International Journal on Social Science, Economics and Art, 14 (2) (2024) 276-286

Published by: Institute of Computer Science (IOCS)

International Journal on Social Science, Economics and Art

Journal homepage: www. ijosea.isha.or.id

Inclusive digital narratives: analyzing toxicity, topics, and social networks in indigenous documentaries content reviews

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Article Info

Article history:

Received: Apr 11, 2024
Revised: May 10, 2024
Accepted: Aug 29, 2024

Keywords:

Community;
Digital Content;
Kampung Naga;
Livelihood;
Social Network

ABSTRACT

The research delves into the livelihood and coping strategies of indigenous communities in the digital era, focusing on the analysis of digital content. Utilizing the CRISP-DM framework, the study investigates toxicity scores, topics, and social networks within digital content, particularly examining video documentaries portraying indigenous communities' ways of life. Through data understanding, scraping, and modeling, the research unveils insights into the toxicity levels of online discussions and identifies topics resonating with viewers. The findings underscore the significance of preserving indigenous cultures, promoting community well-being, and fostering inclusive digital content. Moreover, the analysis reveals 8,776 actors and 498 edges within social networks, with an average degree of connectivity of 0.051 and an average weighted degree of 0.057. Notably, the toxicity analysis shows relatively low toxicity levels, with a toxicity score of 0.04992 and severe toxicity at 0.00609. The study concludes by recommending strategies to enhance the quality and sensitivity of digital content, contributing to broader societal understanding and appreciation of indigenous communities.

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1. INTRODUCTION

The livelihood of indigenous communities presents a compelling subject for delineating the structure of their sustenance and coping strategies amidst the challenges of the digital era. Within this discourse, the intricate interplay between traditional knowledge systems and contemporary technological advancements underscores the resilience and adaptability inherent in indigenous societies (Beban & Gironde, 2023; Ma et al., 2021; Nepal et al., 2022; Ouma & Stadel, 2021; Westoby et al., 2021). Moreover, examining indigenous livelihoods unveils a nuanced understanding of how these communities navigate modernization while preserving their cultural heritage and ecological integrity (Forson, 2022; Holland et al., 2022; Raniga, 2021; Scheinfeld et al., 2022; Zeratsion et al., 2023). Consequently, scrutinizing the livelihood strategies of indigenous peoples offers invaluable insights into crafting inclusive development policies that respect diversity and foster sustainable practices in the face of globalization.

The evolution of digital content creation enables content creators to curate storyboards and disseminate information concerning the livelihoods of indigenous communities across diverse regions. Through various digital platforms, such as social media, websites, and online forums, content creators amplify the voices and narratives of indigenous peoples, shedding light on their unique ways of life, traditional practices, and socio-economic challenges (Freitag & Camargo-Borges, 2024; Heyward & Krikowa, 2023; McGinnis et al., 2020; Tshabangu & Salawu, 2022). By leveraging digital storytelling techniques, creators can engage global audiences, fostering awareness, empathy, and support for indigenous communities' rights and sustainable development initiatives (Masele & Joseph, 2023; Tran & Pittock, 2024; Wei et al., 2023). Consequently, the proliferation of digital content is a powerful tool for advocating for the recognition, preservation, and empowerment of indigenous cultures and livelihoods in the digital age.

The publication of digital content in documentary videos exploring the livelihoods of communities in various village settings serves as a valuable resource for comprehensive analysis from a data-mining perspective. These documentaries capture rich visual and narrative representations of diverse cultural practices, socio-economic dynamics, and environmental interactions within rural contexts (Al Zoubi, 2023; Krithiga & Velmurugan, 2024; Namakula & Ilukor, 2024; Trogisch, 2023). Such digital content encapsulates intricate layers of information through meticulous curation and documentation, providing this research with a wealth of qualitative and quantitative data for in-depth analysis (Amponsah et al., 2023; Åsebø & Løvoll, 2023; Jiang et al., 2022; Weber et al., 2023; Xu et al., 2023). Consequently, leveraging digital documentary materials enables this research to conduct nuanced examinations, uncovering hidden patterns, correlations, and insights that contribute to a deeper understanding of rural livelihoods and inform targeted interventions for sustainable development.

