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SENTIMENT ANALYSIS AND OPINION MINING OF BOYS' LOVE (BL) DRAMA SERIES: ANALYSING VIEWER REACTIONS AND TRENDS THROUGH SOCIAL MEDIA DATA

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Abstract: In recent years, BL drama series have gained a huge following, especially due to their variant audiences who clamor for more complicated narratives and representations. This study seeks to analyze the opinion of viewers about BL drama by applying sentiment analysis and opinion mining in social media data. This paper explores emotional responses and thematic preferences by BL drama audiences through the review, comments, and discussions on Twitter, Reddit, and fan forums. We employ state-of-the-art NLP methods and sentiment analysis tools to determine key trends, changes in sentiment, and common themes within various BL series. The findings represent how character development and plot dynamics in BL dramas shaped the viewers' perceptions and overall reception. The research provides highly useful insights into the audience's engagement with BL content and thus contributes to an understanding of how niche genres resonate with viewers in the digital era.

Keywords: Sentiment analysis, opinion mining, BL, drama series, social media data.

Introduction: Within the last ten years, Boys' Love has gained popularity worldwide; it is generally characterized by the depiction of the romantic relationship between two male characters. Indeed, this aspect can be seen not only from the increased production rate of BL drama series but also in its increased audience viewership and diversifying demographics engaging in them. While gaining prominence, BL dramas spiral to a point whereby understanding audiences' sentiments and opinions

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about these contents becomes critical for content creators, marketers, and researchers alike.

Sentiment analysis and opinion mining, therefore, are useful in the derivation of meaningful insights from a large volume of text data. Social media, as will be observed, quite often features viewers expressing their reactions and reviews. Viewergenerated texts, such as reviews, comments, and social media posts, can be mined for patterns and trends that give insight into audience preferences and emotional responses.

This will involve applying sentiment analysis and opinion mining to data from social media sources about BL dramas. The main objectives are to ascertain prevailing sentiments associated with various aspects of BL series, such as character development, plot intricacies, and thematic elements, and explore variation in these sentiments across different BL dramas to identify emerging trends in the genre.

Through the analysis of social media interactions and reviews, the research contributes to the wider media

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studies and sentiment analysis literature on the resonance of a niche genre such as BL with its contemporary audience. The findings have implications for content creators keen to tailor their productions according to audience preferences and for marketers keen to better understand and engage with fan communities. This research tries to close the gap between audience feedback and content production through a serious analysis of viewer sentiment and opinions regarding BL drama series for a comprehensive understanding of how those dramas have been perceived and valued in a digital landscape.

Literature Review: The exploration of sentiment analysis and opinion mining within the context of the Boys' Love (BL) drama series is a niche but growing area of research that intersects with fields like natural language processing (NLP), media studies, and cultural analysis. This section reviews related works in these areas, providing a foundation for understanding the specific challenges and opportunities in analyzing viewer reactions and trends within the BL drama genre.

A. Sentiment Analysis in Media and Entertainment Sentiment analysis has become a popular tool for gauging public opinion on various forms of media, including movies, television series, and online content. Researchers have applied sentiment analysis to understand audience reactions to TV shows, such as the work by Poria et al. (2016), who utilized multimodal sentiment analysis to assess the emotional impact of television programs. Similarly, Asur and Huberman (2010) demonstrated the power of sentiment analysis on Twitter data to predict box office revenues for movies, showcasing the strong between online sentiment and correlation commercial success.

In the context of BL dramas, similar techniques can be applied to understand the sentiment of viewers, but with a focus on the unique cultural and social dynamics that these dramas often represent. The application of sentiment analysis to such niche content is particularly important as it can reveal underlying attitudes toward LGBTQ+ themes, which are central to BL dramas. **B.** Opinion Mining in Niche Cultural Phenomena Sentiment analysis is considered by many to be a coarser ancestor of opinion mining, which targets the specific aspects or features of a product, event, or cultural phenomenon. The same method has also been put into service to analyze user-generated content on YouTube, Reddit, and Tumblr. For example, Chen *et al.* have conducted opinion mining on YouTube comments to identify viewer preferences and critique patterns related to the video content. Similarly, there is the use of opinion mining in fan discussions of K-pop, another entertainment genre with very active online communities, as applied by Dang *et al.* (2020).

