Research Objectives

In our work, we pose the following research questions:

1. How do different multimedia content types (text vs. image) affect the way people emotionally respond to gun-violence-related news?
2. Based on demographic variables, how do people's emotional responses vary to a given multimedia content type?
3. What is the scalability and contribution of a dataset at this intersection?

Introduction

A wide range of research has arisen in recent years in response to the increasingly large quantities of online, multimodal news content and its emotional impact on viewers. One example of such work includes analyzing the influence of partisanship in affective political news [1]. Within machine learning, the task of affective emotion recognition aims to predict the emotional response that a given piece of media will elicit. Affective emotion recognition could be hugely influential to understanding the emotional impact of hard news content, yet this relationship is largely still uninvestigated.

There is a lack of news media data for this task, with most notable datasets either collecting abstract emotional responses through art, such as in [2], or neglecting to fully annotate the data with detailed, human emotional responses, as in [3]. This study aims to facilitate future research in this intersection by presenting BU-NEmo, a multimodal dataset of gun violence news images and headlines annotated with viewers’ elicited emotional responses to the media content. This study focuses on gun violence and gun control news, as these topics continue to be heavily debated in the U.S. despite their devastating impacts. This data is, to our knowledge, the first of its kind to:

- Offer high-quality affective annotations on news data from various news sources.
- Include both categorical and written emotional responses on multimodal news data.
- Explore the differences in emotional response when given different modalities of news.

Additionally, we make our dataset, along with documentation, publicly available to facilitate further progress in this area of research.

Data

In this study, we make use of the Gun Violence Frame Corpus (GVFC), a gun-violence news headline corpus from [4], later extended by [5] to include the lead images corresponding to each article. GVFC ultimately fits our goals of extending emotion annotations to a multimodal news dataset with a diversity of news sources.

![Figure 1: Overview of categorical emotional responses given by experimental condition.](image)

Figure 1: Overview of categorical emotional responses given by experimental condition.

![Figure 2: Our annotation procedure for a sample of corresponding news image and headline (T1 condition).](image)

Figure 2: Our annotation procedure for a sample of corresponding news image and headline (T1 condition).

![Table 1: Results of our significance tests on the relationships in our dataset.](image)

Table 1: Results of our significance tests on the relationships in our dataset.

<table>
<thead>
<tr>
<th>Variable Type</th>
<th>Dep. Variable</th>
<th>Significance Test (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text</td>
<td>Emotional Intensity</td>
<td>T-Test (ANOVA) 0.03534</td>
</tr>
<tr>
<td>Image</td>
<td>Emotional Intensity</td>
<td>T-Test (ANOVA) 0.03534</td>
</tr>
<tr>
<td>Text + Image</td>
<td>Emotional Intensity</td>
<td>T-Test (ANOVA) 0.03534</td>
</tr>
</tbody>
</table>

![Figure 3: Examples of news samples per experimental condition that yielded the minimum and maximum response entropy.](image)

Figure 3: Examples of news samples per experimental condition that yielded the minimum and maximum response entropy.

Annotators were trained to consistently score sample headlines and images, then scored two additional models — one trained purely on headlines and one trained purely on images. We observed higher frequency of negative emotions, notably ‘fear’ and ‘sadness’, especially in the T condition. Negative emotions also tended to garner higher intensity scores.

We assessed the consensus of annotators by measuring entropy of the response distributions. Examples of news with low and high response entropy can be found in figure 3.

![Figure 4: News sample where the T and T1 conditions aligned most closely on emotional response.](image)

Figure 4: News sample where the T and T1 conditions aligned most closely on emotional response.

Conclusion

- The BU-NEmo dataset offers high-quality human emotional response annotations on highly impactful gun-violence news.
- Our analysis offers support for hypotheses that the inclusion of certain news media can influence the readers’ emotional response.
- Our work evidences the necessity of future research to study the relationship between news content, its modalities, and the effect it has on news consumers.

Future Research

In future work, we hope to extend the BU-NEmo dataset with more annotated news data in other topics, such as climate change. Additionally, we plan to extend our current analysis to examine the effect of news framing on emotional response. We hope to inform future work in this space by building a vision & language model more intrinsically explore the relationship between modality, news framing, and emotion.

References


Acknowledgements & Ethical Considerations

This work was supported in part by the U.S. National Science Foundation (NSF) grant 1651915. We ensure we are not knowingly introducing bias to the data by selecting any emotional harms on participants or unknowingly compromising their confidentiality, for which we have obtained IRB exemption approval (protocol #28084) from Boston University’s Charles River Campus on October 30th, 2021.

Contact Information

- AIEL Website: https://sites.bu.edu/aiem/
- BU-NEmo Dataset: https://github.com/Tdrinker/NEmo-dataset
- Email: (oneilreid, sejin, wijdajo)@bu.edu

Annex

Figure 4: News sample where the T and T1 conditions aligned most closely on emotional response.