

Transforming Decision Making: Exploring the Influence of Natural Language Processing in Analyzing Social Media Interactions

Prashant Pukale¹, Chetan Rathod², Srushti Rokade³, Karishma Phaphale⁴, Rajnandini Rajeshirke⁵, Afsha Akkalkot⁶

Department of Computer Engineering, Zeal College of Engineering and Research, Pune

Abstract - Social media has become a vital aspect of our daily lives in the digital age, allowing for broad interactions among users. This review paper investigates the role of natural language processing (NLP) in realising the huge potential of social media interactions, as well as its impact on decision making. With the exponential growth of user-generated content on platforms like Twitter, Facebook, and Instagram, natural language processing (NLP) approaches have emerged as indispensable tools for analysing and extracting useful insights from this vast corpus of textual data. Researchers have begun to untangle the underlying patterns, sentiments, and ideas conveyed in social media interactions by applying various NLP approaches such as sentiment analysis, topic modelling, and opinion mining. This study gives a thorough review of the literature on how NLP-based textual analysis of social media interactions has altered decision-making processes in fields such as marketing, healthcare, politics, and customer service. It also investigates the potential problems and ethical concerns related with NLP-driven decision making, emphasising the importance of robust algorithms, data protection, and fairness. This review paper provides useful insights for scholars, practitioners, and policymakers alike by throwing light on the extraordinary potential of NLP in comprehending social media interactions and its impact on decision making, paving the way for future improvements in this dynamic sector.

Key Words: Text Mining, Natural language processing, Sentiment Analysis.

1. INTRODUCTION

Individuals are continually involved in digital dialogues, expressing their thoughts, sharing information, and communicating with others in the age of the Internet and social media. The massive volume of textual data generated by these social media exchanges has enormous promise for understanding human behaviour, attitudes, and preferences. However, deriving relevant insights from this large sea of unstructured data is a significant issue.

Enter Natural Language Processing (NLP), an area of artificial intelligence that focuses on computer-human interaction. By allowing machines to interpret, comprehend, and infer meaning from written or spoken language, NLP has transformed the way we analyse and understand text. When applied to social media interactions, NLP-based textual analysis can reveal patterns, feelings, and trends that can have a significant impact on decision-making processes.

The purpose of this paper is to investigate the impact on decision-making of NLP-based textual analysis of social media interactions. NLP enables researchers, organisations, and individuals to acquire important insights from the massive amount of textual data created on social media platforms by utilising complex algorithms and linguistic models. These discoveries have far-reaching consequences in a variety of fields, including marketing, public opinion research, brand reputation management, and political campaigns.

2. LITERATURE REVIEW

[1] Describes the ability of NLP based analytical approach to extract data from highly unstructured text. Experiment performed on the social media data results that Natural Language Processing is better than sentimental analysis for detecting error from social media data. But this can also be fatal for this huge amount of data. [2] Text Mining is a process of extracting interesting and non-trivial pattern from huge unstructured and semi-structured data. Text mining techniques such as information Extraction, Information Retrieval, Natural Language Processing, Clustering, Text summarization are used on the huge data to be processed. Text mining applications elaborated here are Digital Libraries, Academic & Research field, life science, social media, and

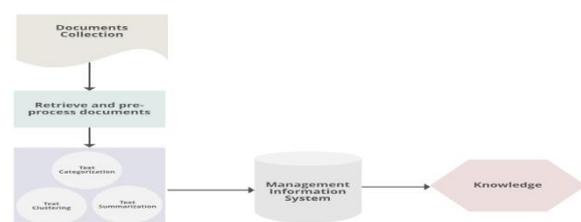


Fig . Text Mining

Business Intelligence.[3] Four phased framework is proposed for improving the extraction process (extracting a subset of content from the massive social media data), which blends the capacities of data science techniques to compress large data sets into smaller spaces with the capabilities of qualitative analysis. Four phased framework consists of compiling a corpus, using the data science techniques to compress the corpus along a dimensions of relevance, extracting a subset of data and performing qualitative analysis on the subset of data.[4] This paper gives the brief overview about retrieving social media knowledge using text mining. Provides the text mining process which involves text processing in which text cleanup, tokenization, filtering, lemmatization and semantic structuring is performed. Text processing is followed by text transformation which performs feature generation accompanied by feature selection task. Text mining techniques used are categorization, clustering and summarization

