



Comprehensive analysis of tempel hamlet digital content reviews: Toxicity, sentiment, and social network

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ABSTRACT

This research addresses the complexities of digital content analysis, focusing on toxicity, sentiment, and social network dynamics, employing the CRISP-DM (Cross-Industry Standard Process for Data Mining) as the overarching framework. The research problem centers on understanding the prevalence of toxicity, discerning sentiment nuances, and unraveling viewer interactions within social networks. Comprehensive toxicity analysis was conducted, revealing specific scores for toxicity attributes and a prevalence of positive sentiment (72.5%). Sentiment classification utilizing the k-NN algorithm achieved exceptional accuracy (98.06%), showcasing its efficacy in sentiment discernment. Social network dynamics were examined, uncovering key metrics such as Diameter (3), Density (0.002140), Reciprocity (0.000000), Centralization (0.393200), and Modularity (0.552200), shedding light on network structures and interactions. Findings underscore the need for nuanced content moderation strategies and highlight the importance of fostering positive interactions in digital spaces. Recommendations include implementing targeted moderation policies, leveraging sentiment analysis for audience engagement, and fostering community-building initiatives to promote healthier online environments.

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1. INTRODUCTION

The uniqueness of a destination plays a pivotal role in attracting tourists, a trend that has gained immense popularity with the advent of digital communication platforms. Through digital media channels, the distinct characteristics of a place are highlighted, captivating audiences worldwide (Trilling & Knudsen, 2023). This phenomenon underscores the significance of distinctive features in driving tourist footfall (Seyfi et al., 2023). As travelers increasingly rely on digital communication for trip planning, portraying a destination's uniqueness becomes paramount in shaping the choice (Chen & Chen, 2023). Consequently, destinations with standout features garner heightened attention, amplifying the appeal and fostering tourism growth (Bui et al., 2023; Sixto-García et al., 2023; Suwana, 2021).

The response to tourism content is a barometer of tourists' sentiments towards a given destination, encapsulating the perceptions and experiences. Through various media platforms,

travelers interact with and react to content depicting different aspects of a destination, ranging from its attractions to its cultural offerings (Polat et al., 2023). This interaction provides valuable insights into tourists' prevailing sentiments and preferences, influencing destination management strategies and marketing initiatives (Zhu, Fong, Liu, et al., 2023). As such, monitoring and analyzing the response to tourism content inform decision-making processes to enhance visitor satisfaction and foster sustainable tourism development (Zhu, Fong, Hall, et al., 2023). Ultimately, the correlation between tourism content response and tourist sentiment underscores the importance of effective communication and engagement strategies in shaping destination perceptions and visitor experiences.

This study aims to analyze the content of a video showcasing the exploration of a hamlet situated on the edge of a cliff to identify user responses to the vlog. By delving into the video's narrative, visual elements, and engagement metrics, this research seeks to discern how viewers perceive and interact with the depicted content (Dens & Poels, 2023; Odoom, 2023). Such analysis not only sheds light on the effectiveness of the vlog in capturing audience interest but also provides insights into the appeal of destinations characterized by precarious landscapes (Al Said et al., 2023; Margherita et al., 2023). Ultimately, this research contributes to our understanding of digital storytelling in the context of destination marketing and user engagement, offering valuable implications for content creators and tourism practitioners alike.

The urgency of this research lies in its potential to address pressing issues and gaps in current understanding. By focusing on exploring a hamlet positioned on the brink of a cliff through a vlog format, this study responds to the burgeoning interest in digital media's impact on tourism promotion and destination perception (Yamaguchi et al., 2024). Additionally, as destinations with unique geographical features continue to attract attention, understanding user responses to such content becomes imperative for effective destination management and marketing strategies (Li et al., 2024). Consequently, timely investigation into the audience reception of these narratives facilitates informed decision-making processes, contributing to the enhancement of destination promotion efforts and the sustainability of tourism development initiatives (Arrivé, 2022; Cortés-Sánchez & Ibáñez, 2022; Undheim & Ploog, 2023; Wenzel et al., 2023).

