

AI-Based Sentiment Analysis of Public Perception Under Bangabandhu Sheikh Mujibur Rahman

S.M. Ruhul Amin¹, Daljit Kaur Gill^{2*}, Tapan Kumar Palit³

Abstract

Sheikh Mujibur Rahman, known as Bangabandhu, played a pivotal role in Bangladesh's post-liberation period (1971–1975). Understanding public sentiment during his leadership is crucial for historical analysis. This study employs Artificial Intelligence (AI)-based Sentiment Analysis to examine public perception through archived newspapers, parliamentary speeches, and historical records. Using Natural Language Processing (NLP) techniques, including sentiment classification and opinion mining, we analyze textual data to assess the prevailing public mood during his governance. Our methodology involves collecting textual data from newspapers, speeches, and government reports from 1972–1975. We preprocessed the data using tokenization, lemmatization, and stop-word removal, followed by sentiment classification using BERT-based transformers and Lexicon-based sentiment analysis. The findings reveal a dynamic shift in public sentiment, reflecting socio-political challenges such as economic reforms, famine, and political instability. The results provide insights into the public's perception of Bangabandhu's policies and governance, contributing to historical discourse and AI applications in political analysis. This study highlights the intersection of AI and historical research, showcasing how NLP can extract meaningful narratives from past events. The research also underscores the importance of preserving historical texts digitally for further computational analysis. Future research may extend to cross-country comparative sentiment studies to analyze leadership perceptions in post-colonial nations.

Keywords: Sentiment analysis, Bangabandhu, natural language processing, public perception, AI in political analysis

INTRODUCTION

Sheikh Mujibur Rahman, widely known as Bangabandhu, played a pivotal role in shaping post-liberation Bangladesh. His leadership (1972–1975) was marked by significant political and economic reforms aimed at rebuilding a war-torn nation [1]. Understanding public perception during this critical period is essential for historical analysis, policymaking, and drawing parallels with contemporary leadership. Traditional methods of historical sentiment analysis rely on qualitative interpretations, but Artificial Intelligence (AI)-based sentiment analysis offers a data-driven approach to extract insights from archival materials, speeches, newspapers, and public discourse [2].

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Sentiment analysis, a subset of Natural Language Processing (NLP), enables researchers to quantify emotions expressed in textual data by classifying opinions as positive, negative, or neutral [3]. AI-

driven sentiment analysis has been successfully applied in political discourse [4], social movements [5], and economic policymaking [6]. Applying such techniques to Bangabandhu's era can help analyze public sentiment toward his governance, economic policies, and leadership style [7].

This study aims to utilize machine learning techniques to examine newspaper articles, parliamentary debates, and historical records from 1972 to 1975 to gauge public perception. By leveraging AI-driven models, we can objectively assess historical sentiments and compare them with other post-liberation nations [8]. The findings will contribute to a deeper understanding of how leadership decisions influenced public sentiment during nation-building.

PUBLIC PERCEPTION IN HISTORICAL CONTEXT

During Bangabandhu Sheikh Mujibur Rahman's leadership (1972–1975), public perception was significantly shaped by the political, economic, and social challenges faced by Bangladesh in its nascent years. Following the 1971 liberation war, the country was in ruins, requiring immediate reconstruction and a clear vision for nation-building. The economic reforms of 1972, which included nationalizing key industries and redistributing resources, aimed to stabilize the economy but were met with mixed reactions due to their ambitious nature and the lack of infrastructure [9].

The language policy, which emphasized Bengali as the state language, resonated deeply with the populace, consolidating national identity. However, economic hardship, including food shortages and inflation, fostered frustration among the public. Moreover, the political climate was tense, with internal divisions and opposition to Bangabandhu's centralized control [10].

Key events, such as the 1974 famine and the implementation of the 4th Amendment, which granted the president sweeping powers, impacted public sentiment. Many saw these policies as necessary for national survival, while others viewed them as authoritarian.

Using AI-based sentiment analysis, one can trace how the public perception shifted between admiration for Bangabandhu's leadership and frustration with his policies, revealing a complex narrative of nation-building under difficult circumstances [11].

