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Analyzing Public Sentiment on Indonesia's Constitutional Court Post-2024 Election Ruling: Insights from Appraisal Theory and Data Mining

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Keywords

Appraisal System Theory; Institutional Accountability; Political Discourse; Public Sentiment; Sentiment Analysis

Abstract

This study examines public sentiment toward Indonesia's Constitutional Court (Mahkamah Konstitusi, MK) following its 2024 regional election ruling. Using sentiment analysis and Martin and White's (2005) Appraisal Theory, the research investigates emotional, evaluative, and dialogic patterns in public discourse through YouTube comments. A mixed-method approach was adopted by combining qualitative appraisal interpretation with quantitative categorization and machine learning-based sentiment classification, all conducted using the Orange data mining application. Orange was chosen for its visual programming interface, ease of integration between linguistic theory and machine learning workflows, and accessibility for researchers working across disciplines. From 4,010 YouTube comments, 223 relevant entries were filtered and analysed according to the three domains of Appraisal Theory: Attitude (affect, judgment, appreciation), Engagement (monogloss and heterogloss), and Graduation (force and focus), enabling a structured evaluation of public responses. Three machine learning models were employed for sentiment classification within Orange: Naive Bayes, for its speed and efficiency in text classification; Logistic Regression, for its interpretability and robust baseline performance; and Neural Network, for its ability to capture nuanced emotional expressions. Among these, the Neural Network achieved the highest performance (AUC: 0.958; F1 score: 0.853), followed by Logistic Regression (AUC: 0.931; F1: 0.807), and Naive Bayes (AUC: 0.925; F1: 0.802). Each model offered distinct strengths: Neural Network revealed deeper emotional intensity, Logistic Regression emphasized positive affect, and Naive Bayes captured dominant monoglossic tendencies in discourse. The findings reveal a predominance of neutral and moderately positive sentiments, with joy, fear, surprise, and dissatisfaction emerging as key affective responses. The integration of Appraisal Theory and sentiment modeling through Orange demonstrates a systematic and scalable method for interpreting public discourse in digital environments. This research contributes methodologically by bridging qualitative linguistic analysis with accessible data mining tools, and substantively by offering insight into how digital publics engage with constitutional authority. It advances the literature on institutional trust by illustrating how social media serves as a platform for democratic evaluations of judicial decisions.

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Từ khóa

Lý thuyết Hệ thống Đánh giá; Trách nhiệm giải trình của cơ quan; Thảo luận chính trị; Cảm xúc công chúng; Phân tích cảm xúc

Tóm tắt

Nghiên cứu này phân tích thái độ của công chúng đối với Tòa án Hiến pháp Indonesia (Mahkamah Konstitusi, MK) sau phán quyết về cuộc bầu cử địa phương năm 2024. Bằng cách kết hợp phân tích cảm xúc và Lý thuyết Đánh giá của Martin và White (2005), nghiên cứu này khám phá các biểu hiện cảm xúc, đánh giá và đối thoại trong các bình luận YouTube liên quan. Một phương pháp tiếp cận hỗn hợp đã được áp dụng, kết hợp giữa giải thích định tính các lĩnh vực trong Lý thuyết Đánh giá (Thái độ, Sự tham gia và Sự phát triển) với phân loại định lượng dựa trên mô hình học máy, tất cả đều được thực hiện qua phần mềm Orange. Orange được chọn vì khả năng trực quan, dễ tích hợp giữa lý thuyết ngôn ngữ và thuật toán học máy, phù hợp với các nghiên cứu liên ngành. Từ 4.010 bình luận, 223 được lọc và mã hóa theo các lĩnh vực chính: Thái độ (cảm xúc, phán đoán, đánh giá), Sự tham gia (monogloss và heterogloss), và Sự phát triển (sức mạnh và trọng tâm). Ba mô hình được sử dụng: Naive Bayes (hiệu quả xử lý văn bản), Logistic Regression (dễ diễn giải), và Neural Network (nắm bắt biểu cảm phức tạp). Neural Network đạt hiệu suất cao nhất (AUC: 0.958; F1: 0.853), tiếp theo là Logistic Regression và Naive Bayes. Mỗi mô hình đóng góp khác nhau vào việc phát hiện chiều sâu cảm xúc. Kết quả cho thấy cảm xúc trung lập và tích cực vừa phải chiếm ưu thế, phản ánh mối quan tâm và sự phân cực trong đánh giá công chúng đối với quyền lực tư pháp.

1. Introduction

Constitutional Court's (Mahkamah Konsititusi, hereafter called MK) of Indonesia plays a crucial role in safeguarding the Constitution, ensuring laws align with constitutional principles, and protecting citizens' rights. Established in 2003, it reviews laws passed by the House of Representatives and annuls those found conflicting with the Constitution (Safitri & Wibowo, 2023). Additionally, it resolves disputes related to election results, adjudicates impeachment cases against the president or vice president, and protects constitutional rights through judicial reviews. By performing these functions, the MK upholds the rule of law, democracy, and human rights in Indonesia.

In 2023, Indonesia entered a heated political period as the country prepared for a presidential transition. One of the most contentious issues arose from the MK's ruling on the minimum age requirement for presidential and vice-presidential candidates. The ruling partially favoured the petition, allowing Gibran Rakabuming Raka (the prior president' son of Indonesia) to participate in the 2024 presidential election. However, the decision sparked controversy, leading to the resignation of the MK chairman and public dissatisfaction. Firman Noor, researcher of the National Research and Innovation Agency (BRIN), emphasized that the most disadvantaged party is the community, as political dynasties are hijacking democratic system in Indonesia (BBC News, 2023). Further rulings by the MK continued to shape Indonesia's political landscape. On August 20, 2024, the MK addressed the nomination threshold for regional heads, further shifting the political landscape in Indonesia. This ruling helped restore MK's reputation but triggered

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a mass movement known as "Peringatan Darurat Garuda Biru," which became a trending topic on social media, urging citizens to safeguard the 2024 regional elections due to the effort of The House of Representatives revising the Constitutional Court's decision. It further reflected the dynamic interplay between judicial decisions and public sentiment. The public reaction to these rulings shows how people view government accountability and judicial integrity. Analyzing how citizens express approval, criticism, or ambivalence is important. Appraisal theory helps examine the evaluative language used in these discussions.

Previous research has explored the appraisal systems within political discourse. These studies focused on political leaders (Abdulameer, 2021) and heads of state (Adriyadi et al., 2020; Alhudaithy, 2022; Megah S, 2022; Hadi & Masyudi, 2023). Several researchers have specifically applied appraisal theory to the analysis of government policies. Mehmet and Simmons (2019) examined public attitudes toward shark management policies in New South Wales on social media comments. Ayuningsih, Gunawan, and Hermawan (2018) analyzed TikTok videos critiquing local government policies in Indonesia, highlighting dominant negative judgments. Nurjanah (2021) investigated "The Guardian" editorials critiquing UK lockdown policies during COVID-19, revealing negative appraisals of government performance. In comparison, these studies underscore the role of appraisal theory in analyzing public sentiment around government policies.

However, two significant gaps remain: the application of appraisal theory to government institutions, particularly the Constitutional Court (MK), and the integration of appraisal system theory into machine learning tools like Orange for enhanced analysis. While linguistic analysis using Appraisal theory offers valuable insights, recent advancements in machine learning (ML) systems and data analytics provide an opportunity to enhance this research. Specifically, the Orange application, a user-friendly, open-source ML platform, allows researchers to process large datasets efficiently and extract patterns in public sentiment. Despite the growing integration of ML tools in sentiment analysis and political discourse research (e.g., sentiment polarity classification and topic modeling), limited studies have utilized Orange to analyze linguistic appraisals in social media discussions about judicial institutions. This gap underscores the need to integrate appraisal theory with machine learning tools, enabling a more scalable and systematic approach to analyzing evaluative language.