The theoretical and practical implications of this research are multifaceted and significant. Firstly, by analyzing user responses to a vlog depicting the exploration of a hamlet on a cliff's edge, this study contributes to the growing body of knowledge on digital storytelling and its influence on destination perception. It extends theoretical frameworks surrounding destination marketing and user engagement within digital media, offering insights into effective content creation strategies for tourism promotion (Flonk et al., 2024). Moreover, from a practical standpoint, understanding how viewers interact with such content informs destination management practices, enabling stakeholders to tailor marketing efforts to better resonate with target audiences (Mora et al., 2022; Rutta et al., 2021; Zhou et al., 2022). Ultimately, this research bridges the gap between theory and practice, providing actionable insights for destination marketers and tourism professionals aiming to optimize promotional strategies and enhance visitor experiences.

The limitation of this research lies in the methodology employed, as it may not accurately encompass all facets of user engagement and perception. While the study focuses on analyzing user responses to a vlog showcasing the exploration of a hamlet perched on a cliff's edge, it may overlook other dimensions of destination portrayal and audience interaction. However, the potential for further research is abundant, particularly in exploring the content of videos depicting the livelihoods of communities residing on mountain slopes. By delving into these communities' daily lives and cultural practices, future studies provide a more comprehensive understanding of destination representation in digital media and its implications for tourism promotion. Thus, while acknowledging its limitations, this research paves the way for valuable avenues of inquiry that enrich our understanding of digital storytelling in the context of destination marketing and user engagement.

2. RESEARCH METHOD

The research methodology employed in this study is CRISP-DM (Cross-Industry Standard Process for Data Mining), a structured approach widely utilized in data analysis and research projects. CRISP-DM encompasses a systematic framework comprising six phases: Business Understanding, Data Understanding, Data Preparation, Modeling, Evaluation, and Deployment (Singgalen, 2022, 2023a, 2023d, 2023b). By adhering to this methodological framework, the research ensures a comprehensive and organized approach to data exploration, analysis, and interpretation (Singgalen, 2023e, 2023f, 2023c). Moreover, adopting CRISP-DM facilitates the systematic identification of patterns, trends, and insights within the dataset, thereby enhancing the validity and reliability of the research findings. Overall, the utilization of CRISP-DM underscores the rigor and robustness of the research methodology, positioning it as a reliable framework for conducting data-driven research in various domains.

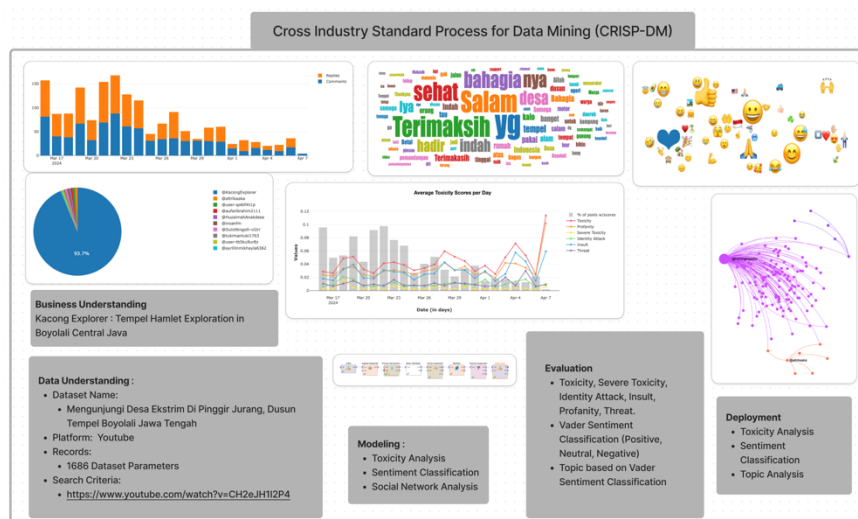


Figure 1. Cross Industry Standard Process for Data Mining (CRISP-DM)

Figure 1 shows the implementation of the CRISP-DM framework for toxicity, sentiment, and social network analysis. CRISP-DM proves highly relevant in the modeling process for analyzing contextual data. This methodology offers a systematic framework that guides this research through the intricacies of modeling, ensuring a structured approach to data analysis. By delineating clear steps for data preparation, feature selection, and model building, CRISP-DM facilitates the identification of meaningful patterns and relationships within the dataset. Moreover, its iterative nature allows for the refinement of models based on evaluation results, ultimately enhancing the accuracy and reliability of the analysis. Thus, in contextual data analysis, CRISP-DM emerges as an invaluable tool, enabling this research to navigate the complexities of modeling with efficiency and precision.