3. BODY OF THE PAPER

Natural Language Processing (NLP) is a branch of artificial intelligence (AI) that studies how computers interact with human language. It entails the creation of algorithms and models that allow computers to understand, interpret, and synthesize meaningful and usable human language. NLP techniques and approaches are critical in extracting important insights from the large volume of text created on various social media platforms when analysing textual data from social media interactions. Here's how NLP is used in this situation:

3.1 TEXT MINING

Text mining, also known as text data mining, is the act of converting unstructured information into a structured format in order to find relevant patterns and fresh insights. Preprocessing procedures such as text cleaning, tokenization, stop word removal, stemming or lemmatization, and handling of special characters or numerical data precede text mining. These processes assist in converting raw text into a structured format appropriate for analysis.

Text mining automates the classification and categorization of documents based on their content. Based on training data, machine learning methods such as Naive Bayes, Support Vector Machines (SVM), or deep learning models can be used to assign documents to predetermined categories or predict labels.

Text mining is a technique for analysing consumer feedback from sources such as surveys, internet reviews, social media, and customer service interactions. It aids in the identification of patterns, sentiment, and particular issues raised by consumers, offering significant information for

product improvement, customer satisfaction improvement, and reputation management.

3.2 SENTIMENT ANALYSIS

Sentiment Analysis: Social media monitoring and brand reputation management are two real-world applications based on sentiment analysis. Sentiment analysis can be used to acquire information about public sentiment towards a business, product, or service by analysing social media interactions. Here's how sentiment analysis can be used in this situation

Sentiment analysis allows businesses to monitor social media platforms for mentions of their brand, products, or services. Organisations can acquire a full picture of how their brand is perceived by the public by analysing the sentiment connected with these references. Sentiment analysis aids in the management and maintenance of a positive brand reputation. Organisations can discover and manage negative sentiment or prospective concerns by analysing the sentiment of social media conversations about their brand. This enables them to take corrective actions, address consumer issues, and reduce reputational threats.

Product comments Analysis: Sentiment analysis can be used to analyse customer comments and reviews on social media sites about items or services. Organisations can identify strengths, flaws, and areas for progress by interpreting the sentiment represented in these reviews. This feedback analysis can be used to help influence product development, marketing strategy, and customer satisfaction campaigns.

Influencer Analysis: Sentiment analysis can be used to discover important persons or social media influencers who have a substantial impact on brand sentiment. Organisations can better assess their impact and establish focused influencer marketing strategies by analysing the sentiment connected with their social media posts or mentions.

For example:-



Fig: Sentiment Analysis

3.3 TOPIC MODELLING

Topic modelling, for example, enables the detection of hidden topics or themes in a collection of texts. NLP can automatically uncover and categorise themes addressed in social media conversations by using techniques such as Latent Dirichlet Allocation (LDA) or non-negative matrix factorization (NMF). This aids in comprehending the primary areas of interest or debate among social media users.

Topic modelling aids in the organisation of vast collections of documents by automatically categorising them. It aids in the comprehension of the primary themes present in the data and provides a high-level overview of the document corpus. This organisation enables efficient information retrieval and knowledge management by facilitating document retrieval and summarization.

By identifying the primary themes mentioned, topic modelling allows for the extraction of crucial information from documents. It aids with the comprehension of textual

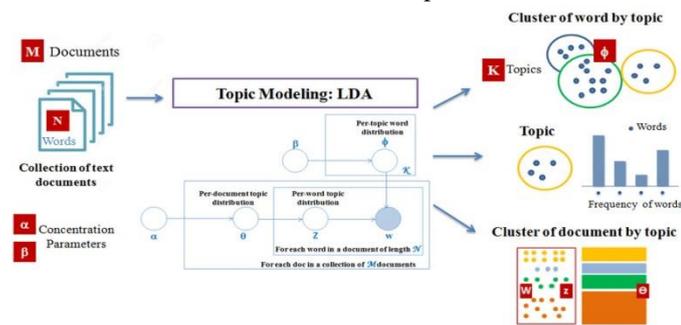


Fig. Topic modelling

material by providing insights on the underlying concepts, ideas, or trends found in the texts. This comprehension helps with knowledge discovery, trend analysis, and decision making.