Given the public reaction to the ruling, this study explores how this event has influenced public perception of the MK. By employing Appraisal theory (Martin and White 2005), a subfield of systemic functional linguistics, the study investigates how evaluative language reveals attitudes, judgments, and emotional responses in netizens' comments. The qualitative approach allows for an in-depth analysis of the appraisal system, highlighting the linguistic resources used to express approval, criticism, or ambivalence toward the MK's decision. Data will be collected from the comments section of the YouTube video, *Peringatan Darurat Garuda Biru*, posted by narasinews.com. This

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research provides new insights into public sentiment regarding the MK's role in shaping Indonesia's political landscape. It offers a unique contribution by analyzing public discourse through social media, highlighting how citizens' evaluations of judicial decisions reflect broader democratic concerns and perceptions of institutional integrity.

1. Literature Review

The Appraisal System is an important component within Systemic Functional Linguistics (SFL), a framework developed by M.A.K. Halliday (Halliday & Matthiessen, 2014). This framework explores how language constructs meaning in social contexts. As further elaborated by Martin and White (2005), the appraisal system extends SFL's interpersonal metafunction by focusing on how speakers or writers express attitudes and judgments and engage their audience in various evaluative stances. This system deals primarily with text evaluation and is divided into three subsystems: Attitude, Engagement, and Graduation. Each subsystem offers distinct insights into how language reflects and shapes social interactions.

1.1 Attitude

Attitude concerns how speakers or writers express emotions, feelings, and evaluations. Martin and White (2005) classify Attitude into three categories: Affect, Judgment, and Appreciation. Affect refers to emotional responses (Dis/Inclination, Un/Happiness, In/Security, and Dis/Satisfaction), Judgement evaluates human behaviour in terms of ethics and morality (Social Esteem and Social Sanction), while Appreciation deals with the evaluation of objects, processes, or phenomena (Reaction, Composition, and Valuation). The main contribution of Attitude is its ability to distinguish between subjective emotional expressions and objective evaluations, revealing how personal bias or neutrality is conveyed in discourse.

This subsystem is crucial in uncovering how speakers project empathy, authority, or criticism. For instance, political leaders often use affective language to connect emotionally with the public, while judgments can reinforce ideological positions (Alhabib & Arabia, 2020; Alhudaithy, 2022; Simanjuntak, 2022). Research applying Attitude analysis to government communication has revealed how leaders strategically frame policy decisions by emphasizing social values or national pride, shaping public perception (Sekarsari et al., 2024). In this study, Attitude provides insight into how the public reacts to rulings by the Constitutional Court. By analyzing emotional responses, moral assessments, and evaluations of judicial decisions, Attitude reveals underlying feelings of approval, dissatisfaction, or distrust.

1.2 Engagement

While Attitude focuses on expressing evaluations and emotions, Engagement examines how speakers or writers position themselves concerning the voices or opinions of others. It involves dialogic positioning, where language acknowledges alternative

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viewpoints (heteroglossia) or presents a stance as authoritative and unchallengeable (monoglossia). Martin and White (2005) identify resources such as modality, concession, and projection, which allow for varying levels of alignment or misalignment with other perspectives. Engagement's contribution lies in mapping the dialogic space within a text, showing how authors manage disagreement, agreement, and neutrality. This subsystem is particularly significant in argumentative and persuasive texts, highlighting strategies for building consensus or suppressing dissenting views.

Engagement analysis has been instrumental in examining speeches, debates, and official statements in political contexts. For example, research into presidential addresses has demonstrated how leaders use concessive language to acknowledge opposing views while reinforcing their stance, creating an impression of fairness and balance (Mesu, 2022). Similarly, engagement markers in parliamentary debates illustrate how politicians align with or challenge opposing parties, influencing the construction of collective ideologies (Abubakar & Omowunmi, 2023). In the context of this study, Engagement helps explore how public discourse on platforms like YouTube either invites alternative viewpoints or suppresses dissent regarding the Constitutional Court's rulings. Analyzing Engagement, we can better understand how various voices are represented or marginalized in public discourse.

1.3. Graduation

Graduation refers to how evaluations are intensified or softened. It allows speakers to scale their appraisals by strengthening or weakening the force of their evaluations or by sharpening or softening the focus. Graduation operates along two axes: Force, which deals with the intensity (e.g., slightly happy vs. extremely happy), and Focus, which refers to the clarity or preciseness of categories (e.g., definitely true vs. somewhat true). Graduation's contribution is its role in amplifying or downplaying statements' emotional and rhetorical weight, influencing the perceived strength of arguments. This subsystem is critical in literary and political discourse, where subtle shifts in intensity can alter a text's persuasiveness or dramatic effect.

In political discourse, Graduation can intensify nationalistic rhetoric during campaigns or soften critiques to avoid alienating certain voter groups. For instance, election speeches often escalate emotional appeals to foster solidarity with the audience, while official government reports may use tempered language to downplay risks, fostering a sense of stability. In this study, Graduation provides insights into how public sentiment toward the Constitutional Court is expressed. For example, analyzing how evaluations of the Court's rulings are framed in online discussions can reveal the intensity of support or opposition. Graduation also helps us understand how discourse may be softened or intensified depending on political or social contexts, influencing the perceived strength of public opinion.

The Appraisal System within SFL offers a comprehensive framework for analyzing how language expresses evaluations, negotiates social relationships, and positions

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speakers or writers to their audience. Through its subsystems—Attitude, Engagement, and Graduation—the Appraisal System reveals the dynamic nature of meaning-making in various social, cultural, and political contexts. This research will provide valuable insights into how the public evaluates the performance of government institutions. The study will highlight the nuanced ways attitudes and judgments are embedded in discourse by analyzing public statements in YouTube comments. This research will also shed light on how evaluative language is strategically used to influence public perception, frame accountability, and manage ideological positions, shaping narratives around institutional effectiveness and policy outcomes.

2. Research Design and Methodology

This research employed a mixed-method approach to explore public perceptions of the Constitutional Court's (MK) rulings following the 2024 regional election decision. While the study is grounded in qualitative appraisal analysis, its interpretive insights are enhanced by the integration of quantitative sentiment classification using machine learning models in the Orange data mining application. The qualitative component is essential for capturing nuanced emotions, judgments, and language patterns expressed by individuals in response to a legal decision. In contrast to purely statistical approaches, this framework allows a deeper understanding of the motivations and evaluative stances underpinning public opinion.

The methodology follows the framework of Appraisal Theory (Martin & White, 2005), a subfield of Systemic Functional Linguistics (SFL), which analyzes the sentiment, judgment, and appreciation expressed in the language of social media comments. This theoretical lens is particularly effective for this study because it provides a structured means to categorize emotional and evaluative responses to a controversial legal ruling. The use of Orange enables not only the classification of sentiment polarity but also the quantification of appraisal categories, thereby supporting a more systematic and scalable interpretation of evaluative discourse.

3.1 Data Collection

The data for this study was collected from the YouTube video titled *Peringatan Darurat Garuda Biru*, posted by narasinews.com. YouTube was selected as the platform for data collection because of its large, diverse user base and the opportunity it provides to capture public opinion on current issues in real-time. The video's comments section was chosen because it specifically addresses the issue at hand—the Constitutional Court's decision on the 2024 regional elections—and has attracted significant public Engagement. The video's popularity, with 4,010 comments at the time of extraction, makes it a suitable data source for analyzing public sentiment.

The website-based application exportcomments.com was used to extract the data on August 23, 2024. This tool was chosen for its ability to efficiently collect large numbers of comments from YouTube videos in an organized format. All 4,010 comments were

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extracted into an Excel spreadsheet for initial review using this tool. Automation allowed for the extraction of comments systematically, ensuring the data collection process was both time-efficient and transparent.