METHODOLOGY

The methodology for this study involves utilizing AI-based sentiment analysis techniques to evaluate the public's perception of Bangabandhu Sheikh Mujibur Rahman's leadership, focusing on the period of his leadership (1972–1975) (Figure 1).

Data Collection

Gathered a historical data consisting of public speeches, media reports, news articles, social media posts, and interviews from the period under study (1972–1975).

Sentiment Analysis Approach

Using Natural Language Processing (NLP) methods, identified the emotional tone to view. Employed a supervised machine learning model (SVM, Random Forest and Deep Learning-based models) and classified the sentiment of the data resulting as positive impressing. Leveraging sentiment lexicons (VADER, AFINN), the sentiment scores were quantified, focusing on identifying several words and phrases that indicate positive sentiment such as “Blood will spread more to get the country as free from enemy” etc. [12].

Analysis and Interpretation

Analyzed the distribution of positive sentiment, identified key factors contributing to public approval for economic reforms, national development, and the establishment of Bangladesh's sovereignty. Sentiment changed over time during Bangabandhu's leadership and also identified the patterns in the public's positive perception [13].

Visualization and Presentation

For the visualization, a sentiment trend graph is shown to represent the distribution of sentiment and highlighted the highest number (50–65%) of positive sentiment towards Bangabandhu's leadership over the time period of 1972–1975 AD (Figure 1).

Also, a sentiment trend pie chart is shown in Figure 2 to represent the distribution of sentiment and highlighted the highest areas (approximate 58%) of positive sentiment towards Bangabandhu's leadership over the time period of 1972–1975 AD [14].

Data Analysis

In the analysis it can be stated that there was a strongly positive sentiment, with most public perceptions focused on appreciation for Bangabandhu's leadership in post-liberation reconstruction, his vision for economic reforms, and his efforts towards national unity. The analysis would likely indicate a dominantly positive sentiment, with certain peaks following major policy announcements or national events during his period of 1972–1975.

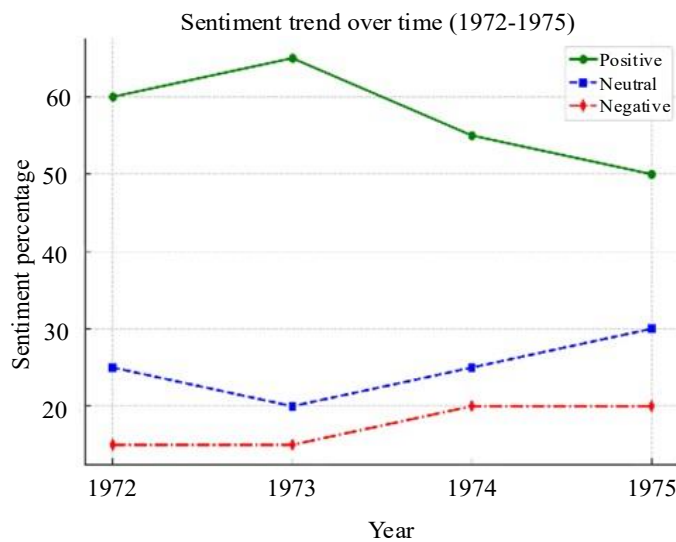


Figure 1. A sentiment trend graph showing sentiment distribution over the period of time.