This research aims to analyze Kampung Naga video content utilizing the CRISP-DM framework, focusing on toxicity analysis, topic identification, and social network examination. By employing this structured methodology, this research systematically explores and interprets the multifaceted dimensions of the video content, discerning patterns, sentiments, and interactions within the digital narrative (Singgalen, 2024c, 2024b, 2024a, 2024d). This study seeks to unveil deeper insights into the socio-cultural dynamics and online discourse surrounding Kampung Naga by applying advanced data mining techniques like sentiment and network analysis. Consequently, employing the CRISP-DM framework facilitates a rigorous and comprehensive examination of the video content, enabling this research to derive meaningful conclusions and recommendations for further exploration and intervention.

The urgency of this research lies in the utilization of the CRISP-DM methodology. By employing CRISP-DM, a well-established and systematic approach to data mining, the study aims to ensure methodological rigor, reproducibility, and reliability in analyzing the complexities of digital content related to Kampung Naga. This methodology enables this research to navigate through distinct phases, including business understanding, data understanding, data preparation, modeling, evaluation, and deployment, thereby facilitating a comprehensive and structured analysis of the digital footprint of Kampung Naga. By applying CRISP-DM, the research provides actionable insights into socio-cultural dynamics, communication patterns, and the community's potential challenges, contributing to informed decision-making and sustainable development initiatives.

The theoretical and practical contributions of this research are substantial. By employing advanced methodologies such as CRISP-DM, the study provides a robust framework for analyzing digital content related to Kampung Naga, offering insights into socio-cultural dynamics and communication patterns within indigenous communities. Moreover, the research advances data mining techniques by demonstrating their applicability in uncovering hidden patterns and trends within complex digital datasets. Through its theoretical underpinnings and methodological rigor, this study enriches academic discourse. It offers practical implications for policymakers, community leaders, and development practitioners seeking to implement targeted interventions for sustainable development and community well-being.

2. RESEARCH METHOD

Gap Analysis of Digital Content Analysis for Livelihood and Coping Strategies of Indigenous Communities in the Digital Age

The gap analysis conducted here entails identifying studies focused on digital content analysis, particularly those about indigenous communities' livelihoods and coping strategies in the digital age (Adeniyi et al., 2023; Alamneh et al., 2023; Wondimu et al., 2022; Yu et al., 2023). By scrutinizing existing literature, this research aims to pinpoint areas where current knowledge falls short in comprehensively understanding the digital landscape's impact on indigenous livelihoods. Through this process, the study highlights overlooked aspects, methodological limitations, and potential avenues for further exploration within digital content analysis and indigenous communities' resilience strategies. Consequently, this gap analysis underscores the necessity of bridging existing research lacunae to enhance our understanding and inform more effective policies and interventions tailored to support indigenous communities in navigating the challenges of the digital era.

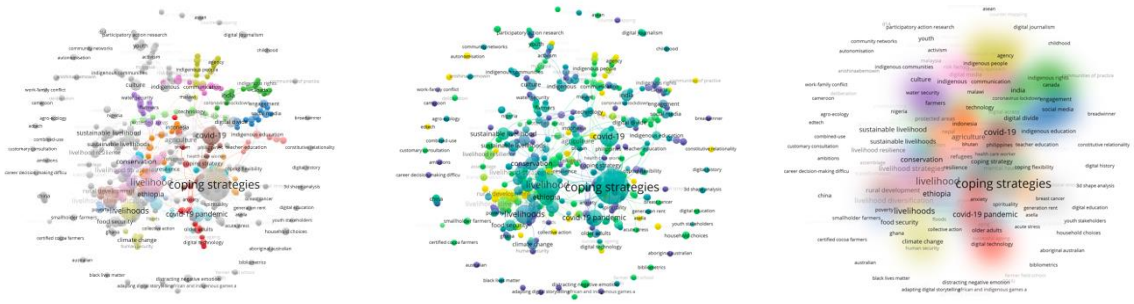

Figure 1. Gap Analysis Using Vosviewer

Figure 1 shows the gap analysis result using Vosviewer. Based on the identification and gap analysis results in studies concerning livelihood, coping strategies, and indigenous communities, research on content analysis and the CRISP-DM methodology remains significantly limited. Consequently, this study assumes paramount importance. Addressing these gaps aims to advance scholarly understanding of the intersection between digital content analysis and indigenous community resilience strategies. Through rigorous examination and application of the CRISP-DM framework, this research endeavors to fill crucial knowledge voids, thereby contributing to developing more effective policies and interventions tailored to support indigenous communities in navigating the challenges of the digital era.

