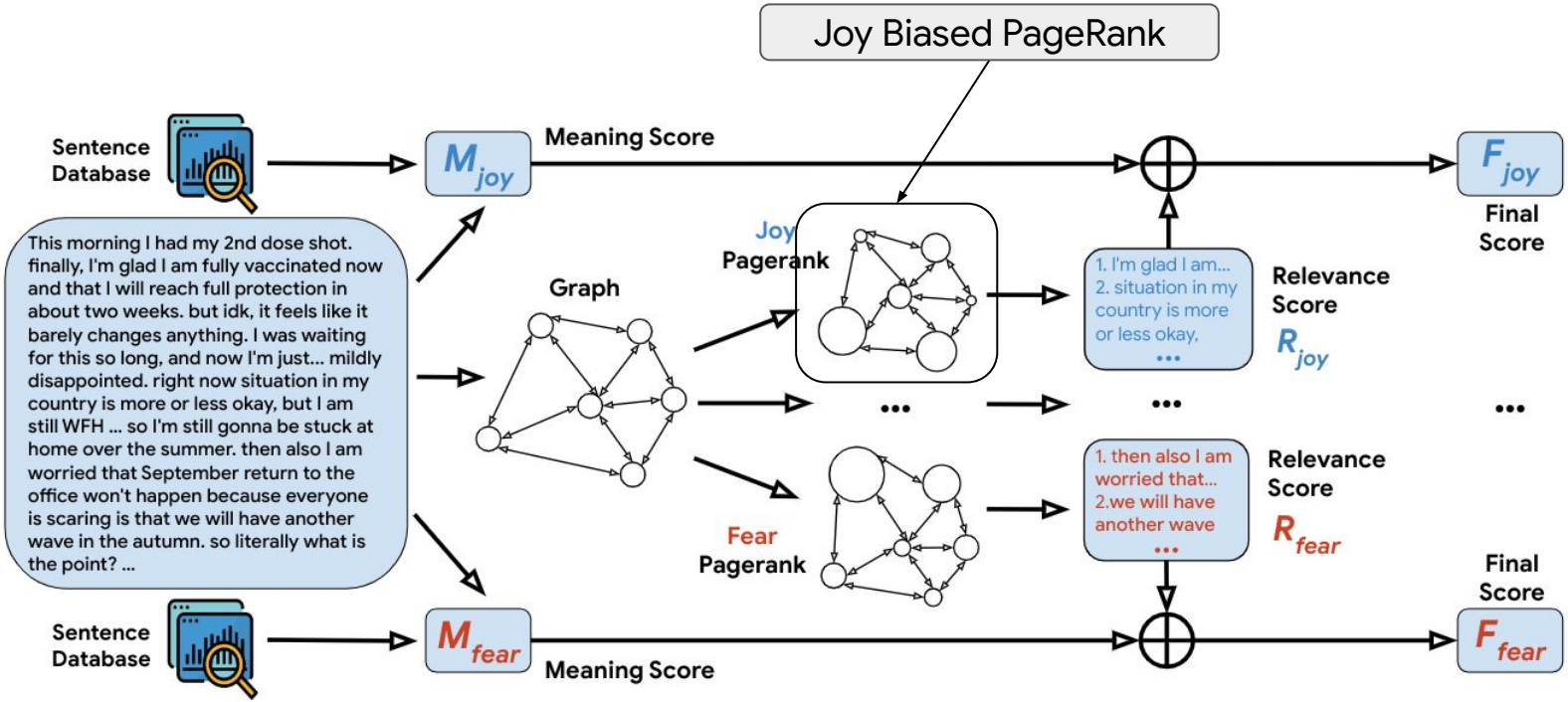


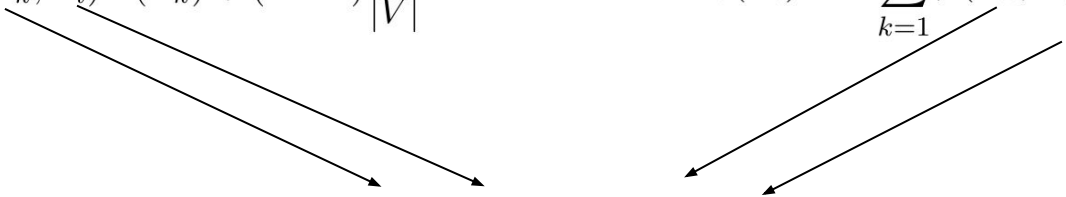
Summarizing Emotion Triggers

PageRank Relevance

$$\mathcal{R}(w_i) = \lambda \sum_{k=1}^{|V|} \beta(w_k, w_i)\mathcal{R}(w_k) + (1-\lambda)\frac{1}{|V|}$$

Biased PageRank Relevance

$$\mathcal{R}_e(w_i) = \lambda \sum_{k=1}^{|V|} \beta(w_k, w_i)\mathcal{R}_e(w_k) + (1-\lambda)\frac{i_e(w_i)}{N}$$