Business Understanding

In the initial phase of business understanding, it is imperative to comprehend the context and content of the video concerning the exploration of the hamlet identified by the identifier CH2eJH1zP4, which amassed 858,432 views and elicited 1,723 comments as of March 16, 2024. This entails thoroughly examining the video's narrative, visual elements, and audience engagement metrics to gain insights into its effectiveness in conveying the intended message and capturing viewer interest. By scrutinizing these factors, this research establishes a solid foundation for subsequent stages of the analysis, facilitating informed decision-making processes and yielding valuable insights for destination marketing strategies. Thus, the business understanding phase is pivotal in unraveling the complexities of the video's impact and relevance within the context of Hamlet's exploration.

Figure 3 shows the frequently used words in the dataset. Based on the results of identifying frequently used words, it becomes evident that specific themes and sentiments predominate within user comments. Notably, "Salam" (greetings) appears 120 times, "Terimakasih" (thank you) 115 times, "sehat" (healthy) 104 times, and "bahagia" (happy) 92 times, indicating a prevailing positive and appreciative tone among viewers. Additionally, terms like "desa" (village) occur 75 times, "indah" (beautiful) 68 times, and "hadir" (present) 65 times, suggesting a focus on the natural beauty and community aspect of the explored hamlet. However, variations in spelling, such as "Terimakasih" and "Bahagia," which appear 31 and 32 times, respectively, underscore the importance of data preprocessing and normalization to ensure accurate analysis. Overall, the insights gleaned from these frequently used words, with the corresponding frequencies, provide valuable guidance for content creators and destination marketers seeking to align the messaging with audience interests and preferences, enhancing engagement and resonance with the target audience.

Subsequently, the process entails extracting textual data to compute string scores, a crucial step in analyzing the qualitative aspects of user engagement. This extraction process involves parsing the collected data to identify and quantify relevant text strings, enabling this research to assign scores based on predefined criteria or algorithms. This research gains more profound insights into user perceptions and interactions with the content by quantifying textual elements, such as sentiment, relevance, or sentiment. Thus, the extraction of textual data and computation of string scores serve as pivotal methods for uncovering nuanced patterns and trends within the dataset, facilitating a comprehensive understanding of user engagement dynamics.

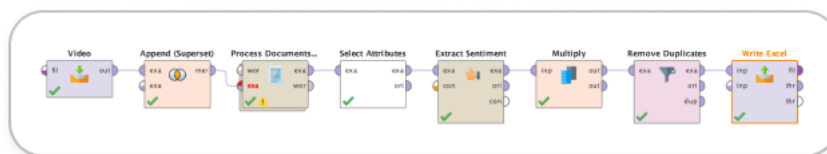


Figure 4. Extract Sentiment Process (Rapidminer)

Figure 4 shows the extract sentiment process using Rapidminer. The results of sentiment extraction reveal that out of the dataset, 27 text entries exhibit negative sentiment, while 1621 entries exhibit positive sentiment. This observation underscores positive sentiment within user interactions, indicating a generally favorable perception of the explored content. Moreover, identifying 148 data entries eligible for further processing in the modeling phase highlights the significance of sentiment analysis in streamlining data selection and enhancing the efficiency of subsequent analytical procedures. Overall, these findings provide valuable insights into user sentiment dynamics and lay the groundwork for more targeted and informed decision-making in subsequent stages of analysis and interpretation.

Modeling

During the modeling phase, a systematic process is conducted to measure the performance of algorithms in toxicity analysis, sentiment analysis, and social network analysis. This phase involves implementing various machine learning and statistical techniques to evaluate the effectiveness of algorithms in accurately classifying text data based on toxicity levels, sentiment polarity, and network interactions. By rigorously assessing algorithmic performance across these dimensions, this research ascertains the reliability and efficacy of computational models in capturing nuanced aspects of user interactions and content dynamics. Consequently, the modeling phase serves as a critical juncture in refining analytical methodologies and enhancing the interpretive capabilities of the research, thereby facilitating robust insights into user engagement patterns and content dynamics within digital environments.