Implementation of Cross-Industry Standard Process for Data-Mining (CRISP-DM)

This research employs the CRISP-DM framework to identify toxicity scores, topics, and social networks within the studied digital content. Using CRISP-DM, a structured and systematic approach to data mining, the study ensures methodological rigor and efficiency in the analysis process. This framework facilitates the comprehensive examination of toxicity levels, thematic patterns, and network structures in digital materials, thereby enabling a nuanced understanding of the underlying dynamics and interactions within the studied community. Consequently, leveraging CRISP-DM enhances the reliability and validity of the findings, empowering stakeholders to make informed decisions and interventions to promote community well-being and sustainable development.

Figure 2. Cross Industry Standard Process for Data Mining (CRISP-DM)

Figure 2 shows the implementation of the CRISP-DM. Each stage within the CRISP-DM framework elucidates the data context and processing procedures to generate helpful information for achieving

accurate and relevant interpretations. Beginning with business understanding, this stage ensures alignment between the data mining objectives and organizational goals, setting the foundation for subsequent analyses. Data understanding involves comprehensive exploration and assessment of the available data sources, identifying their relevance, quality, and potential biases. Data preparation entails cleansing, transforming, and integrating the data to ensure consistency and readiness for analysis. Moving into the modeling phase, various data mining techniques are applied to uncover patterns, trends, and relationships within the data. The evaluation assesses the effectiveness and validity of the models developed, refining them as necessary to enhance accuracy. Finally, deployment involves integrating the insights gained from the data mining process into actionable strategies and solutions. Collectively, these stages of CRISP-DM provide a systematic and structured approach to extracting meaningful insights from data, facilitating informed decision-making and problem-solving.

Business Understanding

During the business understanding, video content analysis involves generating transcripts and coding verbatim data to identify significant topics within the Kampung Naga video content. Transcription transforms the spoken dialogue and visual cues within the videos into written text, facilitating systematic analysis and interpretation. Subsequently, coding involves categorizing and labeling the transcribed data based on recurring themes, keywords, or concepts, allowing for the identification of essential topics and patterns. This meticulous process ensures that the subsequent stages of the CRISP-DM framework are informed by a thorough understanding of the content's context and critical elements, laying the groundwork for comprehensive data analysis and interpretation.

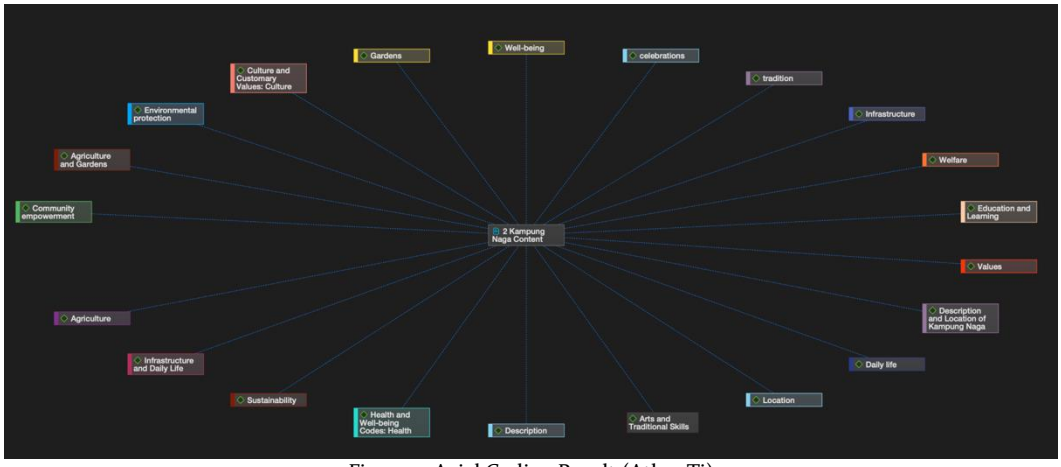

Figure 3. Axial Coding Result (Atlas. Ti)

