

# The Impact of Emojis on User Engagement with Trolling Content in an Online Platform

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**Abstract**—This paper investigates the impact of emojis on user engagement in trolling contexts on social media platforms. Utilizing a comprehensive dataset collected from Reddit, this study categorizes emojis by emotional content and popularity to analyze their effects on comments and upvotes. Findings indicate that more popular emojis and emojis that convey emotionality significantly enhance user engagement, while excessive or misplaced informational emojis reduce it. This research offers critical insights for strategic emoji use to foster positive online interactions and mitigate trolling, benefiting content moderators and digital communicators.

**Index Terms**—Trolling, Emoji, User Engagement, Social Media Platforms

## I. INTRODUCTION

The field of online communication has rapidly evolved, with emojis emerging as significant components. These pictorial symbols have transcended their initial function as visual aids, morphing into tools that convey emotion [1, 2], and shape the tone, nuance, and context of online communication [3]. The surge in emoji usage on social media has sparked interest in their multifaceted roles, particularly in influencing user engagement. Various studies have examined the impact of emojis on user engagement in brand-related content [5], emotional communication [4], and helpfulness of online reviews [12], showing that emojis enhance emotional expression and clarity in online communication, positively affecting user engagement in general contexts [1, 2, 3, 4, 5]. However, limited research has examined the impact of emojis on users' engagement in unethical or negative scenarios, such as trolling.

Trolling, defined as posting provocative, offensive, or misleading messages to elicit strong reactions or disrupt conversation [19, 20], can undermine the quality of online discourse, foster hostile environments, and cause severe psychological distress for targets, posing significant challenges to the civility and integrity of online communities. Understanding its impact and finding ways to mitigate it are crucial for maintaining healthy online interactions [26, 27, 28].

While typically enhancing emotional expression and clarity, emojis' role in trolling—characterized by ambiguity, sarcasm, and malice—is less understood [3, 14]. Emojis can both mitigate and exacerbate the intent of a message, complicating recipient interpretation [12, 13]. In trolling, an emoji can

disguise hostility as humor or add irony, intensifying the message [15, 16]. While previous research has extensively examined how emojis enhance user engagement in various contexts [1, 2, 3], the impact of emojis in trolling scenarios is not well studied. This omission in the literature underscores the importance of the present research in understanding how emojis influence user engagement within trolling contexts, offering insights into managing and mitigating such disruptive behavior.

This study aims to contribute to the empirical research by examining how emojis, integral to online communication, influence trolling dynamics. By doing so, we aim to provide actionable insights for content creators, platform moderators, and policymakers to foster more civil and respectful online communities. Specifically, this paper explores the dynamics between emoji usage and trolling behavior on a social media platform, Reddit. Our research builds on the framework of computer-mediated communication, focusing on user-generated content (UGC) and its impact on engagement dynamics [5, 10]. We extend foundational studies to examine how emojis in trolling amplify or mitigate the intended message. Answering calls by prior researchers (e.g., [17, 18, 24, 25, 30, 31]), the objectives of this study are to:

- 1) Investigate how emojis are employed in online trolling and examine their influence on interaction perception.
- 2) Examine the function of various emoji types (i.e., emotional vs. informational) in trolling.
- 3) Identify patterns in emoji usage by online trolls versus conventional usage in non-trolling scenarios.

We collected a dataset specifically focusing on conversations that are likely to include trolling characteristics. These conversations included popular celebrities who were recently in the news. By analyzing textual content and emojis, we explore how these symbols modify the message's reception [26, 27].

Our study shows that emojis significantly impact user engagement in trolling-related posts. We found that excessive emoji use does not yield the same engagement benefits as moderate use. Economically, trolling posts with emojis see increased negative reactions and comments. Additionally, emotional emojis amplify engagement, particularly in posts with a negative text tone, while informational emojis tend to

diminish engagement in similar contexts. We also discovered that the influence of emojis varies by post type, with emotional emojis being positively associated with engagement, especially in non-commercial user-based trolling posts. These findings extend the current understanding of emoji usage in online communications by providing specific insights into their role in trolling contexts, highlighting the nuanced ways emojis can either mitigate or exacerbate trolling behavior.