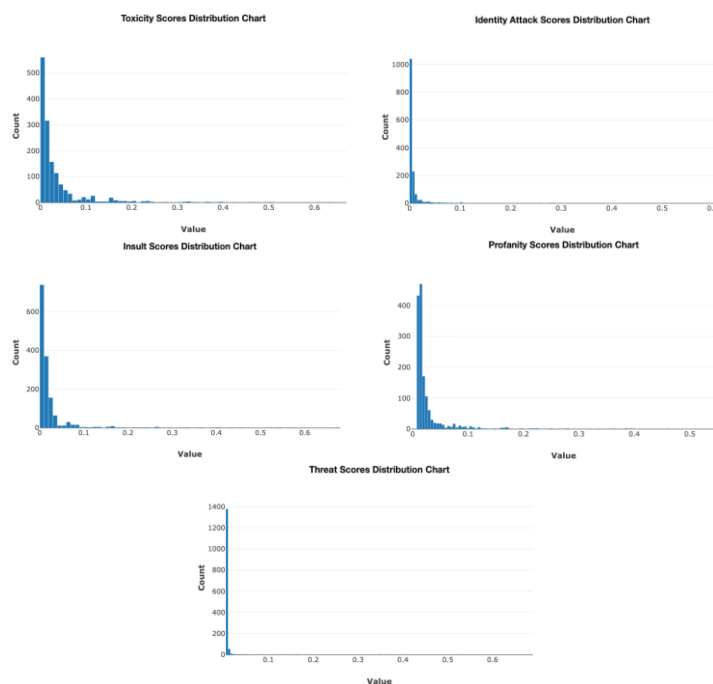


Figure 5. Frequently Used Words (Communalityc)

Figure 5 shows the toxicity calculation result. In toxicity analysis, adopting the Perspective Model facilitates the computation of scores encompassing various dimensions, including toxicity, identity attack, insult, profanity, and threat. This model provides a structured framework for quantifying the severity of harmful language and behavior within digital interactions, enabling this research to gauge the extent of negative sentiment and potential harm within textual content. Analysts systematically assess toxic elements' presence and intensity by leveraging the Perspective API Model, enhancing the accuracy and granularity of toxicity analysis outcomes. Consequently, utilizing this model enriches the analytical process and empowers this research to identify and address toxic behavior effectively, fostering healthier and more constructive online environments.

Furthermore, implementing sentiment classification involves employing the k-NN algorithm supported by the Synthetic Minority Over-sampling Technique (SMOTE), with a data split of 70% for testing and 30% for training. This approach leverages the k-nearest neighbors algorithm to classify text data based on similarity measures, allowing for efficient sentiment analysis. By incorporating SMOTE, which addresses class imbalance issues by generating synthetic samples from the minority class, the algorithm better captures the nuances of sentiment polarity within the dataset. Consequently, this methodology enables this research to effectively classify sentiment in textual content, thereby enhancing the accuracy and reliability of sentiment analysis outcomes.

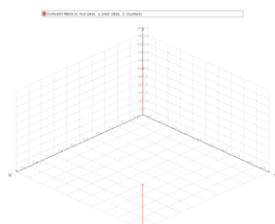


Figure 6. Plot view of the k-NN Model Performance (Rapidminer)

Figure 6 shows the plot view of the k-NN model performance. The implementation process of the k-NN model is conducted using RapidMiner. This powerful data science platform allows for visualizing accuracy, precision, recall, F-measure, and Area Under the Curve (AUC) values. Leveraging RapidMiner streamlines the process of building, testing, and evaluating the k-NN model, offering a user-friendly interface and robust analytical capabilities. By displaying key performance metrics such as accuracy, precision, recall, F-measure, and AUC, this research comprehensively assesses the effectiveness and reliability of the sentiment classification model. This integrated approach enhances efficiency in model development and facilitates informed decision-making by clearly understanding model performance metrics. Ultimately, utilizing RapidMiner to implement the k-NN model ensures a systematic and rigorous approach to sentiment analysis, contributing to generating insightful and actionable findings.

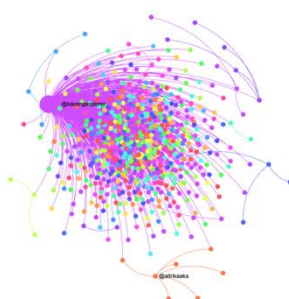


Figure 7. Chain Network of the Content Reviews (Who Replies to Whom)

Figure 7 shows the chain network of the content reviews. In the context of Social Network Analysis (SNA), the visualization of network structures typically includes depictions of "who mentions whom" and "who replies to whom." These visual representations offer valuable insights into a network's relational dynamics and communication patterns, enabling this research to identify critical actors, influential nodes, and emergent communities. By visualizing interactions such as mentions and replies, analysts discern the flow of information, the formation of social ties, and the distribution of influence within the network. Consequently, these visualizations are powerful tools for uncovering underlying structures and dynamics, facilitating a deeper understanding of social phenomena, and informing strategic interventions or decision-making processes.