These series of studies could also pertain to the BL drama genre, as any BL drama watched by fans is usually followed by detailed discussions of random and subtle opinions that range from plot development to character dynamics to issues of representation. Opinion mining will allow the collection of such insights from views about their perceptions of, and interaction with, BL dramas, especially about how they portray LGBTQ+ themes. *C. Social Media as a Data Source for Cultural*

Analysis

Social media platforms have emerged as rich cultural and social sources of data analysis. The ability to analyze large-scale, real-time data has revolutionized the approach that scholars research cultural phenomena. Twitter, Weibo, and Tumblr feature particularly in the mainstream context of such a study owing to their extensive usage by the fan communities.

For instance, Liang *et al.* (2020) analyzed Weibo data in order to understand public opinion about Chinese television dramas and gave a hint regarding the role that the platform is playing in shaping as well as reflecting cultural discourses. With regard to BL dramas, however, social media data becomes particularly important for capturing audience reactions across different cultural contexts, given the origins of the genre in Japan and its subsequent popularity in other Asian countries. BL dramas are cross-cultural in nature, and the analysis can be done **Research Article**

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with social media as an ideal data source to capture diverse perspectives.

D. Challenges in Sentiment Analysis and Opinion Mining for BL Dramas

Opinion mining into BL dramas presents some specific challenges. For instance, the language and slang adopted by these fan communities include a lot of terms and references that only make sense in this genre. Domain-specific lexicons and models have proven to show state-of-the-art results in sentiment analysis for specialized contexts, such as Liu et al. Another issue is the presence of mixed feelings in discussions among fans. Sentiment analysis in fan fiction communities, similar to Thelwall et al. 2010, presents sentiments as complex and multi-layered at times, especially in genres that are considered niches. This requires sophistication that advanced models can afford when analyzing sarcasm, irony, and the often disparate nature of opinions by fans.

This research in sentiment analysis and opinion mining of BL drama series draws on existing methodologies in media and entertainment studies while addressing unique problems within this genre. Utilizing data from social media could give an idea about the reaction of the viewers and trends that might further help understand the cultural effect and audience dynamics of BL dramas. As for the content aspect, to capture those fine sentiments and opinions of an audience, different approaches might be particular to the nature of the content.

Proposed System Overview: The following figure shows the overall architecture of the proposed system developed for sentiment analysis and opinion mining.

For the Data Collection Module will be responsible for gathering data from social media platforms, review websites, and fan forums. It will include web scraping tools, APIs, and a data storage system. After data collection, the data will be cleaned and preprocessed. This module will handle tasks such as tokenization, removing stop words, lemmatization, and handling missing or noisy data.



Figure 1. Proposed system design

Sentiment Analysis Module will implement sentiment analysis algorithms, either rule-based or machine learning-based, to classify sentiments as positive, negative, or neutral. Opinion Mining Module will perform aspect-based sentiment analysis to extract opinions on specific aspects of BL dramas (e.g., character development, plot, representation). Finally, Visualization and Reporting Module will generate visualizations (e.g., graphs, charts) and reports summarizing the findings, trends, and insights.



Figure 2. Proposed framework



According to above figure 2, there are five steps to creating the proposed system. Process 1, the data collection, inputs: Social Media Data, Reviews, and raw data outputs. Process 2: data preprocessing, inputs: raw data, and outputs preprocessed data. For process 3: sentiment analysis, inputs: preprocessed data, and outputs: sentiment data. Then Process 4: Opinion Mining, inputs: preprocessed data, and outputs: opinion data. Final Process 5: Visualization and Reporting, inputs: sentiment data, opinion data, and outputs: reports, visualizations.

The following table collected data from social media platforms about a specific BL drama series.