Our findings contribute to digital communication studies, offering insights into emojis' roles in complex scenarios like trolling. Practically, they inform strategies for social media platforms to identify and mitigate trolling behavior, enhancing online discourse and fostering constructive environments. Understanding emojis' interplay with trolling aids in developing effective moderation tools and policies.

## II. RELATED WORK

The existing literature highlights the multifaceted role of emojis in digital communication, user engagement, and trolling behaviors. This review synthesizes prior findings, interprets their implications, and identifies the need for further research.

### A. Emojis in Digital Communication

Emojis have evolved from simple pictograms to complex tools of digital communication, capable of conveying nuanced emotional and informational content. Prior studies have highlighted their roles in enhancing the expressiveness and clarity of text messages. For instance, Cramer et al. [1] and Alshenqeti [2] examined how emojis serve as tools for enhancing expressiveness and suggested that they constitute a complex, culturally embedded form of communication. Riordan [3] provided a framework for understanding emojis as tools for emotional work, emphasizing their complexity in conveying emotional nuances in digital interactions. Kaye et al. [13] and Elder [14] explored the emotional impacts of emojis, foundational for understanding their role in digital interactions. Boutet et al. [4] investigated the psychological impact of emojis, revealing how these symbols influence emotional communication and shape social attributions. These studies underscore emojis' contribution to digital communication by enhancing message clarity and emotional depth. However, they do not address their specific impacts on more contentious or provocative contexts like trolling, highlighting an opportunity that our study aims to fill.

### B. Emojis and User Engagement

Research has shown that emojis can significantly impact user engagement. Donaway [7] demonstrated how emojis in Facebook news teasers can alter the perception and attractiveness of digital content, while Valenzuela-Gálvez et al. [8] highlighted their persuasive power in email marketing. Ko et al. [5] analyzed emojis' influence on engagement in brand-related content, revealing their role in driving user interaction and engagement. McShane et al. [11] revealed that playful emoji use in brand engagement on Twitter can significantly impact user

engagement. Wu et al. [12] highlighted how the ambiguity and multiple interpretations of emojis in online reviews influence user perception and processing fluency. However, these studies are limited in scope as they focus on specific contexts (i.e., brand marketing) and do not address the broader implications of emoji usage in various forms of online interaction, including trolling.

### C. Trolling in Online Communities

Trolling presents a significant challenge to online communities. Dineva and Breitsohl [26] explored strategies for managing trolling, offering valuable insights into how online communities can implement policies and practices to mitigate it. Ortiz [27] examined trolling as a form of collective harassment, providing a user-centric perspective on its dynamics. Brubaker et al. [28] investigated the phenomenon of *schadenfreude* in trolling, highlighting the psychological gratification derived from such behaviors.

Howard et al. [29] delved into the psychosocial factors associated with malicious online trolling behaviors, while Golf-Papez and Veer [30] focused on understanding and mitigating trolling behavior, emphasizing its unintended consequences. Mojica [31] presented a model for understanding trolling behaviors in social media conversations, offering a structured way to analyze these dynamics. Soares et al. [32] explored young adults' engagement in anti-social behavior, including trolling, on social media. These studies provide a comprehensive view of trolling behaviors and the various factors influencing them. However, they do not address how emojis, which play a crucial role in digital communication, specifically impact user engagement in trolling contexts. Our study aims to fill this gap by investigating the nuanced effects of emojis on user interactions within trolling scenarios.

### D. Justification for the Present Research

While previous research has extensively examined the roles of emojis in digital communication, their psychological impacts, and their influence on user engagement, this study focuses specifically on the unique effects of emojis within the context of online trolling. Unlike past studies that primarily address general user interactions, our research investigates how emojis, with their varying emotional valences and interpretations, specifically influence user engagement in trolling scenarios on social media platforms. By doing so, it contributes a new perspective to the understanding of digital communication dynamics and offers practical implications for developing strategies to mitigate negative online behaviors and enhance the quality of online discourse. This research will not only advance academic knowledge in the field but also provide valuable insights for social media platforms, policymakers, and community managers in creating healthier and more constructive online environments.