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Constant random jump probability

Biased PageRank Relevance

$$\mathcal{R}_e(w_i) = \lambda \sum_{k=1}^{|V|} \beta(w_k, w_i)\mathcal{R}_e(w_k) + (1-\lambda)\frac{i_e(w_i)}{N}$$

Biased random jump probability

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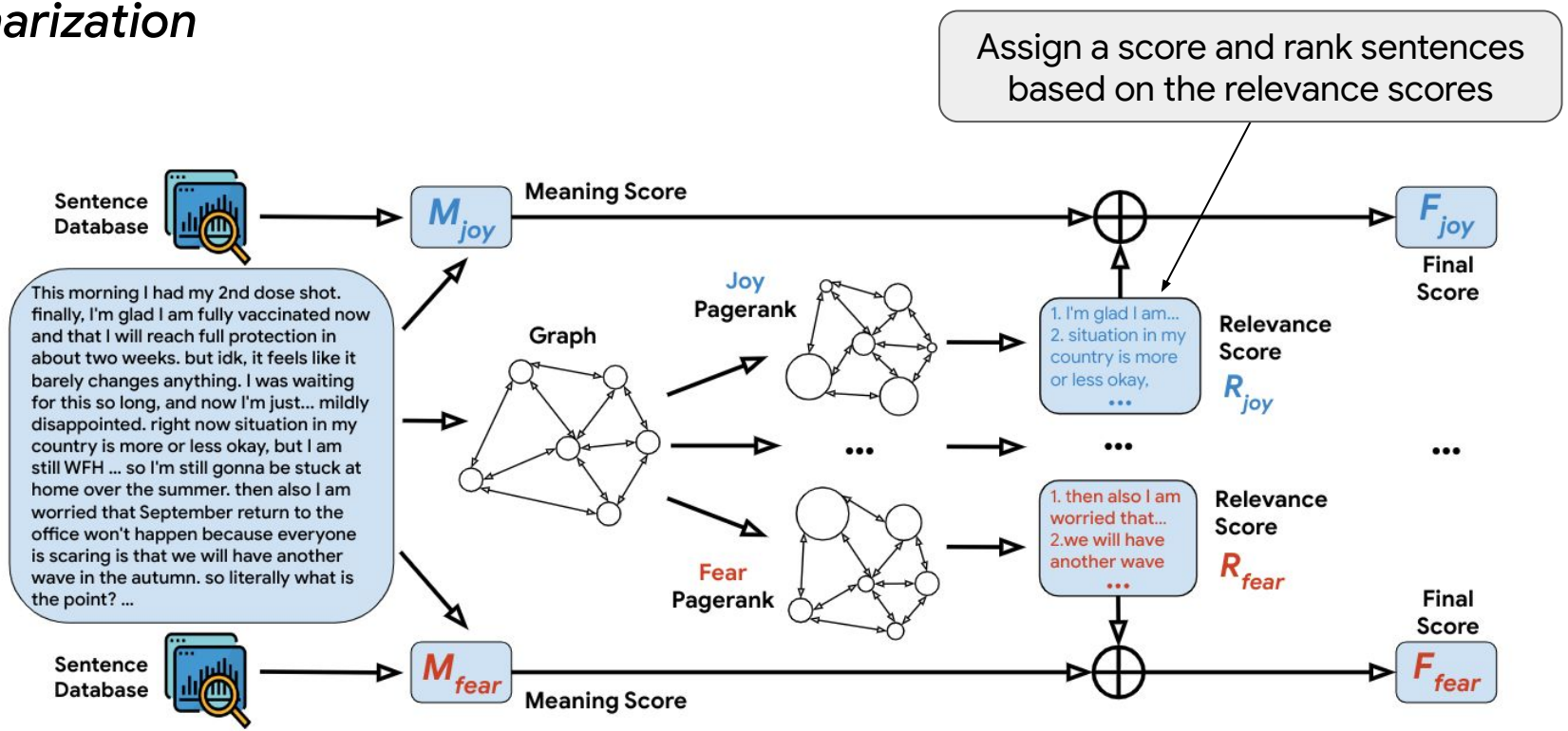
Emotion-intensity lexicon