3.2 Data Reduction

The next step involved filtering the extracted comments to ensure they were relevant to the research objective. Comments were reviewed manually to identify those explicitly referencing the Constitutional Court (MK) or the term "Mahkamah Konstitusi." These keywords were chosen because they directly relate to the subject of the 2024 regional election ruling. Comments not containing these terms or those unrelated to MK were excluded from the dataset.

The final dataset, consisting of 223 comments, reflects diverse opinions, capturing a more nuanced representation of public sentiment toward MK's decision. While this sample size is relatively small compared to the original dataset, it was selected to ensure that each comment could be carefully analyzed and categorized according to the appraisal system. The comments were not selected randomly but filtered to ensure they were directly relevant to the Constitutional Court's ruling, thus maintaining focus on the research question.

3.3 Data Preparation

The refined dataset was prepared for analysis using the Orange application. It involved structuring the data in a manner that aligns with the categories of Appraisal Theory. The dataset included 223 comments that were manually categorized according to the theoretical framework, which includes dimensions such as Attitude (Affect, Judgment, and Appreciation), Engagement (Monogloss and various types of Heterogloss such as Disclaim, Proclaim, Entertain, and Attribute), and Graduation (Force and Focus). Each category was further divided into positive and negative sentiment indicators, and specific instances were coded to reflect the intensity or focus of sentiment.

To facilitate the analysis, a training dataset was constructed comprising 1,500 entries across the various categories mentioned above. Each category contained 100 entries, ensuring a balanced representation of sentiments and providing a robust foundation for the analysis. This categorization allows for a detailed assessment of how the public engages with the issue of the Constitutional Court's ruling, and the structured nature of the dataset enables systematic sentiment analysis through the Orange application.

3.4 Sentiment Analysis

The sentiment analysis process utilized the Appraisal Theory framework to identify the sentiment expressed in each comment. Using the Orange application, the data was classified into the different categories of appraisal. The analysis aims to identify patterns in how the public expressed positive and negative sentiments towards MK's decision. The analysis also included the calculation of appraisal polarity to quantify the sentiment

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expressed in each comment. In addition to polarity scores, the appraisal domains—Attitude, Engagement, and Graduation—were also quantified based on their frequency of occurrence. This numerical representation of evaluative categories enabled structured comparisons across models and deepened the interpretive validity of the qualitative findings. It provided a more structured and objective means of assessing public opinion beyond mere qualitative interpretation. The following outlines the steps for data analysis using Orange:

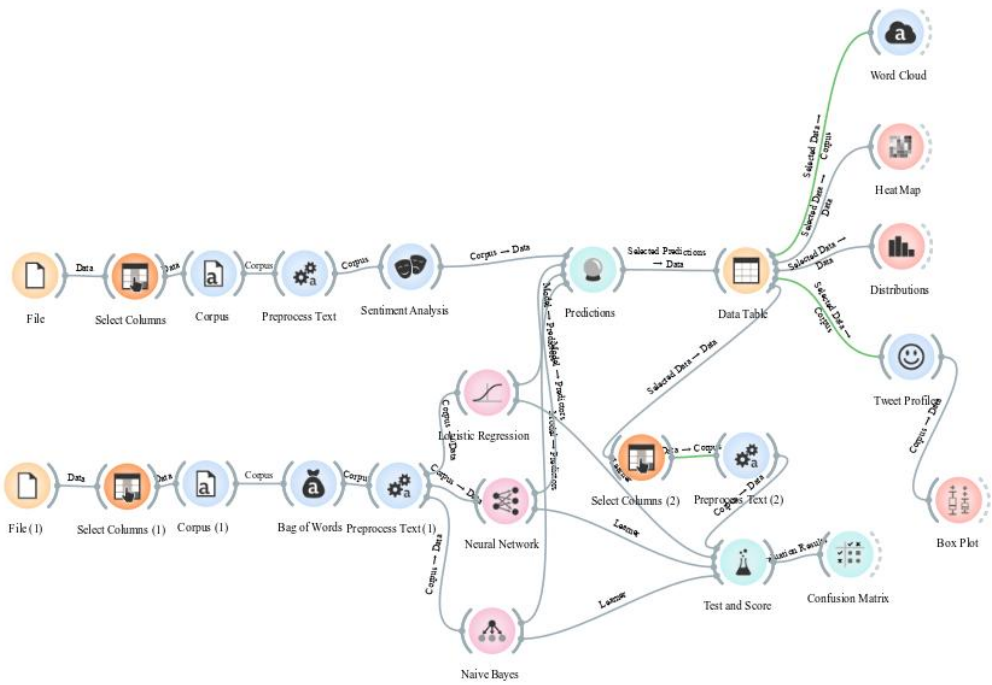


Figure 1. Orange application usage flow

Figure 1 displays the sequential steps employed in the analysis, starting from data input, preprocessing, and sentiment classification, to advanced modeling with logistic regression, neural networks, and Naive Bayes classifiers. Key visualization tools such as word clouds, heat maps, and box plots were used to interpret the data, while metrics like confusion matrices and test scores validated the model's performance. The workflow depicted in Figure 1 demonstrates the systematic use of machine learning algorithms combined with Appraisal Theory to analyze public sentiment toward the Constitutional Court's ruling. It highlights the integration of preprocessing, sentiment analysis, and model validation to ensure accurate and meaningful insights.

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Available Online at https://www.asjp.cerist.dz/en/Articles/155

3.4 Justification for Procedures

The choice of methods, including data collection from social media and applying Appraisal Theory, was specifically tailored to the research objectives. The qualitative approach, combined with the Appraisal Theory framework, offers a comprehensive view of public sentiment, capturing emotional and evaluative responses. Sentiment analysis using this approach allows the research to quantify complex emotions and judgments, facilitating a deeper understanding of public opinion regarding MK's ruling.

The procedures for categorizing comments and applying sentiment analysis are designed to enhance transparency and replicability. The dataset was carefully curated to ensure relevance, and the categorization process is rooted in a well-established theoretical framework. Additionally, by using a tool like Orange, the analysis benefits from the ability to handle large datasets while focusing on the detailed categorization of sentiments. This integration of qualitative interpretation and quantitative modeling within the Orange platform reinforces the study's mixed-method design. It enables both in-depth analysis of evaluative meaning and empirical validation through sentiment classification performance and appraisal frequency distribution.

3.6 Ethical Considerations

Although the comments used in this study are publicly available on YouTube, ethical considerations remain important. All data was anonymized to ensure that individual users' privacy was respected. Furthermore, no personally identifiable information was included in the analysis. The study adhered to ethical guidelines regarding publicly available data, ensuring that sensitive or potentially harmful content was not disseminated. As the comments were publicly posted by individuals who did not express any expectation of privacy, the ethical concerns primarily related to ensuring that the analysis respected the dignity of the commenters and adhered to standard academic research practices.

3.7 Reliability and Validation

In machine learning, reliability refers to the consistency of a model's performance when applied to different datasets or under varying conditions, while validity indicates how well the model measures what it is intended to predict. Using the Orange application, a popular data mining and visualization tool, users can easily assess both reliability and validity through its intuitive interface and rich set of machine learning widgets (Mittal et al., 2023). For example, Orange allows users to perform cross-validation to ensure the model produces consistent results across multiple data subsets, enhancing reliability. Tools like ROC analysis and confusion matrices also help determine the model's accuracy and relevance, validating its predictions. This combination of visualization and analysis enables users to refine their models iteratively, fostering a better understanding of data patterns and boosting overall model performance.

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3.8 Data Analysis Techniques

Various sentiment classification models and algorithms were employed within the Orange application to analyze the dataset. These models enabled the categorization of comments based on the appraisal system and allowed for identifying specific patterns and trends in public sentiment. Statistical tests were applied to identify significant sentiment shifts or trends across different categories of comments. The goal was to uncover deeper insights into how the public perceived the Constitutional Court and its ruling, focusing on their comments' emotional and evaluative language.