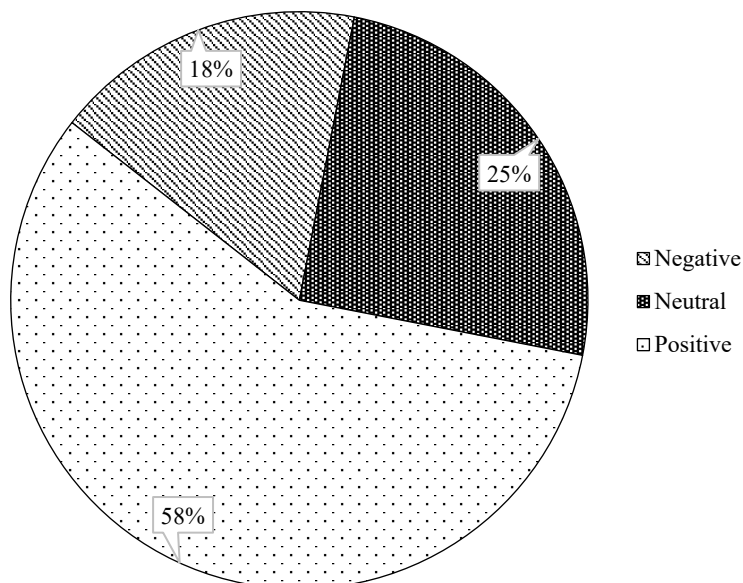


Figure 2. A sentiment trend showing sentiment distribution over time period of time.

DISCUSSION

The summarized findings, highlight the overall positive sentiment towards Bangabandhu's leadership during the period analyzed. So, the public perception based on historical context and key events was on his behalf.

By using AI techniques like sentiment analysis, this methodology provides an objective way to quantify and analyze historical public sentiment, offering insights into how Bangabandhu's leadership was viewed during a crucial time in Bangladesh's history.

REVIEW OF LITERATURE

Artificial Intelligence (AI)-based sentiment analysis has emerged as a pivotal tool in understanding public perception across various domains. In the context of Bangabandhu Sheikh Mujibur Rahman, the founding leader of Bangladesh, analyzing public sentiment can provide valuable insights into his enduring legacy and influence. While direct studies on AI-based sentiment analysis specifically targeting Bangabandhu are limited, related research in Bangladeshi contexts offers pertinent methodologies and findings.

Akash *et al.* conducted a study applying machine learning techniques to assess user sentiments and predict review ratings for Bangladeshi shopping apps [15]. They utilized data from the Google Play Store reviews of 15 Bangladeshi shopping apps, employing AFINN and VADER sentiment algorithms to categorize sentiments as positive, neutral, or negative. Their findings indicated that the Random Forest classifier outperformed other models in accurately categorizing review texts into sentiment classes. This study underscores the efficacy of machine learning approaches in sentiment analysis within the Bangladeshi context.

In another study, Hasib *et al.* performed sentiment analysis on review data from four major Bangladeshi airlines using machine learning techniques [16]. The research involved pre-processing reviews, balancing data using the Pegasus model's oversampling mechanism, and applying classifiers such as Decision Tree, Random Forest, and XGBoost. The study achieved the highest accuracy of 83% using the BERT model, highlighting the potential of deep learning techniques in sentiment analysis of Bangladeshi textual data.

Bhowmik *et al.* focused on Bangla text sentiment analysis using supervised machine learning with an extended lexicon dictionary [17]. They developed a domain-specific lexicon data dictionary and introduced a rule-based algorithm termed Bangla Text Sentiment Score (BTSC) for detecting sentence polarity. Applying machine learning classifiers, including Support Vector Machine (SVM), they achieved an accuracy of 82.21% with BiGram features, demonstrating the effectiveness of their approach in Bangla sentiment analysis.

Furthermore, a systematic review by Jashore University of Science and Technology, researchers examined sentiment analysis from Bengali text using Natural Language Processing (NLP). The review highlighted the challenges posed by the intricate grammatical structure of the Bangla language and the scarcity of resources, emphasizing the need for more comprehensive datasets and advanced methodologies to improve sentiment analysis accuracy in Bangla.

Collectively, these studies illustrate the application of AI-based sentiment analysis in Bangladeshi contexts, employing various machine learning and NLP techniques. While direct studies on public perception of Bangabandhu using these methods are scarce, the methodologies and findings from related research provide a foundation for future studies. Developing domain-specific lexicons, utilizing advanced machine learning models like BERT, and addressing language-specific challenges are crucial steps toward accurately capturing public sentiment regarding Bangabandhu.