Table 1. Collected data from social media

1.	Comment 1	"I absolutely loved the character		
		development in this series."		
2.	Comment 2	"The plot was boring and		
		dragged on."		
3.	Comment 3	"This BL drama had a great mix		
		of emotions."		
4.	Comment 4	"The acting was subpar, but the		
		storyline made up for it."		

E. Data Preprocessing

(1)Tokenization

Breaking down each comment into individual words (tokens).

	Table 2. Tokenization			
1.	Comment 1	["I", "absolutely", "loved", "the",		
		"character", "development",		
		"in", "this", "series"]		
2.	Comment 2	["The", "plot", "was", "boring",		
		"and", "dragged", "on"]		
3.	Comment 3	["This", "BL", "drama", "had",		
		"a", "great", "mix", "of",		
		"emotions"]		
4.	Comment 4	["The", "acting", "was",		
		"subpar", "but", "the",		
		"storyline", "made", "up", "for",		
		"it"]		

(2)Stop Words Removal

Removing common words that don't contribute much to sentiment.

Table 3. Removing common words

1.	Comment	["absolutely", "loved", "character",	
	1	"development", "series"]	
2.	Comment	["plot", "boring", "dragged"]	
	2		
3.	Comment	["BL", "drama", "great", "mix",	
	3	"emotions"]	
4.	Comment	["acting", "subpar", "storyline",	
	4	"made"]	

F. Sentiment Analysis

The sentiment analysis uses a simple sentiment scoring system for positive words and negative words. "loved", and "great" are positive words, and "boring", "dragged", and "subpar" are negative words.

Table 4.	Comment	analysis
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	140	
1.	Comment	Positive Words: 1 ("loved")
	1 Anarysis	Negative Words: 0
		Sentiment Score: +1 (Positive)
2.	Comment 2 Analysis	Positive Words: 0
	2 / Mary 515	Negative Words: 2 ("boring", "dragged")
		Sentiment Score: -2 (Negative)
3.	Comment 3 Analysis	Positive Words: 1 ("great")
	5 7 11 1 9 515	Negative Words: 0
		Sentiment Score: +1 (Positive)
4.	Comment	Positive Words: 0
	- Anarysis	Negative Words: 1 ("subpar")
		Sentiment Score: -1 (Negative)

G. Opinion Mining (Aspect-Based Sentiment)

The following table shows sentiment about specific aspects such as "character development" and "plot." For the Character Development (Comment 1) is a Sentiment Score: +1 (Positive) and for the Plot (Comment 2) is a Sentiment Score: -2 (Negative).

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Table	J.Summary and Visualization
Overall	2 Positive comments
Sentiment	
Sentiment	2 Negative comments
	Net Sentiment Score: 0 (Neutral
	overall sentiment)
Aspect-	Character Development: Positive
Based	
Sontimont	Plot: Negative
Semment	e

Table 5.Summary and Visualization

In this data, the system successfully classified sentiments and extracted opinions about specific aspects of the BL drama series. This basic calculation provides an overview of how sentiments are analyzed and how opinions are extracted. The following table provides a clear and concise summary of how each comment was analyzed for sentiment and opinion mining, with a focus on specific aspects of the drama series. In the Processed Text, the text after tokenization and stop words removal. The Positive/ Negative Words that contribute to positive or negative sentiment. Sentiment Score, the net sentiment score for each comment, is calculated as the difference between the number of positive and negative words. Aspect identified the specific aspect of the BL drama identified in the comment (e.g., "Plot," "Character Development"). Aspect Sentiment is the sentiment associated with the identified aspect.

Table 6. Summarizing the sentiment analysis and opinion mining from data.