3.9 Limitations

The use of YouTube comments as the sole data source introduces potential bias, as it only represents the views of YouTube users, who may not be fully representative of the general population. Furthermore, interpreting sentiment from short, context-limited comments presents challenges in accurately capturing the nuances of public opinion. These limitations are addressed through careful data reduction, but they should be kept in mind when interpreting the findings.

3. Results and Discussion

Based on the research findings, the public expressed varied opinions regarding MK and its role in the 2024 regional election decision. Some individuals supported MK's decision, viewing it as an appropriate exercise of authority. In contrast, others argued that MK overstepped its boundaries, asserting it lacks the authority to create laws and regulations. Figure 1 illustrates the analysis results processed with the Orange application.

Figure 2 illustrates the distribution of public emotions toward the Constitutional Court (MK) as expressed in YouTube comments. The evaluation scale spans from anger to surprise, ranging between -2.108 and 3.383. These emotions are categorized as follows: anger (7), disgust (6), fear (14), joy (150), sadness (3), and surprise (43). The data reveals a significant prevalence of joy, indicating that many commenters view MK's actions positively. However, other emotions such as surprise and fear also appear notably, suggesting mixed reactions and highlighting an underlying complexity in public perception. The lower frequencies of anger, disgust, and sadness reflect that these negative sentiments, while present, are less dominant in the overall sentiment landscape. The x-axis represents the sentiment evaluation scale, ranging between -2.108 and 3.383, providing insights into the distribution and intensity of emotions within the dataset.

The dominance of "joy" in the sentiment analysis reflects a generally positive public perception of the MK's rulings, particularly among commenters who support the decisions. Conversely, the presence of "fear" and "surprise" reveals underlying concerns and uncertainties, potentially reflecting apprehensions about the implications of the rulings. The lower frequencies of "anger," "disgust," and "sadness" suggest that while negative emotions are present, they do not dominate the discourse. This mixed emotional

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response underscores the complexity of public reactions and the need for nuanced analysis of sentiment dynamics.

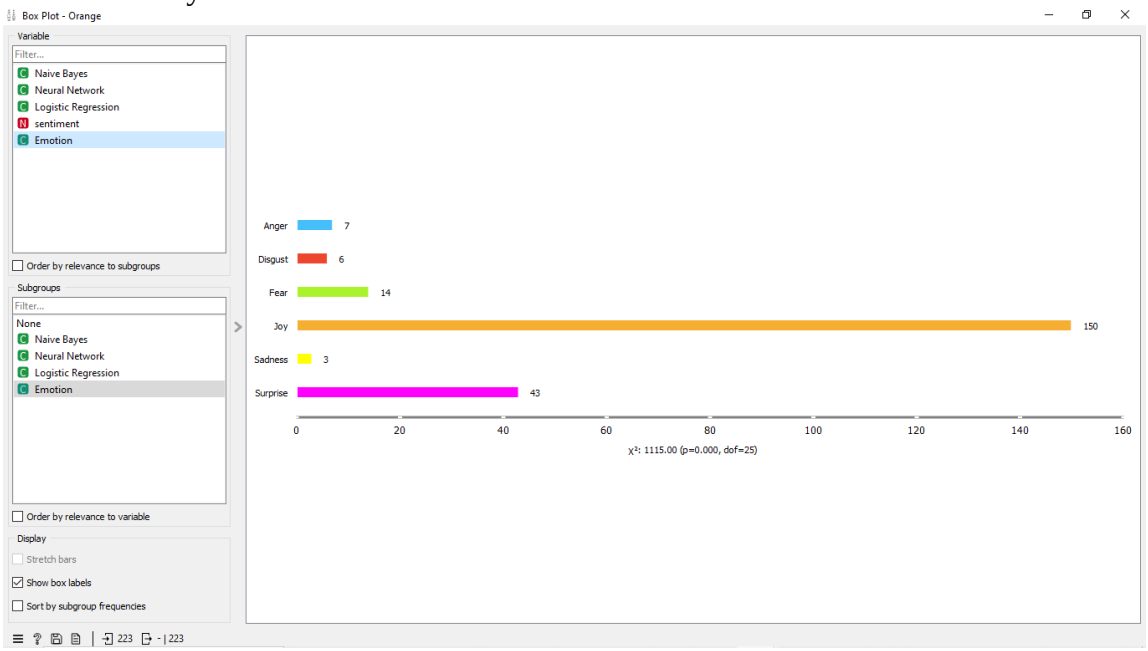


Figure 2. Public Emotions



Figure 3. Word Cloud

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Additionally, Figure 3 displays a word cloud generated from the dataset, highlighting the various perspectives from the YouTube community concerning MK and its performance. The most frequently mentioned term is "MK" (344), followed by commonly used terms such as "yg" (abbreviation for "yang") (183), "DPR" (172), and "putusan" (91). Other significant terms include "rakyat" (86), "keputusan" (82), "partai" (49), "pilkada" (45), and colloquial expressions like "gak" (44), "nya" (44) and "aja" (42). Further mentions of "negara" (42), "jokowi" (40), "presiden" (39), "demo" (34), "uu" (32), "aturan" (30), "kaesang" (28), and "undang" (28) reflect the broader themes discussed within the community, including opinions on government actions, political figures, legislative matters, and public protests. This word cloud underscores the complexity and breadth of public discourse on MK, highlighting specific references to legal decisions and broader political commentary.

The word cloud provides a nuanced overview of public discourse, with the dominance of terms like "MK," "putusan," and "rakyat" reflecting a strong focus on the Constitutional Court's decisions and their perceived impact on citizens. References to political figures and institutions, such as "DPR," "Jokowi," and "partai," underscore the intertwined nature of legal rulings and political processes. The presence of terms related to public protests, such as "demo" and "aturan," highlights the public's active engagement and concerns about democratic processes and accountability. The frequent use of colloquial terms ("gak," "aja") also reveals the informal and accessible nature of online discussions, reflecting how digital platforms democratize political discourse.

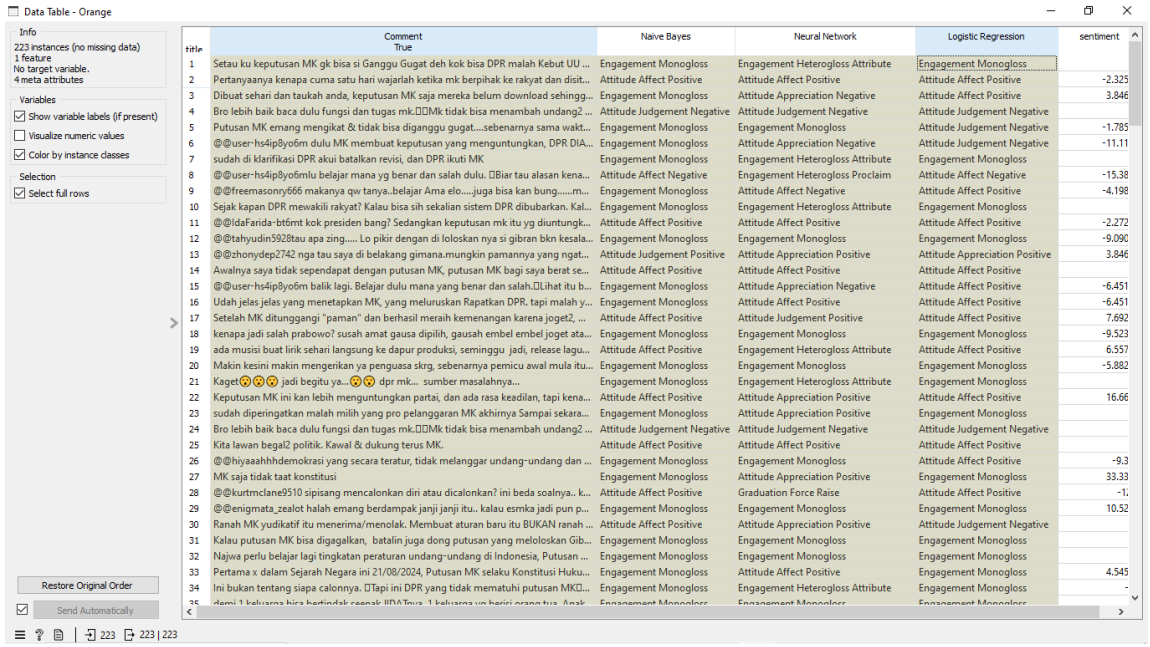


Figure 4. Heat Map

The data analysis, represented by a heat map plot in Figure 4, reveals that positive sentiment scores 33, while negative sentiment scores 50. This score indicates a two-sided