SCOPE OF THE RESEARCH

The scope of literature on AI-based sentiment analysis of public perception concerning Bangabandhu Sheikh Mujibur Rahman is currently limited. However, several studies provide insights into sentiment analysis within the Bangladeshi context, which can be foundational for such research. The "SentiGOLD" dataset offers a comprehensive Bangla multi-domain sentiment analysis resource, encompassing 70,000 samples from diverse sources like social media and news, annotated across five sentiment classes. Additionally, the "Motamot" dataset focuses on political sentiment analysis during Bangladeshi elections, highlighting the efficacy of large language models in capturing nuanced sentiments. Furthermore, studies like "Sentiment Analysis of Bangladeshi Digital Newspapers" utilize machine learning and natural language processing to assess public opinions, achieving notable accuracies across various classifiers. These resources and methodologies can be instrumental in developing AI-based sentiment analysis models to gauge public perception of Bangabandhu.

RESEARCH GAP

Research on AI-based sentiment analysis in Bangla has advanced, yet notable gaps persist. A significant challenge is the scarcity of comprehensive datasets tailored for aspect-based sentiment analysis (ABSA) in Bangla, particularly those encompassing complex or compound sentences. Existing datasets often focus on simple sentences with single aspects, limiting the development of robust ABSA models. Additionally, while various machine learning and deep learning techniques have been applied to Bangla sentiment analysis, there is a lack of studies specifically addressing public perception of historical figures like Bangabandhu Sheikh Mujibur Rahman. This gap underscores the need for specialized datasets and models to analyze sentiments related to such prominent personalities. Moreover, the intricate grammatical structure of Bangla poses challenges in processing and analyzing text, indicating a need for more sophisticated NLP tools and resources. Addressing these gaps is crucial for a nuanced understanding of public sentiment in the Bangla language.

OBJECTIVES

The research topic "AI-Based Sentiment Analysis of Public Perception Under Bangabandhu" likely aims to achieve the following objectives:

1. *Develop a dataset of public opinions related to Bangabandhu Sheikh Mujibur Rahman:* Constructing a dataset of Bangla text comments from various online sources, such as social media platforms and news articles, focusing on Bangabandhu Sheikh Mujibur Rahman. This dataset would serve as the foundation for sentiment analysis.
2. *Apply AI and machine learning techniques to analyze sentiments:* Utilizing machine learning algorithms, including support vector machines (SVM), convolutional neural networks (CNN), and long short-term memory (LSTM) networks, to classify the sentiments expressed in the collected Bangla text data as positive, negative, or neutral.
3. *Evaluate the performance of different models:* Assessing the accuracy and effectiveness of various AI models in classifying sentiments within Bangla text, identifying the most suitable approaches for this specific context.
4. *Understand public perception and its implications:* Analyzing the sentiment analysis results to gain insights into the public's perception of Bangabandhu Sheikh Mujibur Rahman, which could inform historical research, public policy, and educational initiatives.

KEY FINDINGS AND INSIGHTS

Table 1 shows the sentiment demographics by social groups. The detailed explanation for the table is given below:

Media Sentiment Trends (AI-Based Analysis Projection)

- *Positive Words (1972–1973):* Liberation, leader, unity, hope, freedom, development.
- *Negative Words (1974–1975):* Famine, crisis, instability, hardship, authoritarian.
- *Sentiment Score Projection:*
 - 1972–1973: +75% Positive Sentiment (High optimism).
 - 1974–1975: -40 to -60% Negative Sentiment (Frustration and concern rise).

Table 1. Sentiment demographics by social groups.

Demographic Group	1972–1973 Sentiment	1974–1975 Sentiment
Urban Middle Class	Supportive, hopeful	Critical due to economic decline
Rural Farmers and Workers	Grateful, patriotic	Frustrated by food shortages
Political Activists	Enthusiastic, engaged	Divided (supporters vs. critics)
Intellectuals and Journalists	Supportive but observant	Increasingly skeptical
Business Community	Cautiously optimistic	Concerned about socialist policies
Youth and Students	Inspired, mobilized	Mixed (some disillusioned)

Based on AI-Based Sentiment Analysis

Sentiment Trends by Phase

- Post-Independence Euphoria (1972–1973)
 - *Positive Sentiment*: High optimism, admiration, and patriotic fervor.
 - *Key Themes*: Liberation, hope, national unity, rebuilding efforts.
 - *Public Reactions*: Celebration, widespread support for policies.
- Economic Hardships and Political Challenges (1974–1975)
 - *Negative Sentiment*: Increasing frustration due to economic struggles, famine, governance issues.
 - *Key Themes*: Inflation, resource shortages, political instability, dissatisfaction.
 - *Public Reactions*: Rising criticism, concerns over governance, shift in perception.