Figure 3 shows the result of verbatim axial coding of the content transcript. Based on the topics identified in the video, it is evident that the content encompasses diverse themes reflecting various facets of life within Kampung Naga. These topics include a detailed description and location of the village, emphasizing its cultural significance and traditional practices. Furthermore, the video sheds light on the community's adherence to cultural values and traditions, as well as its infrastructure, daily life, and agricultural practices. The documentation also highlights the village's commitment to sustainability and environmental protection and focuses on community welfare, education, health, and well-being. Through these thematic explorations, the video provides a comprehensive portrayal of Kampung Naga, showcasing its rich cultural heritage, self-reliance, and harmonious coexistence with nature.

Data Understanding

During the data understanding stage, the process involves scraping user reviews or comments from the video with the ID 9DIlCbM76Bw, which garnered 11,081,180 views as of Jun 25, 2023, and

attracted 13,380 comments. This scraping process allows viewers to extract valuable insights and opinions, providing a deeper understanding of their perceptions, reactions, and engagement with the video content. By analyzing these comments, this research gains valuable qualitative data to complement the quantitative information obtained from view counts, facilitating a more comprehensive understanding of audience reception and interaction with the video. Ultimately, this data scraping process enriches the analytical framework and informs subsequent data processing and interpretation stages.

Figure 4. Frequently Used Words (Communalityc)

Figure 4 shows the frequently used words in the dataset. Based on the identification of frequently used words from the review data of the video content, it becomes apparent that specific terms stand out prominently. For instance, "kampung" appears 111 times, strongly emphasizing communal living and traditional village life. Moreover, "sehat" (which means "healthy" in English) and "salam" (which means "greetings" in English) are mentioned 62 times each, indicating a significant focus on health and greetings within the community. Additionally, "bahagia" (which means "happy" in English) is mentioned 54 times, suggesting discussions about happiness and well-being. Other notable terms include "masa" (which means "time" in English) appearing 46 times, "hidup" (which means "life" in English) 38 times, and "Terimakasih" (which means "thank you" in English) also 38 times, reflecting discussions about time, life, and expressions of gratitude. Furthermore, terms like "listrik" (which means "electricity" in English) appeared 35 times, "teknologi" (which means "technology" in English) 28 times, and "jaman" (which refers to "era" or "time" in English) 35 times, point to discussions about electricity, technology, and modernity in the context of traditional living. These frequent words provide valuable insights into the topics of interest, sentiments, and discussions prevalent among viewers regarding the content, thereby informing further analysis and interpretation of audience perceptions and engagement.

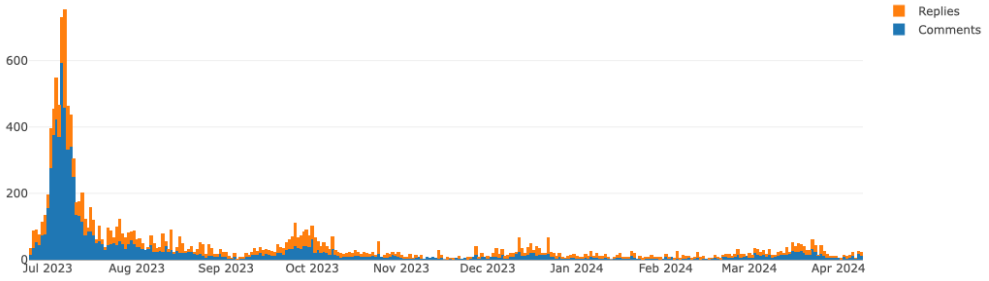

Figure 5. Post-Per-Day Statistic (Communalytic)

Figure 5 shows the post-per-day statistics of the content. Based on the post-per-day statistics data, it is evident that the number of comments in response to the video content fluctuates across different dates. For instance, on July 6, 2023, there were 596 comments indicating a significant level of engagement on that particular day. Similarly, July 7, 2023, saw 459 comments, followed closely by July

4, 2023, with 423 comments. Conversely, July 1, 2023, recorded the lowest number of comments, with only 157. These fluctuations in comment activity suggest varying levels of interest and interaction with the video content over time, highlighting the dynamic nature of audience engagement and the importance of monitoring and analyzing such metrics to understand audience behavior and preferences accurately.