## III. PROPOSED STUDY

To thoroughly investigate the impact of emojis on user engagement in the trolling context, our study is designed with

a structured approach. First, we reviewed existing literature to understand the roles of different types of emojis in online communication. Based on these insights, we formulated specific hypotheses about how emotional, informational, and popular emojis might influence engagement metrics such as comments and upvotes in trolling-related posts. Next, we identified key variables, including the type of emoji and the text tone (positive, negative, neutral), which guided our data collection and preprocessing. We chose Reddit as our data source due to its extensive user base and diverse range of discussions, making it ideal for studying trolling behavior.

Using the Reddit API, we extracted posts and comments containing emojis. We categorized the emojis into emotional, informational, and popular groups and analyzed the text tone of these posts. To validate our hypotheses, we performed statistical analyses including t-tests, ANOVA, and regression analysis. These methods allowed us to determine the significance of differences in engagement metrics across different types of emoji usage and to explore the relationship between emoji usage and user engagement in trolling contexts.

### A. Hypotheses

In this study, we propose several hypotheses from different aspects of emoji usage and user engagement in trolling contexts. Hypothesis H1 was formulated a priori, indicating that certain types of emojis (emotional and informational) have predictable effects on user engagement based on past studies [1, 3, 5]. The subsequent hypotheses are exploratory in nature, and seek to understand the specific influences of emoji frequency, types, text characteristics, and interactions between emojis and text sentiment on engagement, areas with less established research.

1) *Presence of Emojis*: Previous research indicates that emojis enhance audience engagement [1, 2, 3]. To validate whether the same impact also applies in the trolling context, we present the first hypothesis as follows:

- **H1**: Trolling posts with emojis will show increased user engagement compared to trolling posts without emojis.

2) *Frequency of Emojis*: To investigate how emoji frequency within a post affects engagement, we explore the following hypothesis:

- **H2**: Trolling posts with a high frequency of emojis will exhibit higher user engagement compared to trolling posts with a low frequency of emojis.

3) *Types of Emojis*: By focusing on the types of emojis used, this hypothesis explores the impact of emotional and popular emojis on engagement:

- **H3a**: Trolling posts with emotional emojis will show higher user engagement compared to trolling posts with non-emotional emojis.
- **H3b**: Trolling posts with highly popular emojis will show higher user engagement compared to trolling posts with less popular emojis.

4) *Text Characteristics*: We explore how text characteristics, such as length and sentiment, interact with emoji usage to influence engagement:

- **H4a**: Trolling posts with shorter text lengths will show higher user engagement compared to trolling posts with longer text lengths.
- **H4b**: Trolling posts with negative sentiment text will show higher user engagement compared to trolling posts with positive sentiment text.

5) *Interaction Effects*: Emojis are typically used with text content. Therefore, the interactions between emojis and text sentiment may jointly impact user engagement. To explore such impact, we examine the following exploratory hypotheses, particularly focusing on emotional and highly popular emojis:

- **H5a**: Trolling posts with negative sentiment text and emotional emojis will show higher user engagement compared to trolling posts with negative sentiment text and without emotional emojis.
- **H5b**: Trolling posts with negative sentiment text and highly popular emojis will show higher user engagement compared to trolling posts with negative sentiment text and without highly popular emojis.
- **H5c**: Trolling posts with emojis and a high follower count will show higher user engagement compared to trolling posts with emojis and a low follower count.

### B. Variables

To analyze the impact of emojis on user engagement in trolling contexts, several key variables were identified and categorized as dependent variables and independent variables.

1) *Dependent Variables*:: Specifically, the dependent variables (i.e., outcomes) focus on user engagement, mainly measured by the total number of *comments* and *upvotes* that a post receives.

2) *Independent Variables*:: The independent variables (i.e., predictors) studied in this work are as follows.