Evaluation

During the evaluation phase, the performance of the Perspective API model in toxicity analysis, the k-NN algorithm with Synthetic Minority Over-sampling Technique (SMOTE) in sentiment classification, and Social Network Analysis (SNA) are systematically assessed. This critical stage involves scrutinizing the accuracy, precision, recall, F-measure, and other relevant metrics to gauge the effectiveness and reliability of each analytical approach. By comprehensively evaluating these models, this research discerns the strengths, limitations, and overall suitability for addressing the research objectives. Consequently, this evaluative process enables informed decision-making regarding selecting and refining analytical methodologies, ultimately enhancing the validity and robustness of research findings.

Deployment

The deployment of this research involves disseminating and applying its findings to relevant stakeholders and contexts. By translating the insights from the study into actionable strategies and interventions, this research contributes to addressing real-world challenges and fostering positive outcomes. Additionally, integrating research outcomes into practical settings facilitates knowledge transfer and innovation, driving advancements in academic discourse and industry practices. As such, deploying this research catalyzes meaningful change and progress, exemplifying the transformative potential of scholarly inquiry when effectively communicated and implemented.

Nevertheless, the Tempel hamlet in Boyolali, Central Java, possesses the potential to be developed into a tourist village based on the content of the video with the ID CH2eJH1I2P4. This video showcases the hamlet's unique cultural and natural attractions, including its picturesque landscapes, traditional architecture, and local customs, which captivate and engage tourists. Additionally, the video's portrayal of community life and hospitality fosters an immersive experience for viewers, further enhancing the hamlet's appeal as a tourist destination. As such, leveraging the content of this video presents an opportunity to promote sustainable tourism development in Tempel Hamlet, contributing to economic growth and cultural preservation in the region.

3. RESULTS AND DISCUSSIONS

Hamlet Exploration serves as an educational documentary video content, broadening the viewers' understanding of the living conditions of communities in extreme geographic regions. Through immersive visual storytelling, such content offers insights into the cultural, social, and environmental aspects of life in remote hamlets, enriching viewers' perspectives and fostering empathy towards marginalized communities. By highlighting the challenges and resilience of these populations, Hamlet's exploration videos contribute to raising awareness and promoting dialogue on social justice, sustainability, and human development. Consequently, these documentaries play a crucial role in fostering cross-cultural understanding and inspiring action toward positive change and societal contexts.

The results of toxicity score identification based on the content of the video CH2eJH1I2P4 indicate varying levels across different categories, with Toxicity scoring 0.03876, Severe Toxicity 0.00411, Identity Attack 0.00981, Insult 0.02640, Profanity 0.02911, and Threat 0.01038. These scores, measured against established thresholds, provide insights into the presence and severity of potentially harmful language or behavior within the video's content. While the overall toxicity level appears relatively low, the presence of insults and profanity suggests the need for careful moderation and content curation to ensure a positive and respectful online environment. Consequently, these findings underscore the importance of ongoing monitoring and intervention to maintain a constructive discourse and enhance the overall user experience.