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public perception, reflecting both positive and negative views on the topic. However, despite both sentiments, positive sentiment appears to be slightly more prevalent than negative sentiment, highlighting a nuanced public response. This finding underscores the contentious nature of the Constitutional Court's rulings, which have elicited mixed reactions. The presence of strong negative scores indicates dissatisfaction or criticism, possibly driven by concerns over judicial impartiality or political interference. Conversely, the relatively high positive sentiment scores suggest that a segment of the public views the MK's actions as justified or beneficial. This duality underscores the need for further exploration into the factors shaping public opinion, particularly in the context of Indonesia's sociopolitical landscape.



	Comment True	Naive Bayes	Neural Network	Logistic Regression	sentiment
1	Setau ku keputusan MK gk bisa si Ganggu Gugat deh kok bisa DPR malah Kebut UU ...	Engagement Monogloss	Engagement Heterogloss Attribute	Engagement Monogloss	
2	Pertanyaanya kenapa cuma satu hari wajarlah ketika mk berpihak ke rakyat dan disit...	Attitude Affect Positive	Attitude Affect Positive	Attitude Affect Positive	-2.325
3	Dibuat sehari dan taukah anda, keputusan MK saja mereka belum download sehingg...	Engagement Monogloss	Attitude Appreciation Negative	Attitude Affect Positive	3.846
4	Bro lebih baik baca dulu fungsi dan tugas mk.□□Mk tidak bisa menambah undang2 ...	Attitude Judgement Negative	Attitude Judgement Negative	Attitude Judgement Negative	
5	Putusan MK emang mengikat & tidak bisa diganggu gugat....sebenarnya sama wakt...	Engagement Monogloss	Engagement Monogloss	Attitude Judgement Negative	-1.785
6	@@user-hs4ip8yo6m dulu MK membuat keputusan yang menguntungkan, DPR DIA...	Engagement Monogloss	Attitude Appreciation Negative	Attitude Judgement Negative	-11.11
7	sudah di klarifikasi DPR akui batalkan revisi, dan DPR ikuti MK	Engagement Monogloss	Engagement Heterogloss Attribute	Engagement Monogloss	
8	@@user-hs4ip8yo6mlu belajar mana yg benar dan salah dulu. □Biar tau alasan kena...	Attitude Affect Negative	Engagement Heterogloss Proclaim	Attitude Affect Negative	-15.38
9	@@freemasonry666 makanya qw tanya..belajar Ama elo.....juga bisa kan bung.....m...	Engagement Monogloss	Attitude Affect Negative	Attitude Affect Positive	-4.198
10	Sejak kapan DPR mewakili rakyat? Kalau bisa sih sekalian sistem DPR dibubarkan. Kal...	Engagement Monogloss	Engagement Heterogloss Attribute	Engagement Monogloss	
11	@@IdaFarida-bt6mt kok presiden bang? Sedangkan keputusan mk itu yg diuntungk...	Attitude Affect Positive	Attitude Affect Positive	Attitude Affect Positive	-2.272
12	@@tahyudin5928tau apa zing..... Lo pikir dengan di loloskan nya si gibran bkn kesala...	Engagement Monogloss	Engagement Monogloss	Engagement Monogloss	-9.090
13	@@zhonydep2742 nga tau saya di belakang gimana.mungkin pamannya yang ngat...	Attitude Judgement Positive	Attitude Appreciation Positive	Attitude Appreciation Positive	3.846
14	Awalnya saya tidak sependapat dengan putusan MK, putusan MK bagi saya berat se...	Attitude Affect Positive	Attitude Affect Positive	Attitude Affect Positive	
15	@@user-hs4ip8yo6m balik lagi. Belajar dulu mana yang benar dan salah.□Lihat itu b...	Engagement Monogloss	Attitude Appreciation Negative	Attitude Affect Positive	-6.451
16	Udah jelas jelas yang menetapkan MK, yang meluruskan Rapatkan DPR. tapi malah y...	Engagement Monogloss	Attitude Affect Positive	Attitude Affect Positive	-6.451
17	Setelah MK ditunggangi "paman" dan berhasil meraih kemenangan karena joget2, ...	Attitude Affect Positive	Attitude Judgement Positive	Attitude Affect Positive	7.692
18	kenapa jadi salah prabowo? susah amat gausa dipilih, gausah embel embel joget ata...	Engagement Monogloss	Engagement Monogloss	Engagement Monogloss	-9.523
19	ada musisi buat lirik sehari langsung ke dapur produksi, seminggu jadi, release lagu...	Attitude Affect Positive	Engagement Heterogloss Attribute	Attitude Affect Positive	6.557
20	Makin kesini makin mengerikan ya penguasa skrg, sebenarnya pemicu awal mula itu...	Engagement Monogloss	Engagement Monogloss	Engagement Monogloss	-5.882
21	Kaget😵😵😵 jadi begitu ya...😵😵 dpr mk... sumber masalahnya...	Engagement Monogloss	Engagement Heterogloss Attribute	Engagement Monogloss	
22	Keputusan MK ini kan lebih menguntungkan partai, dan ada rasa keadilan, tapi kena...	Attitude Affect Positive	Attitude Appreciation Positive	Attitude Affect Positive	16.66
23	sudah diperingatkan malah milih yang pro pelanggaran MK akhirnya Sampai sekara...	Engagement Monogloss	Attitude Appreciation Positive	Engagement Monogloss	
24	Bro lebih baik baca dulu fungsi dan tugas mk.□□Mk tidak bisa menambah undang2 ...	Attitude Judgement Negative	Attitude Judgement Negative	Attitude Judgement Negative	
25	Kita lawan begal2 politik. Kawal & dukung terus MK.	Attitude Affect Positive	Attitude Affect Positive	Attitude Affect Positive	
26	@@hiyaaahhhdemokrasi yang secara teratur, tidak melanggar undang-undang dan ...	Engagement Monogloss	Engagement Monogloss	Attitude Affect Positive	-9.3
27	MK saja tidak taat konstitusi	Engagement Monogloss	Attitude Appreciation Positive	Engagement Monogloss	33.33
28	@@kurtmclane9510 sipisang mencalonkan diri atau dicalonkan? ini beda soalnya.. k...	Attitude Affect Positive	Graduation Force Raise	Attitude Affect Positive	-1.
29	@@enigmata_zealot halah emang berdampak janji janji itu.. kalau esmka jadi pun p...	Engagement Monogloss	Engagement Monogloss	Engagement Monogloss	10.52
30	Ranah MK yudikatif itu menerima/menolak. Membuat aturan baru itu BUKAN ranah ...	Attitude Affect Positive	Attitude Appreciation Positive	Attitude Judgement Negative	
31	Kalau putusan MK bisa digagalkan, batalin juga dong putusan yang meloloskan Gib...	Engagement Monogloss	Engagement Monogloss	Engagement Monogloss	
32	Najwa perlu belajar lagi tingkatan peraturan undang-undang di Indonesia, Putusan ...	Engagement Monogloss	Engagement Monogloss	Engagement Monogloss	
33	Pertama x dalam Sejarah Negara ini 21/08/2024, Putusan MK selaku Konstitusi Huku...	Engagement Monogloss	Attitude Affect Positive	Engagement Monogloss	4.545
34	Ini bukan tentang siapa calonnya. □Tapi ini DPR yang tidak mematuhi putusan MK□...	Engagement Monogloss	Engagement Heterogloss Attribute	Engagement Monogloss	-
35	demi 1 keluarga bisa bertindak seenak □□Anya, 1 keluarga yg berisi orang tua, Anak...	Engagement Monogloss	Engagement Monogloss	Engagement Monogloss	

