



Analyzing Public Sentiment Towards AI: Insights from Video Comments on Bilibili and YouTube - A ChatGPT Case Study

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Abstract. This study examines user attitudes towards AI on the online platforms Bilibili and YouTube, focusing on ChatGPT, an AI-based language model. Through word frequency, sentiment, and topic modeling analysis, user interests, sentiment distribution, and prevalent themes are explored. Bilibili demonstrates a higher proportion of negative sentiment, primarily driven by critical feedback from student users. Common interests among users on both platforms include human behavior, learning, programming, data analysis, scientific research, video appreciation, and ChatGPT's role in content discovery. These findings contribute to understanding diverse user attitudes towards AI on different online platforms.

Keywords: ChatGPT; User Attitudes; Bilibili; YouTube.

1 Introduction

Recent research has shed light on the multifaceted landscape of AI applications, unveiling both transformative benefits and intricate challenges. As our world becomes increasingly intertwined with artificial intelligence, concerns encompassing data privacy, ethical considerations, workforce dynamics, and bias mitigation have come to the forefront. In an endeavor to comprehend and address these challenges, this study delves into the sentiments encapsulated within an extensive corpus of user comments exceeding 45,000 from video platforms Bilibili and YouTube.

In the realm of emerging generative AI, like ChatGPT, research emphasizes acknowledging concerns related to unemployment, privacy, ethics, and biases. Chen Yongwei ^[1] urges prompt attention to these issues as generative AI gains traction. Firat ^[2] notes ChatGPT's potential in education but urges further research on privacy, biases, misuse, and digital transformation's consequences. ANDREW A. DAVINACK's study ^[3] concludes that ChatGPT can't replace expert taxonomists for biodiversity assessments.

Numerous studies emphasize addressing concerns tied to emerging generative AI like ChatGPT. Dwivedi ^[4] stress a comprehensive approach, Sallam ^[5] examines ChatGPT's potential in healthcare, and Asghar ^[6], Jia ^[7], and Schneider ^[8] delve into AI's impact on sentiment analysis and digital platforms.

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While focusing on generative AI, Alias ^[9] explore YouTube's analytical dimensions, and Schultes ^[10] delve into user comments, enriching the discourse.

Notwithstanding the growing body of research, the public discourse on AI remains a dynamic and evolving subject. This study endeavors to enrich our comprehension of public sentiments, as gleaned from diverse video comments, thereby contributing to the ongoing dialogue surrounding AI's implications for society and beyond.

2 Methodology

2.1 Data Collection

The study collected data from Bilibili and YouTube, two popular video platforms, to ensure a diverse range of perspectives on ChatGPT and a broader representation of attitudes towards AI. The data retrieval process involved web scraping techniques using Python and Octoparse to extract comments from selected videos. A substantial volume of comments was collected, including over 23,200 comments from 50 ChatGPT-related videos on Bilibili and over 22,600 comments from 55 ChatGPT-related videos on YouTube. The data collection spanned from December 2022 to June 2023, allowing for a comprehensive analysis of attitudes towards ChatGPT over an extended period.

2.2 Word Frequency and Word Cloud Analysis

2.2.1 Data Preprocessing.

The data underwent cleaning procedures, resulting in a final dataset of 19,789 comments from YouTube and 18,861 comments from Bilibili. The Chinese comments were tokenized to split the text into individual words or tokens. Additionally, stop words were removed from the comments to improve analysis quality by eliminating irrelevant and commonly used words.

2.2.2 Word Frequency Analysis.

After performing the word frequency analysis on both Bilibili and YouTube comments, we have compiled a comprehensive list of the most frequently used words. The top 10 most frequently used words on Bilibili are presented in Table 1, while the corresponding data for YouTube comments can be found in Table 2.

Table 1. Bilibili Word Frequency (Top 10)

Word	Frequency
Human	1129
Good	894
Video	631
Code	561
Data	535
Learning	476

Table 2. YouTube Word Frequency (Top 10)

Word	Frequency
Video	1682
Make	1531
People	1411
Good	1197
Great	1131
Time	1034

were considered: Focus, Learning and Education, Social Impact, and Platform Differences.

Table 3. Comparative Analysis of ChatGPT Discussions on YouTube and Bilibili

Aspect	Bilibili	YouTube
Focus	Technical focus on video content creation and learning	Creative focus on positive aspects and creativity
Learning and Education	Emphasis on learning, training, and educational applications	Recognition of ChatGPT's potential as a learning tool
Social Impact	Concerns about societal impact and job implications	Appreciation for positive impact and human interaction
Platform Differences	Technical focus on domestic discussions	Broader range of topics and global perspectives

The analysis of ChatGPT discussions on Bilibili revealed a predominant focus on technical aspects, such as code and video creation. The frequent use of terms like "human" and "learning" indicates an interest in exploring ChatGPT's applications in these areas. Additionally, Bilibili users engage in discussions about the social impact of ChatGPT, expressing concerns about its implications for society and job prospects. These findings highlight the Chinese online community's preference for technical discussions on Bilibili.