$$i_e(w) = \begin{cases} int_e(w) & if \quad w \in \mathcal{I}_e \\ c & if \quad w \in V \setminus \mathcal{I}_e \end{cases}$$

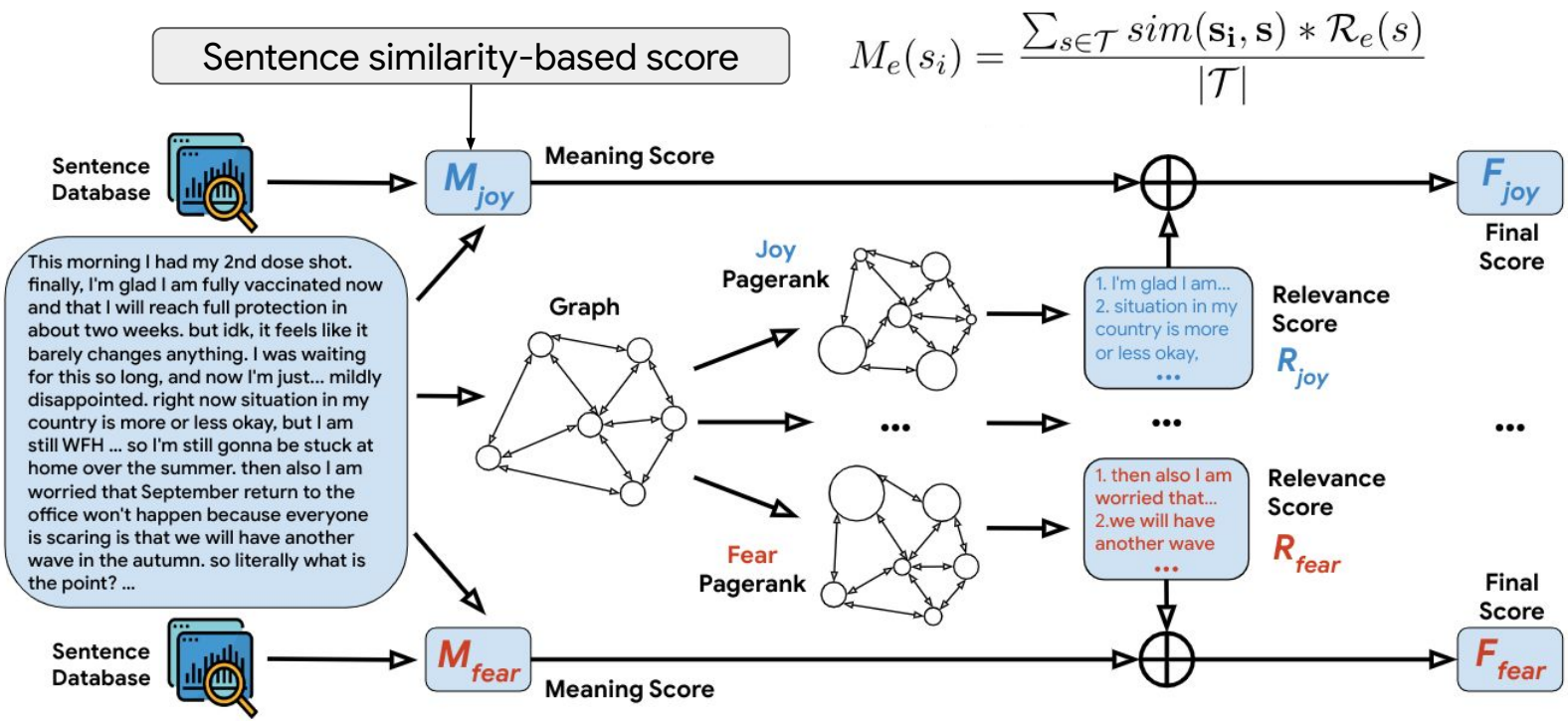
We assign higher random jump probability based on the emotion intensity of words