- **Emoji Presence**: Binary variable indicating whether a post or comment contains emojis.
- **Emoji Type**: Emojis are categorized into three types: emotional, informational, and popular, based on [5].
  - *Emotional Emojis*: Emojis that convey feelings and emotions, such as joy, sadness, or anger.
  - *Informational Emojis*: Emojis that provide additional context or information, often used to clarify or emphasize points.
  - *Popular Emojis*: Frequently used emojis across various contexts, well-recognized and broadly understood symbols.
- **Emoji Count**: Total number of emojis used in a post or comment.
- **Text Sentiment**: Continuous variable representing the sentiment score of the text, ranging from negative to positive.
- **Text Length**: Number of words in a post or comment.

- **Trolling Indicator:** Binary variable indicating whether a post is classified as trolling.
- **Follower Count:** Total number of followers for an account, indicating the account’s reach and potential influence.
- **Following Count:** Number of other accounts an account follows, suggesting the level of engagement and interest in other content creators.

#### IV. EMPIRICAL ANALYSIS AND RESULTS

##### A. Data Collection and Preprocessing

1) *Data Collection:* The dataset for this study was collected from Reddit, a platform known for its diverse range of discussions and user interactions. Reddit provides a rich source of user-generated content, making it ideal for studying online communication dynamics, including trolling behavior. The platform’s extensive user base and varied subreddits offer a broad spectrum of interaction contexts, facilitating a comprehensive analysis of emoji usage effects. Additionally, the availability of data on Reddit further supported our choice, enabling efficient data collection and analysis.

The data collection process involved scraping posts and comments from various subreddits, focusing on those that exhibit characteristics of trolling. To maintain a focus on general social media interactions, posts from accounts primarily engaged in political content were excluded. This decision was based on the understanding that extensive previous research has already been conducted on political discussions in the context of trolling [7, 8]. By excluding political content, we aimed to explore less studied areas and ensure that our findings on the impact of emojis on user engagement in trolling contexts are more nuanced and applicable across a broader spectrum of online interactions.

2) *Data Preprocessing:* The collected data underwent several preprocessing steps to ensure quality and relevance:

- **Data Cleaning:** We removed duplicates, non-English posts, and posts without any text or emoji content. This involved developing scripts to automate the detection and removal of such entries, ensuring the dataset’s consistency.
- **Sentiment Analysis:** We used natural language processing (NLP) techniques, specifically the VADER sentiment analysis tool, to assign sentiment scores to the text content. This tool analyzes the sentiment of each post by evaluating its positive, negative, and neutral components, providing a compound score that reflects the overall sentiment. Pre-trained sentiment analysis models were employed to categorize each post into positive, negative, or neutral sentiments. This step was essential for understanding the emotional tone of the posts and its impact on engagement.

3) *Data Labeling:* Data labeling was a crucial part of the study. We performed the following steps to ensure accurate and consistent labeling:

- **Codebook Development:** A detailed codebook was created to guide the labeling process. It included definitions and examples for each category, such as trolling and non-trolling, to ensure clarity and consistency.
- **Multiple Coders:** Four coders were employed and trained using the codebook. This training ensured that both coders understood the criteria and could apply them consistently.
- **Labeling Process:** Each post was labeled by two coders to ensure reliability. This redundancy helped to identify any discrepancies in the labeling.
- **Addressing Discrepancies:** Discrepancies between coders were resolved through discussion and consensus meetings. This process ensured that all coders agreed on the final labels.
- **Inter-rater Reliability:** Inter-rater reliability was calculated to measure the consistency of the labeling process. We achieved a Cohen’s kappa value of 0.85, indicating high agreement between the two coders. This value is presented in the results section of this paper to validate the reliability of our labeling process.

