Mapping Social Media Misinformation in Bangladesh: Evidence from the FactWatch Dataset

Talukder Hasnat Zadid[1], Md. Shahriar Imtiaz[1], Md. Tahmid Hasan[1], Md. Jayed Hasan[1], Samiul Alam Rafi[1] and Md. Mazid-Ul-Haque[*1]

[1] Department of Computer Science, American International University–Bangladesh, Dhaka, Bangladesh

[*]Corresponding Email: mazid@aiub.edu

Abstract: The most critical ethical and social challenges to solve during the 21st century arise from misinformation that spreads through digital media. The development of artificial intelligence (AI) technologies brings new methods for identifying and preventing misinformation while transforming content creation, storytelling, and documentation practices. This research investigates more than 1,000 fact-checked Bangla posts from social media, which scientists gathered to study how people share false information about internet rumors and politics, and health and science issues. The study describes the findings through analytics methods and visualization techniques, which demonstrate that internet rumors account for more than one-third of all misinformation, while international events and politics, and altered multimedia content (images and videos) form two other important sources of misinformation. The findings demonstrate how misinformation has become part of digital creativity, media ethics, and cultural representation. The research uses the Ethics, Creativity, and Media Innovation in the Age of AI framework to demonstrate how AI-based fact-checking improves digital literacy and enables better representation of non-English media and responsible content consumption. The study demonstrates that AI-driven media innovation enables organizations to establish sustainable public engagement while safeguarding their cultural heritage. The study establishes a framework that demonstrates how Bangla-language misinformation connects to AI technology and media ethics to secure equal access to justice, social fairness, and sustainable development in the digital age.

Keywords: Misinformation, Bangla NLP, AI Ethics, Digital Media, Factchecking.

1. Introduction

Digital media platforms distribute misleading information at an increasing speed, which leads to major changes in how people view information and how social trust is developed, and how democratic systems function. Social media platforms enable quick information sharing, yet they also increase the distribution of deceptive and inaccurate material [1], [2]. The growth of artificial intelligence (AI) technology has increased these problems because automated content production now reaches extensive distribution capabilities [3]. Research about misinformation in high-resource languages has received substantial attention, yet Bangla studies remain underdeveloped [4], [5].

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The situation becomes urgent because Bangla speakers are increasing their online presence while AI technologies remain unavailable in their native language [4], [6]. The current systems cannot accurately represent language details and cultural understanding; therefore, they become ineffective for practical usage in actual environments [7]. This study uses the FactWatch dataset to analyze misinformation trends in order to fill existing research gaps. Unlike prior work focused primarily on detection, this research emphasizes analytical understanding and socio-technical interpretation. This study addresses the following research questions:

RQ1: What are the dominant categories and temporal patterns of misinformation?
RQ2: What thematic structures characterize misinformation content?
RQ3: What sentiment patterns are associated with misinformation?
RQ4: How can AI-driven approaches support ethical media innovation?

The remainder of this paper is structured as follows. Section 2 reviews recent literature. Section 3 describes our methodology. Section 4 presents results and a critical discussion. Section 5 concludes and outlines future work.

2. Literature Review

The social-technical problem of misinformation exists because both human behavior and machine technology create factors that shape its development [1]. The initial research showed how misinformation spreads quickly, while it affects how people view information [9]. The following research studies developed NLP systems that automatically detect and authenticate information [10], [11]. The latest study investigated multilingual and cross-lingual systems for detecting misinformation, but it found difficulties when testing low-resource languages [3], [12]. Transformer technology enables better model performance, but researchers have not yet studied its usage in Bangla language contexts [13]. The research studies from Bangladesh discovered fundamental issues that include both insufficient resources and the absence of region-specific data [4], [6]. Fact-checking programs have tried to solve these problems, but explorations that analyze data on a large scale remain limited [5]. The new research focuses on multimodal misinformation while establishing ethical standards for artificial intelligence governance [14], [15]. Recent research (2025–2026) proposed AI systems for factchecking, which need to adapt to different cultures through their use of local language models and community-based verification methods [16], [17]. The current findings show that solutions that adapt to different cultures need to combine their technical abilities with their ethical principles.

3. Methodology

3.1 Data Collection and Preprocessing

The FactWatch dataset [8] serves as the data source for this study, which contains more than 1000 fact-checked Bangla social media posts. The dataset includes post titles, summaries, categories, and ratings. The preprocessing process included text normalization and the elimination of URLs and special characters, as well as the

removal of stopwords from both Bangla and English text. The research team excluded incomplete or missing data entries to maintain high standards of data quality.

3.2 Descriptive Analysis

The research conducted a basic exploration analysis to study the data. In this study pandas were used to calculate the frequency of different categories. The two Internet Rumors (346) and International (94) categories showed high levels of occurrence. The researchers counted ratings that included "False" and "Misleading" as their operating system. Then researchers extracted data from investigation descriptions through regular expressions, which they transformed into a date format and used to create monthly bar chart data. We used category labels to identify fake news that contained images by searching for the keywords "ছবি" (photo) and "image".

3.3 Sentiment Analysis

The emotional tone of all post summaries was studied. A translation tool was used to convert each summary into English, which they used to determine sentiment polarity with TextBlob. The study contains two limitations, which include translation errors that might occur and the method's inability to provide precise polarity score measurements. The results were visualized through histograms that displayed kernel density curves, which helped to identify the most common neutral and negative emotional states. Fig. 1. shows the distribution of sentiment polarity, with a clear concentration around zero (neutral sentiment).