In contrast, discussions on YouTube have a broader focus. Users on this platform emphasize the creative aspects of ChatGPT, sharing positive experiences and recognizing its potential. The terms "making," "people," and "world" demonstrate an appreciation for ChatGPT's impact on human interaction and the global community.

These differences in user discussions reflect the distinct interests and priorities on each platform. Bilibili users prioritize technical discussions within the Chinese online community, while YouTube users explore a wider range of creative and social aspects related to ChatGPT. Nevertheless, both platforms recognize ChatGPT's potential and express concerns about its societal implications.

2.3 Sentiment Analysis

2.3.1 Sentiment Analysis Results and Chi-square Test.

Sentiment analysis was performed using the snownlp and vaderSentiment libraries, which employ pre-built sentiment lexicons and machine learning algorithms to classify text based on word polarity and contextual factors. Positive sentiment denotes comments expressing positive, appreciative, or liking emotions, while negative sentiment refers to comments expressing negative, dissatisfied, or disgusted emotions. Neutral sentiment encompasses comments that are neutral, objective, or lacking strong emotional inclination. The accuracy of these classifications is enhanced through the validation and optimization of sentiment lexicons and algorithms during training.

The sentiment analysis of comments on Bilibili and YouTube yielded the following results:

Table 4 presents the results of sentiment analysis on comments from Bilibili, showing the count and percentage of each sentiment category.

Similarly, Table 5 provides the sentiment analysis results for comments from YouTube, displaying the count and percentage of each sentiment category.

Table 4. Bilibili Sentiment Analysis Results

Sentiment	Count	Percentage
Positive	9587	50.83
Negative	6103	32.36
Neutral	3171	16.81

Table 5. YouTube Sentiment Analysis Results

Sentiment	Count	Percentage
Positive	11455	57.89
Negative	3611	18.25
Neutral	4723	23.87

To examine whether there is a significant difference in sentiment distribution between Bilibili and YouTube comments regarding AI, a chi-square test was conducted. The chi-square test assesses the association between categorical variables to determine their significant difference. The results of the chi-square test revealed a highly significant difference in the sentiment distribution between Bilibili and YouTube comments ($\chi^2 = 1088.598$, $p\text{-value} < 0.001$).

The findings indicate significant differences in sentiment distribution regarding AI comments between Bilibili and YouTube. The higher proportion of negative sentiments on Bilibili necessitates further investigation into the underlying reasons and dynamics within the Bilibili community.

Although the absence of standardized sentiment analysis criteria between Chinese and English introduces the possibility of error in the results, the impact of this potential error is deemed minimal. The analysis still offers valuable insights into the sentiment distribution among the comments on both platforms, providing a general understanding of public attitudes towards the topic.

2.3.2 Analysis of Sentiment Results.

The sentiment analysis of comments from Bilibili and YouTube unveils noteworthy trends and insights. Bilibili exhibits a higher percentage of negative sentiment (32.36%) compared to YouTube (18.25%).

Bilibili, a video sharing platform centered around anime culture, has attracted a large number of student users. Within this user demographic, students often express strong subjectivity in their comments, predominantly voicing criticism and discontent towards the works they encounter. As a result, the proportion of negative emotions in the comments on Bilibili is significantly amplified.

In contrast, YouTube demonstrates a comparatively lower proportion of negative sentiment. This can be attributed to its global user base, which cultivates diverse perspectives and opinions. The broader reach and diverse demographics of YouTube users contribute to a more equitable distribution of sentiment.

Overall, the sentiment analysis offers valuable insights into the predominant sentiments expressed on both Bilibili and YouTube. Comprehending the factors that

influence sentiment contributes to a more profound understanding of public perceptions and attitudes toward ChatGPT within these platform communities.

2.4 Topic Modeling

The study used the Latent Dirichlet Allocation (LDA) algorithm for topic modeling analysis on comments from Bilibili and YouTube. LDA is a widely used text mining technique that uncovers hidden topics in a corpus and assigns topic weights to each document. The gensim package was employed to implement the LDA algorithm.

2.4.1 Topic Modeling Results for Bilibili Comments.

The LDA analysis of the Bilibili comments unveiled three distinct topics:

Table 6 displays the integrated topic modeling results for Bilibili comments, showcasing the weights and corresponding keywords for each topic.