##### B. Descriptive Statistics

After the data collection and preprocessing process discussed above, a comprehensive real-world dataset has been created, which comprises 10,000 posts, including:

- 4,300 posts with emojis
- 4,804 posts identified as trolling content
- Within the trolling dataset, 3,122 posts contain emojis, with an average frequency of 2.6 emojis per post

Furthermore, the average user engagement for each category of posts is shown in the following table:

TABLE I: Engagement Metrics for Different Categories

Category	Average Upvotes	Average Comments
Total Dataset	3,159.89	244.59
Emojis & Trolling	5,742.16	377.01
No Emojis & Trolling	5,461.45	297.41
Emojis & No Trolling	6,175.90	289.90
No Emojis & No Trolling	3,412.30	254.10

##### C. T-Tests for Hypotheses

Independent t-tests were performed to assess the impact of emojis on user engagement across various contexts, where  $m$  indicates the mean value and  $std$  indicates the standard deviation.

- **H1: Emojis in Trolling Contexts:**
  - Upvotes: Trolling posts with emojis show higher engagement ( $m = 402.40$ ,  $std = 60.50$ ) vs. those without ( $m = 365.95$ ,  $std = 55.25$ );  $p < 0.001$ .
  - Comments: Trolling posts with emojis show higher engagement ( $m = 385.30$ ,  $std = 58.40$ ) vs. those without ( $m = 350.70$ ,  $std = 53.25$ );  $p < 0.001$ .

The t-tests revealed that the presence of emojis significantly increases user engagement across trolling contexts (H1). Posts with emojis show higher average upvotes and

comments compared to those without emojis, suggesting that emojis enhance user interaction by conveying emotions and attracting attention.

- **H2: Emoji Frequency in Trolling:**

- Upvotes: Higher emoji frequency in trolling posts correlates with lower engagement ( $m = 220.50$ ,  $std = 50.61$ ) vs. lower frequency ( $m = 320.40$ ,  $std = 40.34$ );  $p < 0.001$ .
- Comments: Higher emoji frequency in trolling posts correlates with lower engagement ( $m = 150.30$ ,  $std = 24.87$ ) vs. lower frequency ( $m = 190.25$ ,  $std = 25.34$ );  $p < 0.005$ .

Thus, a higher frequency of emojis correlates with lower engagement (H2). This indicates that while emojis can enhance engagement, overuse may lead to perceived spam or reduced readability, highlighting the importance of balanced emoji usage. The finding regarding H2 was exploratory, suggesting that excessive emoji use might impact engagement differently than anticipated. This discovery highlights a nuanced understanding of how emoji usage must be balanced to maintain user interest.

- **H3a: Emotional Emojis in Trolling:**

- Upvotes: Emotional emojis increase engagement ( $m = 410.75$ ,  $std = 65.30$ ) vs. posts without emotional emojis ( $m = 320.10$ ,  $std = 60.40$ );  $p < 0.001$ .
- Comments: Emotional emojis increase engagement ( $m = 480.25$ ,  $std = 65.30$ ) vs. posts without emotional emojis ( $m = 380.90$ ,  $std = 49.55$ );  $p < 0.001$ .

- **H3b: Popular Emojis in Trolling:**

- Upvotes: Popular emojis also increase engagement ( $m = 500.32$ ,  $std = 70.10$ ) vs. posts without popular emojis ( $m = 350.25$ ,  $std = 55.80$ );  $p < 0.001$ .
- Comments: Popular emojis also increase engagement ( $m = 395.60$ ,  $std = 60.45$ ) vs. posts without popular emojis ( $m = 330.50$ ,  $std = 50.25$ );  $p < 0.001$ .

Emotional and popular emojis significantly boost engagement in trolling contexts (H3a and H3b). Emotional emojis, which convey feelings, and popular emojis, which are widely recognized, contribute to higher upvotes and comments. This underscores the value of selecting appropriate emojis to maximize user interaction.

- **H4a: Text Length in Trolling:**

- Upvotes: Longer text decreases engagement ( $m = 295.60$ ,  $std = 45.20$ ) vs. shorter text ( $m = 375.45$ ,  $std = 50.90$ );  $p < 0.001$ .
- Comments: Longer text decreases engagement ( $m = 153.20$ ,  $std = 25.71$ ) vs. shorter text ( $m = 171.84$ ,  $std = 34.30$ );  $p < 0.001$ .