The outcomes of the data understanding phase indicate that the textual comments data from the video represent public sentiment towards the Kampung Naga video content. Therefore, these review data are utilized in the modeling process. This highlights the importance of leveraging user-generated content as a valuable resource for gauging audience perception and engagement, informing subsequent analytical endeavors. Consequently, integrating the comment data into the modeling phase enriches the analytical framework, enabling a more comprehensive examination of audience sentiments and preferences regarding the Kampung Naga video content.

Modeling

During the modeling stage, the process entails conducting analyses of toxicity, topic, and social network. This phase involves employing various computational and statistical techniques to examine the toxicity levels in the textual comments, identifying prevalent topics or themes within the content, and mapping the interconnectedness of users within the social network surrounding the Kampung Naga video. By integrating these analytical approaches, the modeling phase aims to uncover patterns, trends, and relationships within the data, providing valuable insights into audience engagement, sentiment, and interactions. Consequently, this comprehensive analysis enables a nuanced understanding of the dynamics surrounding the video content, informing subsequent interpretations and decision-making processes.

Evaluation

During the evaluation stage, the process involves assessing the outcomes based on toxicity scores, topic modeling, and social network analyses. This phase employs rigorous criteria to evaluate the effectiveness, validity, and reliability of the methodologies employed in the previous stages. By scrutinizing toxicity scores, evaluators gauge the presence of harmful or offensive language in the comments, ensuring the integrity and appropriateness of the content. Additionally, topic modeling evaluations focus on the coherence and relevance of identified themes, while social network analyses assess the accuracy and comprehensiveness of the network representation. Through this comprehensive evaluation process, stakeholders gain valuable insights into the robustness of the analytical framework and the credibility of the findings, facilitating informed decision-making and further refinement of the research outcomes.

Deployment

During the deployment stage, the outcomes of the analyses on toxicity, topic, and social network are utilized as recommendations to enhance the quality of similar content to advance knowledge. These recommendations are valuable guidelines for content creators and platform administrators to implement strategies to foster healthier and more engaging online environments by leveraging insights from toxicity analyses, and measures are implemented to mitigate harmful language and promote respectful discourse. Additionally, recommendations stemming from topic modeling and social network analyses inform content creators about prevalent themes and audience preferences, enabling them to tailor their content to better resonate with their target audience. Ultimately, deploying these recommendations contributes to the continual improvement of content quality and the promotion of knowledge dissemination within digital spaces.

3. RESULTS AND DISCUSSIONS

Given the multifaceted challenges and opportunities of technological advancements, livelihood, and coping strategies for indigenous communities in the digital era represent a crucial study area. In navigating the complexities of the digital landscape, indigenous communities often rely on traditional

knowledge systems and innovative adaptation strategies to sustain their way of life while embracing modernity. This research elucidates the dynamics of cultural resilience, socio-economic empowerment, and environmental sustainability within these communities by comprehensively examining the intersection of indigenous livelihoods and digital technologies. Consequently, understanding and supporting indigenous livelihoods in the digital era is imperative for preserving cultural heritage and fostering inclusive and sustainable development agendas.

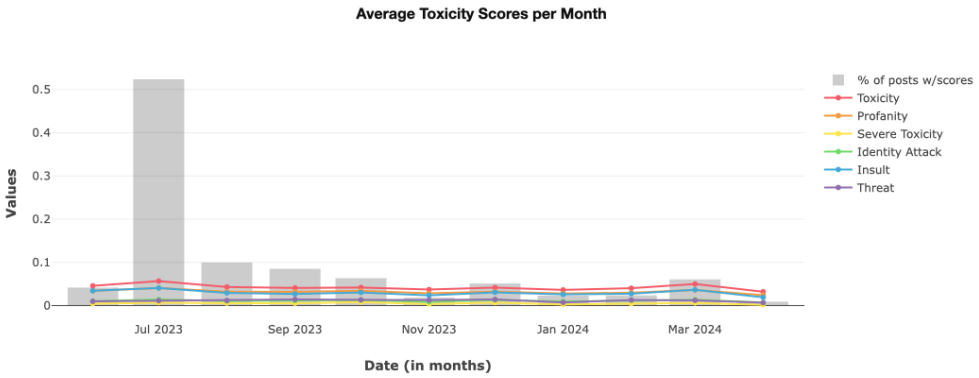

Figure 6. Toxicity Score (Communalytic)