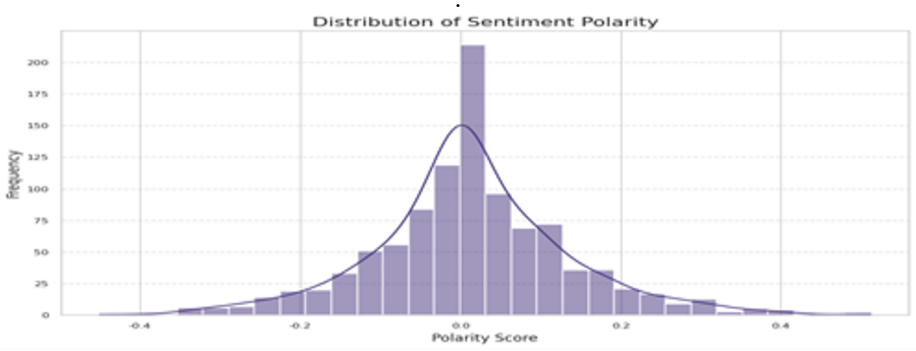

Fig. 1. Distribution of Sentiment Polarity

3.4 Thematic Analysis

This research used Sentence-BERT embeddings to create clusters of post titles, which generated 384-dimensional vectors that were processed in batches while using K-Means to group the data and t-SNE to create 2D visualizations through dimensionality reduction. The research used LDA with five topics to reveal themes that included politics and health beyond basic keyword extraction. The title word cloud displayed up to 100 words to show the most common words, which helped make the title easier to

understand. The bar chart shows the count of cases that belong to six different theme clusters of misinformation, while Cluster 4 shows the highest count according to Fig. 2.

Fig. 2. Thematic Clusters of Misinformation

4. Result and Analysis

4.1 Overview of Misinformation Patterns

There are more than 1,000 checked misinformation cases in the FactWatch data, drawn primarily from Facebook. They are classified into six main categories: "Internet Rumors" (346, 33.8%), "Politics" (212, 20.7%), "Health" (158, 15.4%), "International" (94, 9.2%), "Religion" (76, 7.4%), and "Economy" (52, 5.1%). The rest are made up of categories such as "Education" and "Crime" as shown in Table 1. The study also found that between January 2024 (128 cases associated with elections; 48% political) and August 2024 (112 cases during new government formation). Average monthly counts jumped from 17 before 2023 to 32 after. Misinformation associated with images or video appears in 214 cases (20.9%), often involving forged logos (16% in our sample).

Table 1. Distribution of misinformation categories

Category	Cases	Percentage
Internet Rumors	346	33.8%
Politics	212	20.7%
Health	158	15.4%
International	94	9.2%
Religion	76	7.4%
Economy	52	5.1%
Others	85	8.3%

4.2 Theme Findings and Feeling Checks

Six major themes were identified by meaning-based clustering: Politics and Elections (28%), Health and Vaccines (19%), International Affairs (15%), Religion and Ethnic Issues (13%), Economic Rumors (12%), and Miscellaneous Rumors (13%). The visualization in 2D showed clearly separated clusters; however, it was interesting to

see that political and health language were very semantically close. Topic modeling identified five major topics: Politics (32%), Health (22%), Religion (18%), International affairs (14%), and Economy (14%). According to the model, not only are high-frequency lexical items such as "false," "claim," "Bangladesh," "photo," and "video" consistently very specific on image misinformation, but also with claim-oriented narratives. The sentiment across 978 translated summaries produced a slight negative polarity (mean −0.12), which was made up of 52% neutral, 31% negative, and 17% positive content. This average opinion intensity of 0.45 also indicated a moderate level of subjectivity. Political (−0.18) and religion (−0.22) topics were found to be the most negative, meaning there is evidence of fear-inducing and polarizing communication patterns.

4.3 Critical Discussion of Misinformation Dynamics

The investigation shows that false information spread in Bangladesh operates as a complete system that links political cycles, visual deception, and collective social feelings. The period of election campaigns (for example January 2024) showed that political rumors accounted for (48%) of all cases which demonstrated that false information functioned as a tactical communication weapon. The study found that (20.9%) of all visual content displayed fake news outlet logos and government agency symbols, which enabled people to trust visual content while avoiding textual verification. The situation becomes more dangerous because people in Bangladesh use reverse image search tools to investigate manipulated visuals, which present challenges for investigators.

This study demonstrates that Bangla religious and political misinformation shows stronger negative sentiment than previous research in high-resource languages [10], [13]. The users of social media platforms share false information to show their dedication to their online communities, which demonstrates the concept of participatory misinformation. The dataset only contains fact-checked posts, which creates a major restriction because numerous rumors stay hidden for people who need to access fact-checking services, which have limited coverage in Bangladesh [5]. The current situation lacks real-time detection systems, which results in the complete propagation of a claim before its debunking across WhatsApp and Facebook groups. The findings demonstrate that AI ethics demands organizations create fact-checking systems that use local languages and visual evidence to develop cultural testing methods instead of relying on post-event verification.

5. Conclusion And Future Works

This work uncovers specific fake news dissemination patterns in Bangladesh; wherein political and image-tampered disinformation are prevalent during the elections and transfer of power. Half of the cases in January 2024 were political rumors, and one-fifth included manipulated visuals, including forged logos. Most false claims were classified in the "False" category (59.8%), showing that more clear-cut fabrication still tends to be most prevalent. Emotive analysis revealed a slightly negative attitude toward

politics and religion, respectively triggering fear and anger, which then deepens the split in society. Through combining topic modeling, clustering, and emotion analysis, this paper offers a holistic perspective of misinformation dynamics in the bilingual Bangla-English community. The results emphasize the necessity of efficient, multilingual fact-checking mechanisms to cope with fake visuals in real time. Future work should focus on real-time detection with multilingual BERT, network analysis of rumor propagation, cross-country comparison in South Asia, and conducting an experimental study on intervention.

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