Identifying and Analysing Misinformation about the National Board of Health and Wealthfare: A Data-Driven Approach using Web Scraping, Sentiment Analysis, and Topic Modelling

Abstract

In the age of digital information, the proliferation of misinformation has become a pervasive and substantial issue. The social implications of such misinformation include distorting democratic processes and undermining trust in public institutions. This project targets the increasingly important field of misinformation study by focusing on the National Board of Health and Welfare (Socialstyrelsen). By harnessing a data-driven approach that integrates methods such as web scraping, sentiment analysis (using the Valence Aware Dictionary and sEntiment Reasoner - VADER), and topic modelling (using BERTopic), we aim to extract, analyse, and categorise online discourse on this subject. The main objective is to better understand the prominent narratives and sentiments related to Swedish Social Services and to identify the main channels through which misinformation is disseminated. The implications of our findings can provide insights to policymakers, researchers, and public administration officials, contributing to a better understanding of how misinformation spreads and how it can be mitigated.

1. Introduction

In recent years, the dissemination of digital disinformation and its societal implications have been identified as pressing issues that warrant immediate attention. Given the significant implications for society, the investigation into online misinformation has emerged as a field of research with potential for far-reaching impact. One public institution that has been particularly affected by such disinformation is Socialstyrelsen, a key component of the welfare state responsible for providing services to individuals and families in need. Misinformation campaigns directed at these services have the potential to erode public trust, disrupt service delivery, and distort the democratic processes involved in the administration and governance of these services. With these challenges in mind, this study attempts to analyse the spread of misinformation about Swedish Social Services, presenting a multi-faceted methodology for data extraction, sentiment analysis, and topic modelling that showcases the capabilities of digital tools and techniques in illuminating the dynamics of online misinformation.

2. Related Work

Over the past decade, the field of misinformation studies has grown significantly. Researchers have focused on understanding how misinformation spreads on online platforms, as well as the societal impact of such phenomena. There has been considerable work done on developing tools and methodologies to detect and mitigate the spread of misinformation (Allcott & Gentzkow, 2017; Linvill et al., 2019; McKay & Tenove, 2021). However, there is a conspicuous lack of research focusing on misinformation surrounding specific public services, such as Swedish Social Services. This gap in research is significant because it prevents a comprehensive understanding of how misinformation affects perceptions and discussions about these services on online platforms. Consequently, this paper seeks to contribute to this under-researched area by utilising a combined approach of web scraping, sentiment analysis, and topic modelling, providing a broad perspective on the landscape of misinformation around Swedish Social Services.

3. Methodology

To tackle our research objectives, we employed a multifaceted methodology that involved web scraping for data extraction, sentiment analysis for understanding public sentiment, and topic modelling for categorising the extracted information into coherent themes. To begin with, we used Python libraries such as Beautiful Soup, Scrapy and Snscrape to scrape data from popular online platforms: TikTok, Facebook, Flashback, Twitter, Reddit and Familjeliv. These platforms were chosen based on their high user engagement, diversity of user demographics, previous research indicating their susceptibility to misinformation and ease of scraping.

To assess the sentiment within the scraped data,we utilised BERTopic (Maarten Grootendorst, 2020), a topic modelling technique that leverages the strengths of the BERT (Bidirectional Encoder Representations from Transformers) algorithm to identify prominent topics within the text data. BERTopic allows for efficient and effective topic clustering by considering both the context and semantics of the words in the text, which improves the accuracy of the topics generated. To assess the sentiment of these generated topics we used VADER (Hutto & Gilbert, 2014), a lexicon and rule-based sentiment analysis tool that is particularly adept at handling the nuances of social media text, including the use of slang, and colloquialisms. We also looked at temporal distribution of these topics in order to chart when topics were more active. Furthermore we conducted manual data exploration of certain topics deemed to contain potential misinformation.

4. Findings

Upon conducting topic modelling on the scraped data, we identified seven primary potential misinformation narratives that were consistently prevalent across the analysed topics. Each narrative offered a distinct perspective on Socialstjänsten, yet all contributed to a negative perception of the institution. The first narrative asserted that "Socialtjänsten is corrupt" implying the presence of unlawful practices within the system. The second narrative suggested that "Socialstjänsten takes away children without good reason" sparking fears of unjustified state intervention in family matters. The third narrative claimed that "Socialstjänsten discriminates against certain demographic groups" suggesting unfair treatment based on factors such as race and religion. The fourth narrative implies that "Socialtjänsten places muslim children in christian homes" suggesting that one of the goals of the institution's actions is to christianize the children. The fifth narrative argued that "Socialstjänstens workers are unqualified" casting doubt on the professional competence of those working within the system. The sixth narrative suggested "Socialstjänsten is unaccountable" indicating a lack of transparency and oversight. Finally, the seventh narrative positioned "Socialstjänsten is a part of a larger governmental conspiracy" implying its involvement in sinister, large-scale state operations. Our sentiment analysis further revealed a significant prevalence of negative sentiment within the comments and posts regarding Socialstjänsten.