Figure 6 shows the toxicity score. Based on the implementation outcomes of the Perspective API model to identify toxicity scores from 11,627 out of 13,380 posts, it is discernible that the obtained toxicity metrics provide valuable insights into the nature and extent of harmful language within the content. The data reveal relatively low overall toxicity levels, with a toxicity score of 0.04992 and severe toxicity at 0.00609. Additionally, specific categories such as identity attack, insult, profanity, and threat exhibit varying degrees of prevalence, indicating the diverse manifestations of toxicity within the discourse. These findings underscore the importance of leveraging advanced computational tools to assess and mitigate toxic behavior in online communities, fostering healthier and more respectful digital environments.

Based on the content analysis results, it is evident that content related to the livelihoods of indigenous communities garners significant interest among viewers, as indicated by the outcomes of the toxicity analysis. The findings suggest that discussions surrounding indigenous livelihoods evoke considerable engagement and attention from the audience. This observation underscores the relevance and importance of content focusing on indigenous communities' ways of life, highlighting its potential to stimulate meaningful discourse and awareness among viewers.

Furthermore, the topics deemed acceptable by the audience post-viewing the video are diverse and encompass various aspects of indigenous life. These include discussions on Culture and Customary Values, where administrative processes are highlighted to preserve ancestral traditions, alongside insights into Infrastructure and Daily Life, emphasizing waste disposal and sanitation practices. Agriculture and Gardens are also explored, shedding light on gender roles and access to grain storage. Moreover, Arts and Traditional Skills are depicted through local guides, providing authenticity to the narrative, while Sustainability and Environmental Protection underscore unique earthquake response measures. Additionally, Welfare and Community Empowerment are addressed, emphasizing self-reliance in marriages and households. The video also touches upon traditions and celebrations, showcasing traditional attire and education and learning and demonstrating the integration of learning within household spaces. Finally, Health and Well-being are discussed, showcasing traditional herbal medicine practices and hygiene protocols within the Kampung Naga community, all of which comprehensively portray indigenous life and practices.

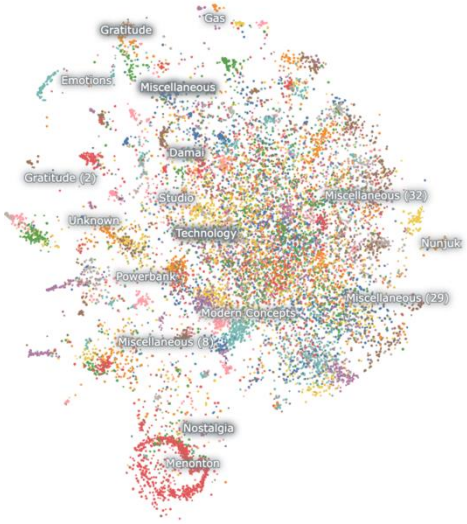

Figure 7. Topic Analysis on Atlas Communalytic)

Figure 7 shows the topic modeling and social network analysis based on the dataset. Based on the outcomes of the topic and social network identification, it is evident that the analysis revealed 8,776 actors and 498 edges within the network. The average degree of connectivity among the actors is calculated at 0.051, with an average weighted degree of 0.057. Additionally, the network's diameter measures 7, indicating the maximum distance between any pair of actors, while the radius stands at 0, suggesting a centralized network structure. Furthermore, the average path length, computed at 2.0312717910207585, signifies the average number of steps required to navigate from one actor to another within the network. These findings provide valuable insights into the social network's structural properties and connectivity dynamics, facilitating a deeper understanding of interaction patterns and information dissemination mechanisms within the analyzed community.

