#WhyDidTheyStay: An NLP-driven approach to analyzing the factors that affect domestic violence victims

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Abstract

This paper uses domain specific data extracted from publicly available posts on social media platforms, Reddit and Twitter, to analyze and provide insight into the various psychosocioeconomic factors that affect domestic violence survivors and contribute to their reluctance to leave abusive relationships. We propose a methodology that employs an unsupervised machine learning algorithm and natural language processing to extract abstractive topics from a large corpus of unstructured text. Further, we determine the distribution of these factors across the psychosocioeconomic spectrum and provide a few recommendations for policymakers based on the results of our analysis.

1 Introduction and Related Work

One in three women worldwide have experienced domestic violence in their lifetime (Organization and others, 2020). Domestic violence has only increased during the COVID-19 pandemic (Evans et al., 2020). It is a significant public health problem with various psychosocioeconomic factors (Schmidt and Willis, 2007) contributing to it. As defined by (Schmidt and Willis, 2007), psychosocioeconomic is a term that refers to the combination of psychological, sociological, and economic factors affecting an individuals surrounding environment. Despite the number of established helplines, NGOs and shelters that provide help to domestic violence victims, less than 40% of the victims seek help (Women, 2020). Thus, this research aims to analyze the various psychosocioeconomic factors that contribute to victims stuck in abusive relationships via the data publicly available on Twitter and Reddit. Our primary contribution is a publicly proposed dataset and the utilization of the LDA algorithm to uncover the most relevant abstractive topics and analyze the prominent themes that emerge from a psychological viewpoint.

Social media platforms act as extremely rich sources of data. (Manikonda et al., 2018) discuss how Twitter is useful for sparking a movement, whereas Reddit is useful for sharing moments in the context of the popular #metoo movement. Thus, we choose Reddit and Twitter as our source of data for this research. Further, topic modelling has proven useful in the extraction of abstractive topics that are hidden in significant amounts of unstructured text (Sutherland and Kiatkawsin, 2020). Our work is most similar to that of (Xue et al., 2019). They use Twitter data to analyze the trending topics that pertain to domestic violence. Our work is more specific and comprehensive because it relies on specific hashtags and flairs from multiple sources of data. We also provide an analysis of these factors from a psychological point of view. Like (Kavadichanda et al., 2021) and (Schmidt and Willis, 2007) who use the psychosocioeconomic spectrum as a basis for classification of various factors, we analyze the emergent themes by categorizing them as either psychological, social or economic.

2 Methodology:

In this section, we describe the methods we leverage to collect our data, preprocess it and employ the LDA topic modelling algorithm.

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Table 1: A few emergent prominent themes from our study across social media platforms

<table>
<thead>
<tr>
<th>Platform</th>
<th>Theme</th>
<th>Representative Topic Words</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reddit</td>
<td>Concern for children</td>
<td>Dad, baby, kid, take, together, threaten, abusive, custody</td>
<td>Social</td>
</tr>
<tr>
<td>Reddit</td>
<td>Concern for family</td>
<td>Mother, think, call, come, happen, dad, brother, sister, ask</td>
<td>Social</td>
</tr>
<tr>
<td>Twitter</td>
<td>Emotional Isolation</td>
<td>Feel, alone, go through, enough, break, deserve, fear, tired</td>
<td>Psychological</td>
</tr>
<tr>
<td>Twitter</td>
<td>Conflicted emotions</td>
<td>Want, change, love, believe, understand, hurt, always, think</td>
<td>Psychological</td>
</tr>
<tr>
<td>Twitter</td>
<td>Need for support</td>
<td>Need, help, deserve, home, child, daughter, worth, car, loan</td>
<td>Economic</td>
</tr>
</tbody>
</table>

**Data Collection:** We obtain two sets of data from Twitter and Reddit using the python APIs Tweepy and Praw, respectively from 2013 to 2021. Thus, our data also consists of data from the pandemic-based reality. We collect 55085 posts on Twitter and 450 posts on Reddit. On Twitter, we crawl the posts tagged with the hashtags #WhyIStayed and #WhySheStayed. Based on an exhaustive querying of popular hashtags pertaining to domestic violence, we found that these hashtags are most likely to contain information relevant to our research objectives. For Reddit, we crawl all the posts shared on the /r/domestic Violence subreddit. To ensure that the privacy of the users is respected, we crawl only the publicly shared posts. The dataset is available at https://github.com/MarthalaSaiKavya/DV-Analysis.

**Pre-processing:** Our preprocessing pipeline is simple and effective. First, we remove the relevant stopwords and turn the entire text to lowercase. Then we remove all the newline characters, URLs, mentions and hashtags from the sentences. Further, we tokenize the dataset and clean up the text. Finally, we create bigrams and trigrams, and perform lemmatization.

**Topic-Modelling:** Topic modelling is a well known, unsupervised, statistical model that uses probability to uncover abstractive topics from a large corpus of unstructured text. Before performing topic modelling using the Latent Dirichlet Allocation algorithm (LDA), we generate a bag of words and filter out the top 20% of the most commonly used, contextually irrelevant words using the TF-IDF algorithm. These are the generic topic-specific words that bring no context to the corpus. Then, we find the optimal number of topics by comprehensively comparing the well established metrics, perplexity and coherence values, obtained for any number of topics between 0 to 100. This is because these two metrics are well established in assessing the quality of the topic model. Once the optimal number of topics has been empirically obtained for each corpus (num=20), we build the topic models. We find that LDA is particularly useful here, as each topic is a collection of keywords that indicate clear, segregated, and meaningful themes. Figure 1 provides an illustration of some of the topics yielded by the LDA algorithm.

![Figure 1: An illustration of a few topics yielded by the LDA topic modelling algorithm](image-url)

Further, we categorize these themes as shown in the Results section.
Results:

In this section, we analyze the emergent themes and provide an analysis of how they are distributed across the psychosocioeconomic spectrum. A topic is a result of the LDA algorithm, whereas a theme is a broader categorization of these topics. We define a theme as psychological if it is primarily about the emotional state or mental state of the victim. A theme is defined as social if the concern expressed is mainly about the social/familial relations of the victims and as economic if there is an indication of need of financial support for either the victim or their dependents. Specific to Reddit, we find that 65% of the emergent themes are social in nature, 33% are psychological and only 2% are economic. The psychological themes pertain to emotional confusion and doubt. On the other hand, we find that 55% of the themes on Twitter are psychological, 44% are social and 1% are economic. The most prominent emergent themes are showcased in Table1.

This reveals that while the initiatives taken to curb domestic violence have increased over time, victims are hesitant to seek help due to a variety of social and psychological factors. This indicates a need for change in policy, and an exponential increase in social awareness about domestic violence and the challenges faced by abusive relationship survivors. Also, there is a need for social awareness about advanced psychological abusive tactics like gaslighting and emotional manipulation. To this end, psychological resources should be made more easily accessible to identified domestic violence victims.

Conclusion:

Our work focuses on using a publicly proposed dataset and employing LDA to analyze the concerns of domestic violence victims and provide a comprehensive psychological overview of the factors that prevent abused victims from seeking help. Our findings suggest that there is a need for increased social awareness about domestic violence and its challenges, and increased psychological support for victims. Future work endeavours could explore alternative methods to extract data from social media platforms and perform a comparative analysis of the results obtained.

References