Solution: Fully unsupervised Emotion Detection and Extractive Trigger Summarization

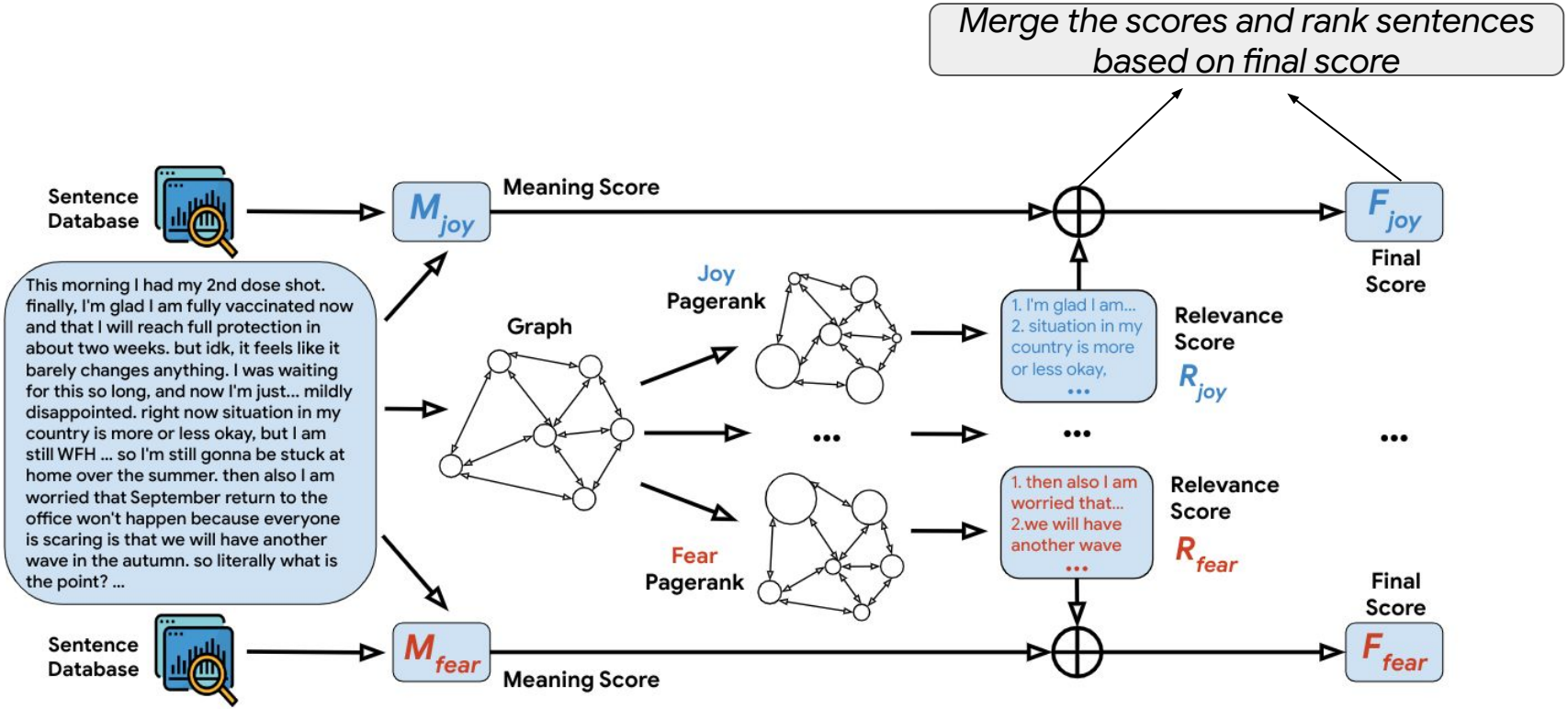


Summarizing Emotion Triggers

Create a `meaning` score M based on similarity measures with our sentence database



Create final ranking



Summarizing Emotion Triggers

Results

	ANGER		DISGUST		FEAR		JOY		SADNESS		TRUST		ANTICIPATION		AVG	
	R-2	R-L	R-2	R-L	R-2	R-L	R-2	R-L	R-2	R-L	R-2	R-L	R-2	R-L	R-2	R-L
1-SENT	0.174	0.240	0.095	0.170	0.202	0.256	0.119	0.179	0.110	0.177	0.189	0.236	0.160	0.220	0.149	0.211
3-SENT	0.301	0.315	0.196	0.253	0.322	0.343	0.273	0.310	0.239	0.292	0.248	0.279	0.263	0.307	0.258	0.288
PACSUM	0.308	0.314	0.210	0.218	0.327	0.331	0.276	0.282	0.287	0.304	0.225	0.234	0.283	0.295	0.273	0.282
PRESUMM	0.306	0.312	0.219	0.221	0.332	0.335	0.268	0.274	0.295	0.317	0.222	0.227	0.284	0.291	0.275	0.282
TEXTRANK	0.296	0.301	0.236	0.235	0.319	0.326	0.272	0.276	0.286	0.306	0.225	0.231	0.218	0.221	0.264	0.270
EMOLEX	0.213	0.260	0.218	0.256	0.309	0.341	0.218	0.252	0.301	0.331	0.176	0.203	0.207	0.242	0.234	0.269
EMOINTENSITY	0.307	0.322	0.269	0.281	0.342	0.355	0.222	0.235	0.329	0.341	0.227	0.242	0.295	0.310	0.284	0.298
BERT-GOEMO	0.247	0.264	0.232	0.237	0.296	0.312	0.221	0.247	0.314	0.321	0.201	0.204	0.247	0.225	0.253	0.258
EAP	**0.324**†	**0.348**†	**0.285**†	**0.296**†	**0.364**†	**0.373**†	**0.285**†	**0.319**†	**0.348**†	**0.354**†	**0.258**†	**0.291**†	**0.319**†	**0.324**†	**0.309**†	**0.325**†

Summarizing Emotion Triggers

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Conclusion and Future work

- We introduced CovidET-EXT, a new benchmark dataset composed of 1,883 Reddit posts annotated for the task emotion detection and extractive trigger summarization in the context of the COVID-19 pandemic.
- The proposed Emotion-Aware Pagerank approach yields strong results on our datasets, consistently outperforming prior work in an unsupervised learning context.
- In the future, we plan to study *abstractive* trigger summarization from a zero-shot perspective to remove the requirement for labeled data.

Thank you!

Contact: *tsosea2@uic.edu* *honglizhan@utexas.edu*
cornelia@uic.edu *jessy@austin.utexas.edu*

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