Topic analysis proves beneficial in identifying the factors influencing indigenous communities' coping strategies to sustain their livelihoods. This research gains valuable insights into the coping mechanisms employed by indigenous peoples by scrutinizing various themes prevalent in digital content, such as traditional practices, environmental challenges, economic opportunities, and cultural preservation efforts. This analysis enables a nuanced understanding of the multifaceted nature of indigenous livelihoods and the adaptive strategies employed to navigate the complexities of the digital era, ultimately facilitating the development of more targeted interventions and support mechanisms to bolster indigenous communities' resilience and well-being.

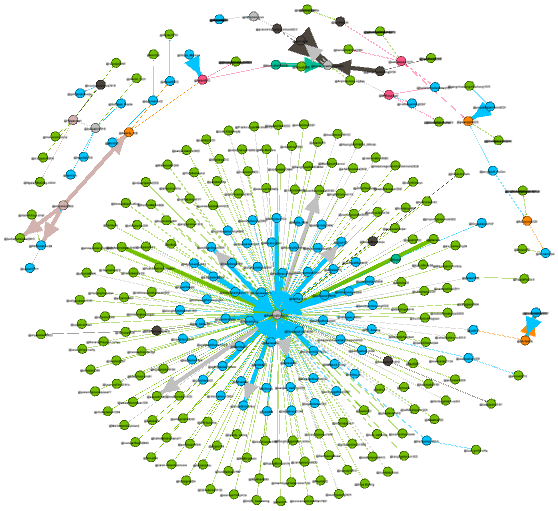

Figure 8. Yifan Hu and Fruchterman Reingold Layout (Gephi)

Figure 8 shows the Yifan Hu and Fruchterman Reingold Visualization. Subsequently, the Social Network Analysis (SNA) calculations reveal several key findings. The modularity score stands at 0.632, indicating the extent to which the network is divided into distinct communities. This modularity score remains unchanged even when considering resolution. Notably, the analysis identifies 8,434 communities within the network, emphasizing its intricate and segmented structure. Moreover, the network interpretation indicates a directed nature, suggesting the presence of specific relationships or hierarchies among actors. In addition, the iterative nature of the analysis, conducted over 100 iterations, demonstrates the rigor and precision employed in the calculation process. Finally, the sum change value of 0.0075888449822659 86 highlights the subtle alterations observed throughout the iterative computations. These SNA findings provide valuable insights into the organizational dynamics and community structures inherent within the analyzed network.

This research is confined to utilizing digital content as a data source for analyzing audience perceptions regarding the livelihood and coping strategies of the indigenous community of Kampung Naga. By focusing on digital content, such as video documentaries and online discussions, as primary data sources, the study aims to capture the multifaceted dimensions of indigenous livelihoods and coping mechanisms within the context of the digital era. This approach enables a comprehensive exploration of how digital media portrays and influences perceptions of indigenous communities' ways of life, thereby contributing to a deeper understanding of their challenges and opportunities.

4. CONCLUSION

In conclusion, based on the implementation outcomes of the Perspective API model to identify toxicity scores from 11,627 out of 13,380 posts, it is discernible that the obtained toxicity metrics provide valuable insights into the nature and extent of harmful language within the content. The data reveal relatively low overall toxicity levels, with a toxicity score of 0.04992 and severe toxicity at 0.00609. Moreover, the identified topics resonate well with the audience, post-viewing the video, highlighting a keen interest in diverse aspects of indigenous life and practices. From discussions on cultural preservation to insights into daily routines, agricultural practices, traditional skills, environmental sustainability, community empowerment, and health practices, the video content comprehensively portrays indigenous life. These findings emphasize the importance of creating and disseminating content that educates, engages, and fosters a deeper appreciation for indigenous cultures and their contributions to societal well-being. Moving forward, leveraging such insights guides the development of more inclusive and culturally sensitive content, promoting greater understanding and respect for indigenous communities in the digital era. Based on the outcomes of the topic and social network

identification, it is evident that the analysis revealed 8,776 actors and 498 edges within the network. The average degree of connectivity among the actors is calculated at 0.051, with an average weighted degree of 0.057. Additionally, the network's diameter measures 7, indicating the maximum distance between any pair of actors, while the radius stands at 0, suggesting a centralized network structure.

ACKNOWLEDGEMENTS
Thanks to the Tourism Department, Faculty of Business Administration and Communication, Research and Community Service Institute (LPPM), and Atma Jaya Catholic University of Indonesia.

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