Figure 5. Data Analysis

The dataset, as shown in Figure 5, was extracted and analyzed using the Orange application, yielding a refined sample of 223 entries that form the core data of this study. The dataset presented in the Orange application categorizes comments into various sentiment and engagement types, covering a wide range of categories such as Attitude Affect (Positive and Negative), Attitude Judgement (Positive and Negative), and Attitude Appreciation (Positive and Negative). It also includes Engagement Monogloss and several types of Heterogloss, such as Disclaim, Proclaim, Entertain, and Attribute. Furthermore, the analysis encompasses Graduation aspects, including Force (Raise and Lower) and Focus (Sharpen and Soften). This comprehensive categorization enables a nuanced analysis of public sentiment and Engagement, capturing the comments' varied emotional and evaluative expressions.

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The dataset visualized in Figure 5 exemplifies the systematic categorization enabled by the Orange application, which integrates Appraisal Theory into machine learning workflows. The distribution of categories such as Attitude Judgment and Engagement types reveals a significant presence of evaluative language that either critiques or supports the Constitutional Court's decisions. Notably, the inclusion of Graduation aspects highlights the intensity and focus of sentiments, providing insights into how strongly netizens feel about specific rulings. This nuanced dataset underscores the value of combining linguistic frameworks with machine learning tools to uncover patterns in public sentiment, ultimately contributing to a richer understanding of societal attitudes toward judicial institutions.

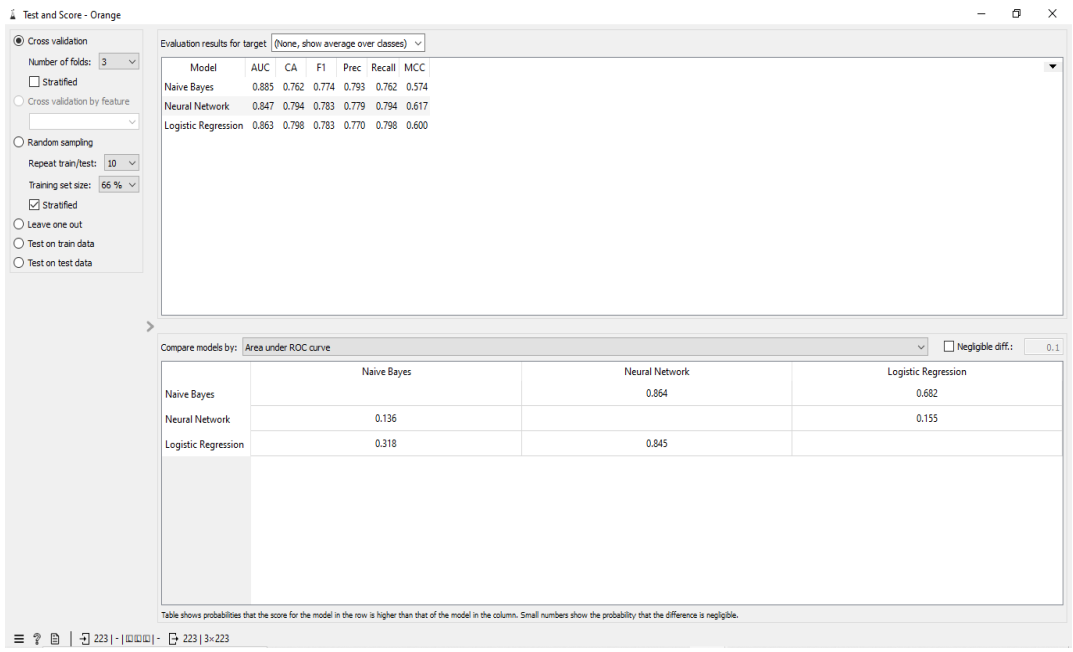


Figure 6. Model Evaluation on Naive Bayes, Neural Network, and Logistic Regression

The image displays the results of a model evaluation using the Orange application, where three machine learning models—Naive Bayes, Neural Network, and Logistic Regression—were assessed for their performance on a sentiment analysis task. The evaluation metrics shown include AUC (Area Under the ROC Curve), CA (Classification Accuracy), F1 score, Precision, Recall, and MCC (Matthews Correlation Coefficient). The Neural Network model achieved the highest AUC score (0.947), reflecting its superior ability to distinguish between classes. Logistic Regression followed closely with an AUC of 0.863, and Naive Bayes achieved 0.885. Regarding Classification Accuracy, F1 score, and Precision, the Neural Network and Logistic Regression models performed similarly, with scores close to 0.79. Logistic Regression achieved the highest MCC score (0.600),

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indicating robust performance in handling imbalanced data. Additionally, a comparison of models by AUC shows that the Neural Network significantly outperformed the Naive Bayes and Logistic Regression models with probabilities of 0.864 and 0.845, respectively.

The evaluation metrics (Figure 6) underscore the effectiveness of the Neural Network model in sentiment classification tasks, achieving the highest AUC (0.947), which indicates excellent discriminative power. Its strong performance across metrics such as Classification Accuracy and Precision suggests that it effectively captures the complexity of evaluative language. While slightly behind in AUC, the Logistic Regression model excelled in MCC (0.600), highlighting its reliability in handling imbalanced data scenarios, which are common in sentiment datasets. Although naive Bayes achieves a slightly lower AUC and MCC, it remains a simpler yet reasonably effective option. These findings emphasize the suitability of Neural Networks for nuanced sentiment analysis while validating the applicability of Logistic Regression for robust performance in similar tasks.

Table 1. *Model Performance Comparison*

Model	AUC	CA	F1	Prec	Recall	MCC
Naive Bayes	0.925	0.794	0.802	0.819	0.794	0.626
Neural Network	0.958	0.852	0.853	0.859	0.852	0.730
Logistic Regression	0.931	0.821	0.807	0.794	0.821	0.650

Table 1 shows an evaluation summary for three machine learning models—Naive Bayes, Neural Network, and Logistic Regression—used in the Orange application to classify data. Each model's performance is evaluated using several metrics: AUC (Area Under the ROC Curve), CA (Classification Accuracy), F1 score, Precision, Recall, and MCC (Matthews Correlation Coefficient).

The Neural Network model achieved the highest AUC score at 0.958, indicating strong discriminative power, followed by Logistic Regression at 0.931 and Naive Bayes at 0.925. Regarding Classification Accuracy, the Neural Network performed slightly better, with a score of 0.852, compared to Logistic Regression (0.821) and Naive Bayes (0.794). The F1 score, Precision, and Recall for all three models are comparable, with the Neural Network model having a slight edge in F1 (0.859) and Precision (0.852), suggesting consistent performance in both positive and negative classifications.

Although Logistic Regression performed slightly better than Naive Bayes in most metrics, it excelled particularly in MCC, achieving 0.650 compared to Naive Bayes' 0.626. This suggests that Logistic Regression had a stronger correlation between predicted and actual values. Overall, the Neural Network emerged as the most effective model for the classification task, demonstrating the best performance across AUC, CA, F1, and Precision. However, Logistic Regression also showed reliable and comparable results, making it a viable alternative for scenarios where interpretability or simplicity is

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prioritized. Naive Bayes, while slightly lagging in performance metrics, may still be a suitable option for simpler implementations or when computational resources are constrained.