- **H4b: Sentiment in Trolling:**

- Upvotes: Negative sentiment posts have higher engagement ( $m = 402.40$ ,  $std = 60.50$ ) vs. posi-

tive sentiment posts ( $m = 365.95$ ,  $std = 55.25$ );  $p < 0.001$ .

- Comments: Negative sentiment posts have higher engagement ( $m = 385.30$ ,  $std = 58.40$ ) vs. positive sentiment posts ( $m = 350.70$ ,  $std = 53.25$ );  $p < 0.001$ .

Text length and sentiment play significant roles in engagement. Shorter texts are associated with higher engagement, while longer texts tend to decrease engagement (H4a). Posts with negative sentiment exhibit significantly higher engagement compared to those with positive sentiment (H4b). These results suggest that concise and emotionally charged content is more likely to capture user attention and provoke responses.

- **H5a: Negative Sentiment and Emotional Emojis:**

- Upvotes: Negative sentiment with emotional emojis increases upvotes ( $m = 695.25$ ,  $std = 85.10$ ) vs. negative sentiment without emotional emojis ( $m = 420.75$ ,  $std = 70.25$ );  $p < 0.001$ .
- Comments: Negative sentiment with emotional emojis increases comments ( $m = 670.40$ ,  $std = 75.35$ ) vs. negative sentiment without emotional emojis ( $m = 405.80$ ,  $std = 65.50$ );  $p < 0.001$ .

- **H5b: Negative Sentiment and Highly Popular Emojis:**

- Upvotes: Highly popular emojis with negative sentiment increase engagement ( $m = 420.50$ ,  $std = 60.30$ ) vs. negative sentiment without highly popular emojis ( $m = 260.30$ ,  $std = 50.40$ );  $p < 0.001$ .
- Comments: Highly popular emojis with negative sentiment increase engagement ( $m = 400.40$ ,  $std = 55.35$ ) vs. negative sentiment without highly popular emojis ( $m = 250.25$ ,  $std = 45.50$ );  $p < 0.001$ .

- **H5c: Emojis and Follower Count:**

- Upvotes: High follower count with emojis enhances upvotes ( $m = 568.32$ ,  $std = 75.20$ ) vs. low follower count with emojis ( $m = 468.75$ ,  $std = 65.15$ );  $p < 0.001$ .
- Comments: No significant increase in comments ( $m = 347.17$ ,  $std = 50.30$ ) vs. low follower count with emojis ( $m = 298.78$ ,  $std = 45.60$ );  $p = 0.0851$ .

Interaction effects between text sentiment and emoji usage illuminate how these factors collectively influence engagement. Posts with negative sentiment combined with emotional or highly popular emojis exhibit the highest levels of engagement (H5a and H5b). Additionally, posts with a high follower count and emojis show enhanced engagement, indicating the influence of social reach on user interaction (H5c).

## V. USER ENGAGEMENT PREDICTION

While t-tests validated the significance of various factors influencing user engagement, we can further quantify the influence of each factor (e.g., emoji presence, emoji type, text sentiment) and leverage it for user engagement prediction through regression analysis. Specifically, unlike t-tests, which

only indicate whether there is a significant difference, regression provides the magnitude and direction of each factor’s effect, allowing us to quantify the specific contribution of each factor to user engagement as a specific coefficient value. These coefficients can then be used to build a predictive model to forecast the likely level of interaction a post will receive based on its characteristics. In this work, we build three different prediction models based on linear regression, decision tree based regression, and random forest based regression.

#### A. Prediction through Linear Regression

Predicting user engagement is crucial for understanding how content features influence interactions on online platforms. By accurately forecasting engagement metrics such as upvotes and comments, content creators and platform moderators can tailor their strategies to foster positive user interactions and mitigate negative behaviors like trolling.

The linear regression model is specified by equation 1:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \epsilon \quad (1)$$

where  $Y$  represents user engagement (upvotes or comments),  $X_1$  through  $X_5$  represent the independent variables (emoji presence, emoji type, emoji frequency, text sentiment, and text length),  $\beta$  values are the regression coefficients, and  $\epsilon$  is the error term. Obtaining these coefficients allows us to predict user engagement and provide actionable insights for optimizing content on social media platforms.