4. CONCLUSIONS

The most important contribution this study makes to social media research is that it demonstrates that reading streams of consumer discourse by humans rather than using sentiment analysis to learn from customers is likely more effective. This result is critical for improving social media monitoring systems. As indicated by the fact that an NLP approach may be superior to SA, developing an information system based on NLP principles is a good and helpful goal. NLP-based software holds the possibility of considerably increasing the knowledge that firms may learn from analysing customer-to-customer exchanges, as well as improving the efficacy with which they monitor and respond to customer-to-firm communications.

To summarise, the impact of textual analysis of social media interactions using Natural Language Processing (NLP) on decision making is apparent. The introduction of NLP has transformed the way we analyse and exploit the massive amounts of textual data created by social media sites. NLP uses complex algorithms and linguistic models to extract useful insights, patterns, and feelings from data, boosting decision-makers' capacity to make educated and data-driven decisions.

Decision-makers can obtain a better understanding of their target audience, detect new trends, predict consumer behaviour, and identify chances for growth by using NLP-based textual analysis. The capacity to extract useful information from social media interactions enables organisations to establish focused marketing strategies, improve brand reputation management, and communicate with customers more effectively.

Finally, in today's digitally-driven environment, the influence of NLP-based textual analysis of social media interactions on decision making is game-changing. Decision-makers can access significant insights that can drive commercial success, guide policy-making, and allow a deeper knowledge of human behaviour by leveraging the power of NLP. It is an interesting topic with enormous potential, and with careful evaluation of its problems and ethical implications, NLP-based textual analysis has the ability to continue revolutionising decision-making processes across multiple domains.

REFERENCES

1. Larson keri and Richard T, "The impact of Natural Language Processing- Based textual analysis of social media interactions on decision making", Proceedings of the 21st European Conference on Information Systems(2013)
2. Ramzan Talib and Fakeeha Fatima, "Text Mining: Techniques, Applications and Issues", IJACSA, Vol. 7 No.11,(2016)
3. Matthew Andreotta and Fabio Boschetti, "Analyzing social media data: A mixed-methods framework combining computational and qualitative text analysis", The psychnomic society(2019)
4. Qixuan Hou, Meng Han and Zhipeng Cai, "Survey on Data Analysis in Social Media: A Practical Application Aspect", Volume 3, Number 4, December (2020)
5. Lata Gohil, "Text Mining: Process and Techniques", International Journal of Innovative Research in Computer Science & Technology (IJIRCST), ISSN: 2347-5552, Volume-3, Issue-3,(May-2015)

6. F. Alattar and K. Shaalan, "Using Artificial Intelligence to Understand What Causes Sentiment Changes on Social Media," in IEEE Access, vol. 9, pp. 61756-61767, 2021
7. Y. -W. Lai and M. -Y. Chen, "Review of Survey Research in Fuzzy Approach for Text Mining," in IEEE Access, vol. 11, pp. 39635-39649, 2023
8. P. Ducange and M. Fazzolari, "Social sensing and sentiment analysis: Using social media as useful information source," 2017 International Conference on Smart Systems and Technologies (SST), Osijek, Croatia, 2017.
9. R. Singh and P. Sharma, "An Overview of Social Media and Sentiment Analysis," 2021 5th International Conference on Information Systems and Computer Networks (ISCON), Mathura, India, 2021.
10. S. Srikamdee, U. Suksawatchon and J. Suksawatchon, "Thai Sentiment Analysis for Social Media Monitoring using Machine Learning Approach," 2022 37th International Technical Conference on Circuits/Systems, Computers and Communications (ITC-CSCC), Phuket, Thailand, 2022.