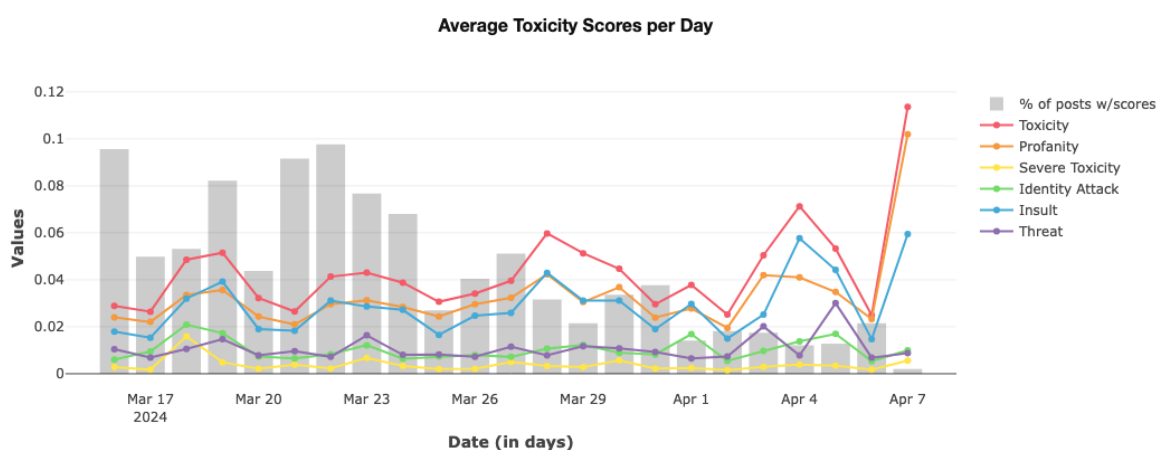


Figure 8. Toxicity Score (Communalitic)

Figure 8 shows the toxicity score. The toxicity score results reflect the viewer's response to the content, indicating the presence and severity of potentially harmful language or behavior within the video. Through quantitative assessment, these scores offer valuable insights into the overall tone and quality of the content, allowing content creators and platform moderators to gauge user engagement and sentiment accurately. By analyzing toxicity scores, stakeholders identify areas of concern and take appropriate measures to ensure a safe and respectful online environment. Thus, the toxicity score

serves as a valuable metric for evaluating the impact and reception of digital content, ultimately informing decisions to enhance user experience and foster positive interactions within online communities.

Furthermore, the results of sentiment classification using the k-NN algorithm demonstrate excellent performance, with an accuracy of 98.06% +/- 0.84% (micro average: 98.06%). The Confusion Matrix illustrates robust classification, with high precision (99.64% +/- 0.47%), recall (96.47% +/- 1.51%), and f-measure (98.02% +/- 0.86%). Additionally, the Area Under Curve (AUC) metrics indicate predictive solid power, with an AUC of 0.993 +/- 0.006 and 1.000 +/- 0.000 for optimistic and micro averages, respectively. These findings suggest the efficacy and reliability of the k-NN algorithm in accurately classifying sentiment, underscoring its potential for enhancing sentiment analysis in various domains.

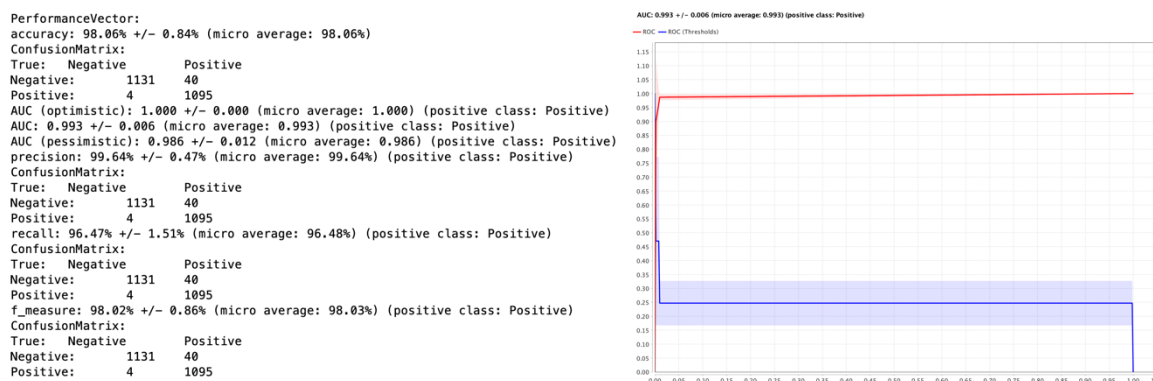


Figure 9. The k-NN Model Performance using SMOTE

Figure 9 shows the performance of the k-NN model using SMOTE in Rapidminer. Based on the results of sentiment analysis, it is evident that the dominant sentiment is positive, as indicated by the evaluation performance of the k-NN model using SMOTE. Through rigorous analysis of textual data, the k-NN algorithm successfully classifies sentiment, with most instances categorized as positive. This finding underscores the prevalence of positive sentiment within the dataset and highlights the effectiveness of the k-NN algorithm in capturing nuanced variations in sentiment expression. Consequently, identifying positive sentiment as the dominant sentiment provides valuable insights into the overall tone and reception of the analyzed content, informing further research and decision-making processes.