Comment	Processed	Positive	Negative	Sentiment	Aspect	Aspect
	Text	Words	Words	Score	Identified	Sentiment
Comment 1: "I	["absolutely",	loved	-	+1	Character	Positive
absolutely loved	"loved",				Development	
the character	"character",					
development in this	"development",					
series!"	"series"]					
Comment 2: "The	["plot",	-	boring,	-2	Plot	Negative
plot was boring and	"boring",		dragged			
dragged on."	"dragged"]					
Comment 3: "This	["BL",	great	-	+1	General	Positive
BL drama had a	"drama",				Sentiment	
great mix of	"great", "mix",					
emotions."	"emotions"]					
Comment 4: "The	["acting",	-	subpar	-1	Acting,	Negative,
acting was subpar, "subpar",					Storyline	Neutral
but the storyline	"storyline",					
made up for it."	"made"]					

Findings and Analysis: The following section highlights the key findings of sentiment analysis and opinion mining on the sample data of comments regarding the BL drama series. It's required to find out the general trend of sentiments expressed in these comments, aspects discussed, and sentiments linked to those aspects.

From the sentiments analyzed in the data, one can see that the general feeling of the people towards the BL drama series is mixed. Positive and negative sentiments are equated in the viewer's mind, which means it received both positive and negative reviews. Whereas the character development comes to be a strong point, other factors like plot and acting were criticized. That is to say, there are certain aspects of the series that viewers will attach themselves to, and there are aspects that drag it down from pleasing everyone as a whole. The comment analysis shows a rather balanced distribution in terms of sentiment. Positive Comments: 2 out of 4 comments have expressed a



positive sentiment. Negative Comments: 2 out of 4 comments express a negative sentiment. Net Sentiment Score: Since very few samples are available, the net sentiment score is 0, indicating a neutral general trend. It states that opinions about the BL drama series are divided, as viewers' opinions may vary between good and bad.

The aspect-based sentiment analysis allows for finer details in aspects where the drama will strike a chord with viewers or will disappoint them. Research has pinpointed targeted areas of improvement by breaking down sentiment according to different aspects: character development, plot, and acting. This level of analysis is particularly valuable for content creators and marketers, as it allows them to focus on enhancing the elements that viewers care about most. The opinion-mining process identified specific aspects of the BL drama that viewers discussed.

H. Comparative Analysis of Sentiments

For the comparative analysis of sentiments, Character Development stands out as the most positively perceived aspect in the sample data. The Plot and Acting received negative sentiments, indicating areas where the series might fall short according to viewers. The Storyline received neutral feedback, balancing the negative sentiment from the acting. The following table summarizes an analysis of the sentiments and aspects.

Aspect	Sentiment	Sentiment	Net	Analysis
	Count	Count	Sentiment	
	(Positive)	(Negative)		
Character Development	1	0	Positive	Viewers appreciate the character development in the BL drama, indicating that this aspect positively impacts their overall perception of the series.
Plot	0	1	Negative	The plot received negative feedback, suggesting that viewers found it unengaging and drawn out. This indicates that the plot might be a weak point in the series, potentially affecting the overall viewer satisfaction.
Acting	0	1	Negative	Although one comment mentioned the acting as subpar, the impact on overall sentiment was mitigated by a favorable view of the storyline. However, this could indicate a potential area for improvement in the series.
Storyline	0	0	Neutral	The storyline is seen as a redeeming factor despite other negative aspects, suggesting it plays a crucial role in maintaining viewer interest.

Table 7. The table summarizes the sentiments and aspects identified

I. Statistical Validation for the Sentiment

To perform statistical validation for the sentiment analysis on the sample data provided, we can use a chi-square test for independence. This test helps to determine whether there is a significant association between two categorical variables—in this case, the aspect (e.g., "Character Development," "Plot") and the sentiment (e.g., "Positive," "Negative").

J. Statistical Validation Using Chi-Square Test

Firstly, organize the sample data into a contingency table showing the distribution of positive and negative sentiments across different aspects.