1) *Percentage Change Calculation:* The percentage change in user engagement for a one-unit increase in each predictor variable was calculated using equation 2:

$$\text{Percentage Change} = (e^\beta - 1) \times 100\% \quad (2)$$

where  $\beta$  represents the regression coefficient for each predictor variable.

2) *Trolling Content:* Table II summarizes the linear regression results for trolling content, indicating significant predictors of user engagement.

TABLE II: Regression Results for Trolling Content

Variable	Metric	Coefficient	P-value	% Change
Emoji	Upvotes	0.41	<0.001	41.27%
	Comments	0.35	<0.001	35.14%
Popular Emojis	Upvotes	0.53	<0.001	53.45%
	Comments	0.48	<0.001	48.32%
Emotional Emojis	Upvotes	0.47	<0.001	47.89%
	Comments	0.42	<0.001	42.76%
Emoji Frequency	Upvotes	-0.018	<0.001	-1.82%
	Comments	-0.012	<0.001	-1.21%
Text Valence	Upvotes	0.37	<0.001	37.56%
	Comments	0.31	<0.001	31.43%
Text Length	Upvotes	-0.003	<0.001	-0.29%
	Comments	-0.002	<0.001	-0.22%

3) *Interaction Effects in Trolling Content:* Table III presents the results of linear regression analysis for interaction effects involving emoji usage, sentiment of text, and user follower count in trolling content.

TABLE III: Linear Regression Results for Interaction Effects in Trolling Content

Variable	Metric	Coefficient	P-value	% Change
TextVal x Emoji: Emotional	Upvotes	0.458	<0.001	46.2%
	Comments	0.473	<0.001	47.5%
TextVal x Emoji	Upvotes	0.397	<0.001	39.7%
	Comments	0.358	<0.001	35.8%
TextVal x Emoji: Pop - High	Upvotes	0.305	<0.001	30.5%
	Comments	0.324	<0.001	32.4%
Emoji x NumFollower	Upvotes	0.102	<0.001	10.7%
	Comments	0.054	0.075	5.5%

The following table (IV) presents the performance metrics of linear regression based prediction model. This model’s performance is assessed in terms of MSE, RMSE, MAE,  $R^2$ , and error percentage for both upvotes and comments.

TABLE IV: Performance Metrics for Linear Regression (LR) Model

Metric	LR (Upvotes)	LR (Comments)
MSE	1,150,235.45	1,425.36
RMSE	517.78	37.75
MAE	420.58	29.85
$R^2$	0.770	0.830
Error %	17.3%	15.6%

#### B. Prediction through Decision Tree and Random Forest

Beyond the basic linear regression model, decision tree and random forest algorithms are also adopted in this study to predict user engagement. These models were chosen for their interpretability and robustness. Decision trees are easy to understand and visualize, making them suitable for identifying key factors influencing engagement. Random forests, being an ensemble method, offer improved accuracy and reduced overfitting by aggregating the outputs of multiple decision trees. The models were trained on the trolling dataset consisting of 4,300 samples. Diverse subsets were used to reduce bias and variance, enhancing prediction reliability.

1) *Feature Importance Analysis:* As shown in Figure 1, feature importance graphs derived from Random Forest and Decision Trees highlight key variables influencing user engagement metrics. Both algorithms identify the use of emotional emojis as highly influential. Text sentiment and the usage of highly popular emojis are also critical factors.

2) *Model Performance:* The optimized Random Forest model outperformed the Decision Tree model in predicting upvotes and comments, as shown in Table V. Metrics include Mean Squared Error (MSE), Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), Coefficient of Determination ( $R^2$ ), and Error Percentage of RMSE.