4. 1 Public Sentiment Analysis towards MK

The YouTube account managed by narasinews.com has become a focal point for netizens, where individuals express both support and dissent regarding the content shared, particularly its portrayal of Indonesia's current state. While many in the community disagree with the viewpoints presented in these videos, this research narrows its focus to comments specifically concerning the Constitutional Court (MK) and its performance. Although broader issues are discussed within the comments, this study hones in on opinions about MK's authority and recent decisions, allowing for a deeper analysis of public sentiment toward MK amidst the varied responses on other national matters.

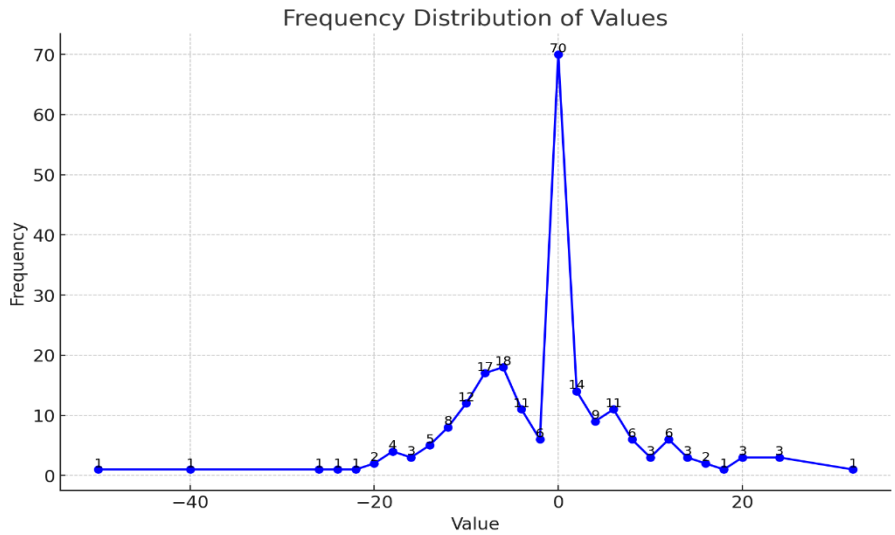


Figure 7. Sentiment Analysis Frequency

Figure 7 summarizes the frequency distribution of values derived from sentiment analysis of YouTube comments on Constitutional Court's (MK) recent decision regarding the 2024 regional elections. The x-axis represents the range of sentiment values, spanning from negative (dissatisfaction) to positive (support), while the y-axis illustrates the frequency of comments for each value. A prominent feature of the distribution is the sharp peak at zero, indicating that the majority of comments express a neutral or balanced sentiment toward MK's decision. This suggests that a significant portion of the public either refrains from expressing strong opinions or holds mixed views on the issue.

On the left side of the graph, the spread of negative sentiment values reflects criticism or dissatisfaction with MK's decision. However, the frequency of such comments diminishes as the values move further into the extreme negative range. Conversely, on the

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right side, positive sentiment values indicate supportive or favorable comments, although their frequency is noticeably lower than that of neutral sentiments. The frequency of positive comments also declines gradually as the values move further right, representing extreme positivity. Overall, the distribution is relatively symmetric around the neutral peak, showing a balanced spread of both positive and negative sentiments. However, the dominance of neutral sentiments highlights the cautious or mixed reactions of the public toward MK's decision, reflecting a nuanced and diverse appraisal within the broader public discourse.

4.2 Public Appraisal on MK after ruling the 2024 regional elections

Table 2. *Learning Model Comparison*

Category	Naive Bayes	Neural Network	Logistic Regression
Attitude Affect Negative	13	34	24
Attitude Affect Positive	50	46	58
Attitude Judgement Negative	7	9	14
Attitude Judgement Positive	1	3	0
Attitude Appreciation Negative	0	6	2
Attitude Appreciation Positive	0	9	1
Engagement Heterogloss Attribute	3	28	0
Engagement Heterogloss Disclaim	0	2	0
Engagement Heterogloss Proclaim	0	4	0
Engagement Heterogloss Entertain	0	0	0
Engagement Monogloss	145	58	122
Graduation Force Lower	1	2	0
Graduation Force Raise	3	15	0
Graduation Focus Sharpen	0	7	0
Graduation Focus Soften	0	0	2
Total	223	223	223

Based on the appraisal system theory (Martin and White, 2005), Table 2 outlines the application of three learning models—Naive Bayes, Neural Network, and Logistic Regression—to analyze sentiment across YouTube comments regarding the Constitutional Court's (MK) decision on the 2024 regional elections. Each model

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interprets evaluative language through the appraisal framework, focusing on three main domains: Attitude, Engagement, and Graduation.

- ***Attitude***

This domain captures the emotional stance within public comments, divided into Affect (emotions), Judgement (ethical evaluations), and Appreciation (valuations of objects or phenomena). Positive and negative appraisals within each category reveal how MK's decision is perceived. For instance, Neural Network recorded 34 instances of "Attitude Affect Negative" compared to 13 for Naive Bayes and 24 for Logistic Regression, suggesting a greater sensitivity to discontent. In the "Attitude Affect Positive" category, Logistic Regression recorded 58 instances, the highest among the models. It indicates a tendency to capture favourable sentiment more frequently.

- ***Engagement***

The Engagement domain captures how speakers align or distance themselves from various perspectives, with categories such as Heterogloss (open acknowledgement of other voices) and Monogloss (uncontested statements). Here, Naive Bayes displays the highest Monogloss frequency at 145, suggesting an interpretation where statements are largely taken as self-contained opinions without engaging alternative perspectives. By contrast, Neural Network shows higher Engagement with diverse views in Heterogloss Attribute (28 instances), indicating more sensitivity to comments that acknowledge or attribute other voices and opinions.

- ***Graduation***

Graduation, which modulates the force or focus of an expression, highlights how strongly attitudes are expressed. Here, Neural Network shows a pronounced presence in Graduation Force Raise with 15 instances and Graduation Focus Sharpen with 7 instances, indicating a stronger or more intensified expression of sentiment. In contrast, Logistic Regression records 0 instances across both Graduation Force Raise and Focus Sharpen, potentially interpreting public comments with more restraint and subdued force in sentiment expression.

This analysis, grounded in the appraisal system theory, provides insight into how evaluative language is applied across different learning models. It highlights how attitudes, Engagement, and graduation values shape the framing of MK's actions in public opinion, potentially influencing public narratives and perceptions of institutional accountability and policy outcomes.

The results of this study contribute to the existing literature on public sentiment analysis in political discourse by examining the appraisal system (Martin James & White, 2005) in community responses to the Constitutional Court (MK). This research not only provides theoretical insights but also has practical implications for policymakers and the Constitutional Court. By understanding the public's emotional and evaluative responses

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to MK's decisions, policymakers or government can design more transparent and inclusive communication strategies to address concerns and build trust. Similarly, the Constitutional Court can utilize this feedback to ensure its decisions are perceived as fair, accountable, and reflective of democratic principles. This analysis aligns with recent studies on evaluative language in political contexts (Abdulameer, 2021; Adriyadi et al., 2020; Alhudaithy, 2022; Hadi & Masyudi, 2023; Megah S, 2022) but uniquely focuses on a government institution rather than political figures.

The Naive Bayes, Neural Network, and Logistic Regression models demonstrate distinct patterns in capturing public sentiment. For example, the Neural Network model identified 34 instances of negative affect, a value significantly higher than Naive Bayes (13) and Logistic Regression (24), highlighting its sensitivity to discontent within public discourse. This dominance aligns with studies by Alhudaithy (2022) and Hadi and Masyudi (2023), which suggest that neural networks are more adept at detecting negative effects in complex political contexts. Furthermore, the Monogloss frequency in Naive Bayes (145 instances) reflects a tendency to capture self-contained opinions without alternative perspectives. In contrast, Neural Network, which identified 28 Heterogloss Attribute instances, supports the findings by Megah (2022) on the model's capability to detect diversity in perspectives, a vital feature in appraising public reactions toward institutional actions. Graduation patterns in Neural Network, particularly with 15 instances of Force Raise and 7 of Focus Sharpen, reveal a heightened intensity in public opinion, emphasizing how Neural Networks interpret sentiment with greater force, a characteristic also noted in previous sentiment studies (Abdulameer, 2021; Alhudaithy, 2022).