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Table 8. S	Summary and	Visua	lization
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Aspect	Positive Sentiment	Negative Sentiment	Total
Character	1	0	1
Development			
Plot	0	1	1
Acting	0	1	1
Storyline	0	0	0
Total	1	2	3

K. Calculate the Expected Frequencies

The expected frequency for each cell in the table can be calculated using the formula:

 $\label{eq:expected Frequency} \text{Expected Frequency} = \frac{(\text{Row Total} \times \text{Column Total})}{\text{Grand Total}}$

- Character Development Positive Sentiment: (1×1)/3=0.33
- Character Development Negative Sentiment: (1×2)/3=0.67
- **Plot Positive Sentiment:** $(1 \times 1)/3 = 0.33$
- Plot Negative Sentiment: (1×2)/3=0.67
- Acting Positive Sentiment: $(1 \times 1)/3 = 0.33$
- Acting Negative Sentiment: $(1 \times 2)/3 = 0.67$

Aspect	Positive Sentiment	Negative Sentiment
Character	0.33	0.67
Development		
Plot	0.33	0.67
Acting	0.33	0.67
Storyline	0.00	0.00

Table 9. Expected frequency

L. Apply the Chi-Square Test Formula

The chi-square statistic is calculated using the formula:

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Where,

- Oi is the observed frequency
- Ei is the expected frequency.

Calculate the following,

- **Character Development Positive Sentiment:** (1-0.33)2/0.33=1.36
- Character Development Negative Sentiment: (0–0.67)2/0.67=0.67
- Plot Positive Sentiment: (0-0.33)2/0.33=0.33
- Plot Negative Sentiment: (1-0.67)2/0.67=0.15
- Acting Positive Sentiment: (0-0.33)2/0.33=0.33
- Acting Negative Sentiment: (1-0.67)2/0.67=0.15

Sum of chi-square statistics,

χ2=1.36+0.67+0.33+0.15+0.33+0.15=2.99

M. Determine the Degrees of Freedom and Critical Value

The degrees of freedom (df) for a chi-square test are calculated as:

$$df = ($$
Number of Rows $-1) \times ($ Number of Columns $-1)$

$$df = (3-1) \times (2-1) = 2$$

Using a chi-square distribution table or a calculator, we find the critical value for df = 2 at a 0.05 significance level, which is approximately 5.99.

N. Compare the Chi-Square Statistic to the Critical Value

- If the calculated chi-square statistic is greater than the critical value, we reject the null hypothesis, suggesting that there is a significant association between the aspect and the sentiment.
- If the chi-square statistic is less than the critical value, we fail to reject the null hypothesis, suggesting no significant association.

In the above analysis, the calculated chi-square statistic is 2.99, which is less than the critical value of 5.99. Therefore, we fail to reject the null hypothesis.

The chi-square test suggests that, based on the small



sample provided, there is no statistically significant association between the aspects of the BL drama (e.g., Character Development, Plot, Acting) and the sentiment (Positive or Negative). This means that within this small dataset, the sentiments expressed do not significantly vary based on the specific aspect being discussed.

Conclusion, Limitations and Future Work: In conclusion, this research demonstrates the utility of sentiment analysis and opinion mining in understanding and improving viewer engagement with BL drama series. By employing advanced techniques and focusing on specific aspects of the content, the system provides actionable insights that can guide content creation, marketing, and viewer

interaction strategies. This initial analysis of sentiments related to a BL drama series highlights key strengths and areas for improvement. While character development is well-received, issues with the plot and acting suggest that these areas could benefit from further attention. Based on the findings Character Development is a strength of the BL drama series, contributing positively to viewer satisfaction. This aspect could be emphasized in marketing and promotional materials. The Plot is a significant weakness, as it detracts from the overall viewer experience. The creators might need to revisit the narrative structure to make it more engaging.

Table 10. Limitations and future work

1.	Sample Size	The analysis was conducted on a limited dataset, which may not fully capture
		the diversity of viewer opinions. Future research should involve larger and
		more diverse datasets to enhance the robustness of the findings.
2.	Model Limitations	Despite improvements, the sentiment analysis model may still struggle with
		certain linguistic challenges, such as sarcasm or context-dependent sentiments.
		Further development of the model is needed to address these issues
		Turiner development of the model is needed to uddress these issues.

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