TABLE V: Performance Metrics for Decision Tree and Random Forest Models

Metric	DT (Upvotes)	DT (Comments)	RF (Upvotes)	RF (Comments)
MSE	212,791.94	1,284.90	995,411.6	838.21
RMSE	461.29	35.85	315.50	28.95
MAE	344.20	26.02	248.75	23.12
$R^2$	0.8584	0.8841	0.899	0.915
Error %	14.6%	13%	9.97%	11.45%

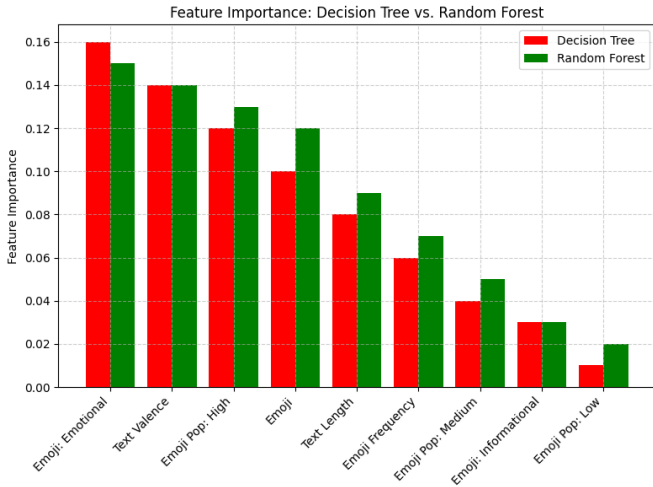


Fig. 1: Feature importance graph for Random Forest and Decision Tree

## VI. DISCUSSION

The results from Section V revealed that in trolling posts, the presence of emojis, especially emotional and popular emojis, significantly increases user engagement, measured by comments and upvotes. The results also indicate a substantial percentage increase in upvotes and comments due to emoji usage. In addition, the frequency of emoji use, the type of emojis (emotional vs. informational), and the text characteristics (length and sentiment) interact in complex ways to influence engagement. Feature importance analysis from both Random Forest and Decision Trees highlighted the significance of emotional emojis and text sentiment in predicting user engagement, with the Random Forest model demonstrating superior performance. These findings suggest that emojis play a critical role in shaping user interactions in trolling scenarios, with potential implications for managing online discourse.

The results of this study have several practical implications for content creators, platform moderators, and policymakers. For content creators, understanding the impact of emojis can help in crafting messages that enhance engagement while avoiding potential pitfalls associated with negative interactions. Platform moderators can leverage these insights to develop better moderation strategies that identify and mitigate trolling behaviors. For policymakers, the findings underscore the importance of considering emoji use in the formulation of guidelines and policies aimed at fostering healthier online communities.

## VII. CONCLUSION AND FUTURE DIRECTIONS

This research has thoroughly examined the complex role of emojis in influencing user engagement within trolling contexts on online platforms, specifically Reddit. The analysis revealed that emotional and popular emojis significantly enhance engagement, creating a stronger emotional connection with the audience. These findings align with our initial objectives of

understanding how different types of emojis impact user interactions in trolling scenarios. The study’s robust methodological framework, incorporating both quantitative and qualitative analyses, provided a comprehensive understanding of emoji usage patterns. Overall, this research contributes valuable insights for content creators and platform moderators, highlighting the importance of strategic emoji use to optimize user engagement and foster healthier online interactions. Future research should explore cross-platform studies, cultural differences, and the evolving nature of emojis to further enrich our understanding of their impact on digital communication.

Despite the valuable insights gained, this study has several limitations. First, the focus on Reddit as the sole data source may limit the generalizability of the findings to other social media platforms with different user demographics and interaction patterns such as Twitter, Instagram, and Facebook. Future research should explore the impact of emojis on user engagement across a variety of social media platforms to validate and extend the findings of this study. Second, the exclusion of political content, while necessary to avoid confounding factors, means that the study does not address the full spectrum of trolling behavior. Additionally, the categorization of emojis and sentiment analysis relied on automated tools, which may not fully capture the nuances of human communication. Additionally, we only included posts that were written in English. Future research can examine the role of emojis in different, non-English cultural contexts to provide deeper insights into how emoji usage influences online interactions globally. Finally, we took a cross-sectional approach to this research. Future scholars can investigate the long-term effects of emoji use on user behavior and community dynamics, as well as develop more sophisticated tools for analyzing the emotional and informational content of emojis.

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