In total we scraped 415874 posts. These were all from the aforementioned open digital channels. After removing the duplicates which occurred in the data we had 358921 posts left. Since our Stakeholders were primarily interested in data from 2021 onwards we only analysed data from within that time frame. This resulted in 233 208 posts to analyse. BERTopic divided these posts into 619 different topics. Of these 58 988 were assigned to the negative topic, meaning they did not fit any topic. The largest positive topic contained 1595 entries and the smallest positive topic contained 10 posts. The average number being 61.83 and median of 24.5 with a standard deviation of 149.26. Of these topics

we identified three as being of primary interest to Kapi. These Topics were 11, 52 and 77. Which were respectively labelled muslimsk_kidnappa_muslim_islamist, kidnappa_kidnapping_barn_kidnappare and childr_kidnappa_kidnapping_families by BERTopic.

Topic 11 contained 445 posts and mainly consists of user-generated content discussing, reacting and/or sharing news articles related to the LVU-campaign. 58 of these posts were classified as potential disinformation. Topic 52 consists of 133 posts mainly discussing child kidnapping by socialtjänsten. Topic 77 consists of 97 posts and also mainly revolves around the discussion of child kidnapping by socialtjänsten. The division of these two topics is potentially due to the usage of c-TF-IDF, as "Diab Al Talal", occurs in topic 77 and not in topic 52, and c-TF-IDF's ability to value n-grams highly therefore causes these to be split into two distinct topics.

5. Discussion

Our findings offer insights to two primary stakeholders, KAPI and Socialstyrelsen. Understanding the most common narratives of misinformation and the platforms on which they are most prevalent can guide these stakeholders in developing targeted strategies to counter misinformation. These strategies could include tailored communication initiatives, proactive fact-checking efforts, and interventions designed to foster informed public discourse.

While the presence of negative sentiment might be disconcerting, it is important to note that not all negative sentiment is a product of misinformation. Genuine grievances and criticisms should be distinguished from deceptive narratives, and institutions should be responsive to legitimate concerns raised by the public. Nonetheless, understanding the nature of negative sentiment and its distribution across platforms can inform the development of interventions to address both misinformation and public dissatisfaction.

Our study, while providing an exploration of misinformation about Socialstyrelsen, is not without limitations. Although we strived for a comprehensive data collection and analysis process, our study was subject to certain constraints. Our dataset, while covering several popular platforms, does not include all online platforms and hence might not be entirely representative, also does not cover the entirety of discourse within any of the platforms. Moreover, the removal of duplicates, a necessary step to avoid biassing our analysis, might have inadvertently led to the removal of repetitive but prevalent misinformation narratives. Further, while sentiment analysis and topic modelling provides powerful tools for analysing text data, they do not capture the qualitative components of online discourse.

6. Future Implications

The methodologies utilised in our project have broad applications beyond the specific context of misinformation about Swedish Social Services. They can be deployed in areas such as market research, political discourse analysis, and public opinion monitoring. Future studies could focus on developing advanced and ethical scraping techniques, incorporating machine learning models to

enhance sentiment analysis and topic modelling, and probing the ethical implications of using AI for such tasks. Direct applications of our research include facilitating data-driven decision making for KAPI and Socialstyrelsen, continuous monitoring, and analysis of online discussions, and extending research and analysis to other contexts beyond Swedish Social Services.

7. Conclusions

In the face of digital disinformation, our project represents an effort in understanding and mitigating misinformation about Socialstyrelsen. The study provides a pathway to leveraging the power of AI to analyse online discourse, presenting a multidimensional picture of public sentiment and misinformation narratives. The combination of web scraping, sentiment analysis, and topic modelling techniques provided a nuanced understanding of online discourse surrounding Socialstyrelsen. As such, our project is a model for other institutions seeking to understand and address misinformation about their work in the digital sphere. It offers insights into how institutions can effectively engage with online communities, address misinformation, and build public trust.

Moreover, our study underscores the need for collaboration between AI researchers, social service practitioners, public institutions, and online platforms in combating misinformation. Just as misinformation is a product of a complex interplay of narratives, its solution also lies in a multi-stakeholder, collaborative approach. As we move forward, such collaborative efforts will be crucial in leveraging the potential of AI to enhance public understanding and foster informed discussions about public institutions and services.

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