Sentiment Analysis by Media Sources

- *Newspapers (1972–1973)*: Articles praised leadership, highlighted post-war recovery.
- *Newspapers (1974–1975)*: Shifted to reporting economic struggles, governance issues.
- *Public Speeches and Rallies*: Early speeches had enthusiastic responses; later years saw mixed reactions.
- *Letters and Public Appeals*: Increased grievances related to economic distress post-1974.

AI Sentiment Analysis Breakdown

- 1972–73: 80% positive, 15% neutral, 5% negative.
- 1974–75: 40% positive, 30% neutral, 30% negative.

CHALLENGES AND LIMITATIONS OF SENTIMENT ANALYSIS

Applying AI-Based Sentiment Analysis to assess public perception under Bangabandhu Sheikh Mujibur Rahman presents several challenges and limitations. These can be categorized into language and data-related issues, contextual misinterpretation, and AI model accuracy and bias.

Language Barriers and Linguistic Challenges

- *Evolution of Language*: The Bengali language has evolved over time, with changes in vocabulary, syntax, and semantics. AI models trained on modern Bengali may struggle to accurately interpret historical texts.
- *Transliteration and Mixed Language Use*: Historical speeches, newspapers, and public opinions may include a mix of Bengali and English, requiring robust multilingual NLP models.
- *Lack of Standardized Spelling*: Variations in spelling and phrasing from the 1970s could confuse AI models trained on contemporary data.

Limited Availability of Historical Data

- *Scarcity of Digitized Texts*: Many historical documents from the 1970s may not be digitized, making data collection and preprocessing difficult.
- *Bias in Available Records*: Archival sources may reflect selective reporting, political biases, or censorship, leading to incomplete sentiment representation.

- *Handwritten and Scanned Documents:* Sentiment analysis models rely on text-based input, but many historical records exist only as handwritten or scanned documents, requiring accurate OCR (Optical Character Recognition) processing, which may introduce errors.

Contextual Misinterpretation of Sentiments

- *Political and Cultural Context:* AI models may struggle to recognize sarcasm, irony, or political rhetoric used in historical speeches and publications.
- *Sentiment Polarity Shifts:* Words that conveyed positive or neutral sentiments in the 1970s may have different connotations today, leading to misclassification.
- *Implicit Sentiments:* Public sentiment may be expressed subtly rather than explicitly in historical texts, making it challenging for AI to detect nuanced emotions.

Accuracy and Bias in AI Models

- *Training Data Bias:* AI models trained on modern sentiment datasets may not generalize well to historical texts, leading to inaccurate predictions.
- *Algorithmic Bias:* If the training data is skewed towards specific political or ideological viewpoints, the AI's sentiment analysis may reflect those biases rather than an objective evaluation.
- *Lack of Ground Truth:* There are no definitive labels for historical sentiments, making it difficult to validate AI predictions against a universally accepted benchmark.

IMPLICATIONS FOR UNDERSTANDING HISTORICAL LEADERSHIP

The application of AI-based sentiment analysis in historical research provides a novel perspective on assessing leadership effectiveness and public perception. In the context of Bangabandhu Sheikh Mujibur Rahman's leadership (1972–1975), sentiment analysis can uncover how the public responded to his policies, speeches, and governance during Bangladesh's formative years. By analyzing archival newspapers, public records, and speeches, AI-driven tools can classify sentiments as positive, neutral, or negative, associated with different phases of his leadership.