For the Constitutional Court, understanding this intensity can help proactively address the most polarized issues and foster better public engagement by clarifying the rationale behind key rulings. By monitoring changes in public sentiment, the Court could better anticipate potential backlash and proactively address misunderstandings or misinterpretations of its decisions. It could involve releasing detailed explanations of rulings in accessible formats or collaborating with stakeholders to communicate the long-term benefits of its decisions. These actions would demonstrate the Court's commitment to accountability, thereby fostering a stronger relationship between the institution and the public it serves.

Policymakers of institutional government can use these findings to craft more inclusive and targeted strategies when introducing or enforcing policies. For instance, analyzing sentiment trends over time can help identify the topics that trigger the most dissatisfaction and develop tailored responses or public outreach initiatives to address specific concerns. Public campaigns that explain the rationale for controversial decisions and forums for community input could mitigate negative perceptions and enhance transparency. This approach would strengthen public trust in the goverment and align with democratic ideals by ensuring citizens feel heard and valued in decision-making processes.

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Despite extensive research into appraisal systems in political discourse, few studies have explored how public sentiment analysis can guide institutional reform and policy adjustments. This study highlights how institutions like MK can leverage sentiment analysis to gauge public perception, identify areas of concern, and refine their decision-making processes. For instance, if high levels of negative affect are detected, MK can engage with the public through educational campaigns or stakeholder consultations to ensure its rulings are understood and accepted. This study uniquely examines the MK's influence on the public's perception of legal accountability, suggesting that institutional evaluations can significantly shape governance and accountability narratives, a previously overlooked area.

This study aligns with prior research that utilized the Orange data mining application to capture nuanced public sentiment across various domains, each leveraging appraisal systems to understand public opinion. Alhur et al. (2021) conducted a sentiment analysis of mHealth app reviews, using VADER for polarity analysis and LDA for thematic insights, emphasizing user preferences and improvement areas. Similar to our analysis of MK, their study highlights the importance of public feedback in shaping services, though it focuses specifically on mHealth. Likewise, a study on senior citizens' satisfaction with healthcare administration used sentiment analysis through Orange to gauge perceptions of care quality, finding predominantly negative sentiments and calling for service enhancements. Similar to our work on MK, this study utilized Orange to identify public opinion, though it was more targeted toward service outcomes rather than broader institutional reputation.

Research on public sentiment toward government schemes and Twitter sentiment analysis on India's Agnipath scheme also employed Orange's visualization tools to capture approval ratings for government decisions (Sajwan et al., 2023). Their method, which highlighted positive, negative, and neutral reactions, parallels our approach in analyzing MK-related sentiment, focusing on the public's immediate responses to policy. Putro et al. (2018) further expanded this application by applying appraisal theory to Twitter data about incumbent performance, dissecting public sentiment through affect, judgment, and engagement categories. Their focus on individual politicians contrasts our study on MK as an institutional body, yet both studies reveal public reactions to political actions using appraisal frameworks.

Moreover, Khoo et al. (2012) examined online news articles with appraisal theory, identifying sentiment and author bias within political reporting. While news texts require more contextual interpretation than user comments, both analyses benefit from appraisal theory's structure to capture complex discourse and reveal underlying attitudes. This research extends these prior studies by showcasing how public sentiment analysis can act as a diagnostic tool for policymakers and institutions, offering actionable data to guide reforms, improve public engagement, and strengthen institutional trust. By doing so, this study highlights the judiciary’s pivotal role in maintaining trust and accountability in governance systems.

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Through this approach, our research adds to the literature by providing insights into how public sentiment toward institutional bodies like MK is formed, illustrating appraisal theory's adaptability and depth in understanding complex social discourse. It emphasizes the practical relevance of sentiment analysis in institutional settings, demonstrating how this data can help the Constitutional Court and policymakers respond effectively to public concerns, ensuring governance is perceived as fair and inclusive.

4. Conclusion and Recommendations

This study demonstrates the efficacy of a mixed-method approach, combining appraisal theory with machine learning models via the Orange data mining application to analyze public sentiment toward institutional decisions, specifically the Constitutional Court's (MK) ruling on the 2024 regional elections. By utilizing machine learning models—Naive Bayes, Neural Network, and Logistic Regression—combined with tools such as the Orange application, this research highlights the diverse public responses and their emotional, evaluative, and engagement patterns. The results reveal a predominance of neutral and positive sentiments but also indicate the presence of significant negative affect, reflecting the polarized nature of public opinion toward MK's rulings.

The Neural Network model emerged as the most effective for sentiment classification tasks, consistently identifying nuanced emotional and evaluative expressions in the data. The analysis highlights the importance of recognizing the diversity of public discourse, with critical appraisals ranging from affective responses to deeper judgments about the MK's authority and its broader implications for governance. The findings underscore the utility of sentiment analysis and appraisal theory as valuable tools for examining public sentiment and uncovering complex patterns of public engagement.

This study contributes to the broader discourse on sentiment analysis in political and institutional contexts, extending its application to government institutions rather than individual political figures. By examining public appraisals of MK, this research not only enriches the understanding of how legal decisions are perceived but also underscores the potential of digital platforms as spaces for democratic expression. The inclusion of evaluative language categories such as affect, judgment, and appreciation provides a richer and more nuanced understanding of public attitudes, setting the foundation for future studies exploring institutional trust and accountability in governance contexts.

However, this study has several limitations that must be acknowledged. First, the analysis relies solely on comments from a single platform (YouTube), which may not fully represent the broader public sentiment across other social media platforms or demographics. Second, while the appraisal theory framework provides valuable insights into sentiment dynamics, its qualitative nature may not capture the full complexity of public discourse, especially for nuanced or context-specific comments. Additionally, the reliance on machine learning models, while effective, may introduce biases inherent in the training dataset, potentially affecting the accuracy of sentiment classification. Finally, the focus on MK's decisions limits the generalizability of the findings to other government

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institutions or legal contexts, requiring further research to expand these insights into broader governance frameworks.

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Authors' Biodata

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Authors' Contributions

Ai Yeni Yuliyanti from UIN Sunan Gunung Djati, Bandung, led the conceptualization of the study, integrating appraisal theory and sentiment analysis as the foundational framework. She also coordinated the research process, ensuring alignment with the study's objectives and its theoretical grounding. Additionally, she oversaw the final drafting and synthesis of the findings into a cohesive narrative.

Ponia Mega Septiana from Sekolah Tinggi Ilmu Ekonomi STAN IM played a critical role in data collection and preprocessing. She focused on the extraction and preparation of YouTube comments from the selected viral video, ensuring the dataset's integrity and relevance for sentiment analysis. She also contributed to applying machine learning models and analyzing their performance within the Orange application.

Wiwi Widuri Sintia Putri Sari Universitas Teknologi Bandung contributed significantly to the appraisal analysis, particularly in categorizing sentiment into Attitude, Engagement, and Graduation domains. Her expertise in evaluative language facilitated a nuanced interpretation of public sentiment, bridging the qualitative and quantitative aspects of the study.

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Titania Sari from Universitas Teknologi Bandung focused on visualizing the data patterns and validating the machine learning model outputs. She ensured the proper implementation of computational tools, evaluated model performance, and supported the interpretation of results, particularly in highlighting practical insights for governance and institutional accountability.

Declaration of conflicting interest

The authors declared no conflicts of interest to the article's research, authorship, and/or publication.

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