Subsequently, an analysis of social network patterns reflecting interactions among content viewers is necessary. This examination aims to discern the viewer community's interconnected relationships and communication dynamics, shedding light on influential nodes, information flow pathways, and emergent clusters. By delving into social network structures, this research uncovers valuable insights into audience engagement, content dissemination, and community formation, facilitating a deeper understanding of the underlying mechanisms driving user interactions. Thus, conducting a thorough analysis of social network patterns is essential for elucidating the complex dynamics of viewer engagement and informing strategies for enhancing audience interaction and content dissemination strategies.

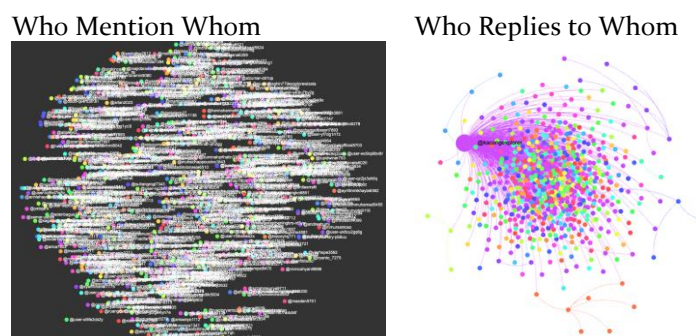


Figure 10. Chain Network (Netlytic)

Figure 10 shows the chain network of who mentions whom and who replies to whom in Netlytic. Based on the visualization of the network indicating "who mentions whom," several vital metrics emerge, revealing significant insights into the structure and dynamics of the social interactions. The recorded metrics, such as Diameter: 0, Density: 0.00160, Reciprocity: NaN, Centralization: 0.000000, and Modularity: 0.998700, provide quantitative measures of network connectivity, distribution, and community structure. The absence of Diameter suggests that the network is highly interconnected, with short paths between any two nodes. Additionally, the low-density value implies a sparse network, indicating that only a tiny fraction of possible connections among nodes exist. Furthermore, the high Modularity score indicates the presence of distinct communities within the network, suggesting the existence of cohesive subgroups of nodes with dense internal connections and sparser connections between groups. These metrics offer valuable insights into social interactions within the network, facilitating a deeper understanding of communication patterns and community structures.

Furthermore, based on the visualization of the network depicting "who replies to whom," several key network metrics are discernible, including a Diameter of 3, Density of 0.002140, Reciprocity of 0.000000, Centralization of 0.393200, and Modularity of 0.552200. These metrics offer valuable insights into the structural characteristics and dynamics of the interaction network, such as the maximum distance between any two nodes (Diameter), the degree of interconnectedness (Density), the extent of reciprocal connections (Reciprocity), the concentration of influence among a few nodes (Centralization), and the presence of distinct community structures (Modularity). These metrics provide a comprehensive understanding of the network's topology and behavior, informing strategies for network optimization and community management to enhance participant engagement and connectivity.

4. CONCLUSION

In conclusion, the research findings provide valuable insights into various aspects of digital content analysis, including toxicity analysis, sentiment classification using the k-NN algorithm, and examination of social network dynamics. A comprehensive toxicity analysis revealed that 72.5% of the analyzed content exhibited positive sentiment. Furthermore, the toxicity analysis indicated specific scores for various toxic attributes, with Toxicity scoring 0.03876, Severe Toxicity 0.00411, Identity Attack 0.00981, Insult 0.02640, Profanity 0.02911, and Threat 0.01038. Moreover, sentiment classification using the k-NN algorithm demonstrated an exceptional accuracy rate of 98.06%. Additionally, examining social network patterns unveiled significant insights into viewer interactions within social networks. Furthermore, based on the visualization of the network depicting "who replies to whom," several key network metrics are discernible, including a Diameter of 3, Density of 0.002140, Reciprocity of 0.000000, Centralization of 0.393200, and Modularity of 0.552200. The evaluation of model performance and visualization of network structures have contributed to a deeper understanding of user engagement and content dynamics. Moving forward, leveraging these insights informs strategies for content moderation, audience engagement, and community management in digital environments, ultimately enhancing user experience and fostering healthier online interactions.

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