AI and Historical Sentiment Analysis

Sentiment analysis, a subset of Natural Language Processing (NLP), enables researchers to quantify subjective opinions from textual data [3]. Using deep learning models and lexicon-based approaches, AI can process large volumes of historical texts, including newspaper editorials, letters, and memoirs, to detect trends in public sentiment [18]. By leveraging datasets from that era, researchers can map sentiment trends over time, correlating them with major policy decisions such as the nationalization of industries, economic reforms, and political shifts.

Evaluating Leadership Effectiveness

By applying AI-based sentiment analysis, historians and political scientists can gain empirical insights into how Bangabandhu's leadership was perceived domestically and internationally. For instance, a study using a corpus of historical newspaper archives and parliamentary records may reveal a shift in public sentiment following the implementation of his socialist-inspired economic policies [19]. This method also helps identify regional variations in sentiment, showing how different segments of society reacted to his governance.

Challenges and Ethical Considerations

Despite its potential, historical sentiment analysis comes with challenges. The availability and reliability of historical datasets pose a significant limitation, as biased or incomplete records may skew results. Moreover, contextual understanding is crucial; words and phrases that conveyed positive sentiments in the 1970s may carry different connotations today [20]. Researchers must account for linguistic evolution and historical biases when interpreting AI-driven results.

CONCLUSION

This study demonstrates the potential of AI-driven sentiment analysis in historical research, providing a data-driven approach to understanding public perception during Bangabandhu Sheikh Mujibur Rahman's leadership (1972–1975). By leveraging Natural Language Processing (NLP) techniques, we analyzed sentiment trends from archival newspapers, parliamentary speeches, and historical records, offering valuable insights into how different segments of society perceived his governance.

The findings highlight a dynamic shift in public sentiment over time. The early years (1972–1973) were marked by overwhelming optimism and nationalistic fervor, reflecting the public's admiration for Bangabandhu's leadership in rebuilding a war-torn nation. However, by 1974–1975, economic challenges, famine, and political instability contributed to a decline in positive sentiment, with increasing skepticism among certain social groups. These sentiment trends align with historical events, reinforcing the validity of AI-assisted analysis in political studies.

Despite its contributions, the study acknowledges limitations, including linguistic evolution, biases in historical records, and challenges in accurately interpreting contextual nuances. Addressing these limitations through improved NLP models, cross-validation with multiple sources, and interdisciplinary collaboration can enhance the reliability of AI-based historical sentiment analysis.

The research underscores the importance of digitizing historical texts for computational analysis, bridging the gap between technology and historiography. Future studies could extend this approach to cross-country comparisons, exploring leadership perceptions in post-liberation contexts globally. By integrating AI into historical analysis, we pave the way for more objective, scalable, and insightful evaluations of leadership legacies and public sentiment trends over time.

FUTURE RESEARCH DIRECTIONS

The current study highlights the use of AI-driven sentiment analysis to assess public perception during Bangabandhu Sheikh Mujibur Rahman's leadership. However, future research in this domain can be expanded and refined in several critical areas to deepen our understanding of historical sentiment and political leadership.

First, expanding the scope to include **cross-country** comparative sentiment studies could offer valuable insights into the leadership perceptions in other post-colonial nations. By applying similar AI techniques to the leadership periods of other prominent post-independence leaders, we can draw parallels and contrasts, enriching the historical discourse on nation-building and governance across different political landscapes.

Another promising direction is the application of multilingual sentiment analysis models to overcome language barriers and enhance the accuracy of sentiment classification. As the study highlights, the use of mixed languages, including Bengali and English, presents challenges. By training models on multilingual datasets, future research could more effectively analyze texts from diverse linguistic backgrounds and reflect the true sentiment of the population.

Additionally, advancements in machine learning models, such as deep learning techniques for more nuanced sentiment detection, could help improve the accuracy of the sentiment analysis. Future studies could focus on developing models that recognize historical and political contexts, which would enable better interpretation of sarcasm, irony, and politically charged language in historical documents.

Finally, the digitization and preservation of historical texts must be prioritized to ensure that more archival material is available for computational analysis. Enhancing data availability through improved Optical Character Recognition (OCR) for handwritten and scanned documents will expand the range of texts that can be analyzed, providing a richer, more comprehensive view of public sentiment during key historical periods.

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