Table 6. Integrated Topic Modeling Results for Bilibili Comments

Topic #1	Weight	Topic #2	Weight	Topic #3	Weight
Humans	0.056	Code	0.04	Papers	0.048
Videos	0.053	Training	0.037	Research	0.043
Content	0.049	Models	0.035	Development	0.036
Learning	0.047	Data	0.033	Problem-solving	0.033
Knowledge	0.038	Technology	0.032	Understanding	0.032

The topic modeling analysis of Bilibili comments reveals three significant themes: user interest in human behavior, learning resources, and knowledge sharing (Topic #1); programming, model building, and data processing (Topic #2); and scientific research and academic discussions (Topic #3).

2.4.2 Topic Modeling Results for YouTube Comments.

Applying LDA topic modeling analysis to the YouTube comments led to the identification of three topics:

Table 7 displays the integrated topic modeling results for YouTube comments, showcasing the weights and corresponding keywords for each topic.

Table 7. Integrated Topic Modeling Results for YouTube Comments

Topic #1	Weight	Topic #2	Weight	Topic #3	Weight
Video	0.117	Learning	0.052	Knowledge	0.027
Content	0.057	Technology	0.046	Human	0.025
People	0.053	Data	0.043	Imagination	0.024

Like	0.047	Programming	0.042	Development	0.023
Create	0.045	Future	0.036	Intelligence	0.022

Similarly, the analysis of YouTube comments through topic modeling uncovers three noteworthy themes: video appreciation and positive sentiments (Topic #1); technological learning, including technology, data analysis, programming, and future developments (Topic #2); and the role of ChatGPT in assisting users in finding valuable content and acquiring knowledge (Topic #3).

In summary, the LDA topic modeling analysis provides valuable insights into the discussed topics and content related to ChatGPT in both Bilibili and YouTube comments. YouTube comments highlight appreciation, technological learning, and content discovery, while Bilibili comments showcase interests in human behavior, technical aspects, and scientific research.

3 Discussion and Conclusion

3.1 Summary

The analysis of comments on Bilibili and YouTube regarding ChatGPT has yielded interesting findings and insights. Word frequency analysis shows commonly used words on both platforms, indicating distinct interests and priorities. Bilibili users focus more on technical aspects and express concerns about social impact, while YouTube users emphasize creativity and positive experiences.

Sentiment analysis reveals a significant disparity in sentiment distribution between Bilibili and YouTube comments, with Bilibili exhibiting a higher proportion of negative sentiment. The greater occurrence of negative sentiment on Bilibili can be attributed to the platform's user demographics and criticisms of Chinese internet companies.

Topic modeling analysis uncovers significant themes in the comments on both platforms. Bilibili comments highlight interests in human behavior, technical aspects, and scientific research, while YouTube comments emphasize appreciation, technological learning, and content discovery.

3.2 Contributions

This study makes several contributions to the understanding of people's attitudes towards AI on Bilibili and YouTube, as outlined below:

- **Creation of two datasets:** Two comprehensive datasets were created by collecting user-generated comments from Bilibili and YouTube. Researchers can utilize these datasets for further investigations and to explore user opinions in-depth.
- **Sentiment analysis and topic modeling:** Sentiment analysis was conducted to understand the distribution of positive, negative, and neutral sentiments among Bilibili and YouTube commenters. This analysis also allowed for the identification of sentiment patterns, providing insights into user attitudes towards AI. Additionally, topic

modeling analysis was performed on the comments from both platforms, unveiling distinct topics and associated keywords, shedding light on user interests and the discussed content related to AI.

- Comparison of platform differences: A comparative analysis of sentiment patterns and topic distributions between Bilibili and YouTube comments was performed. This comparison revealed significant differences in views and perspectives across these platforms.

3.3 Areas for Improvement

This study provides valuable insights into people's attitudes towards AI and platform-specific differences. However, future research can consider the following areas for improvement:

- Sample diversity: Expanding the sample beyond Bilibili and YouTube to include comments from other platforms and diverse demographics would provide a more comprehensive understanding of attitudes towards AI.
- Qualitative analysis: In addition to quantitative techniques like sentiment analysis and topic modeling, incorporating qualitative methods such as in-depth interviews or surveys could offer richer insights into the underlying reasons behind people's attitudes towards AI.
- Longitudinal analysis: Conducting a longitudinal study over an extended period would allow for the tracking of changes in attitudes towards AI. Examining trends and shifts in sentiment and topics discussed over time would provide a deeper understanding of the evolving public opinion on AI.

3.4 Conclusion

In conclusion, this study significantly contributes to the understanding of global public attitudes towards AI and highlights the importance of platform-specific differences. The insights gained from the research are instrumental in informing policymakers, researchers, and industry professionals about the prevailing sentiments, concerns, and expectations surrounding AI technology. By recognizing these platform-specific variations and taking them into account, AI developers and content creators can tailor their approaches to better address the preferences and concerns of their target audiences.

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