

Games and Beyond: Analyzing the Bullet Chats of Esports Livestreaming



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0. Background

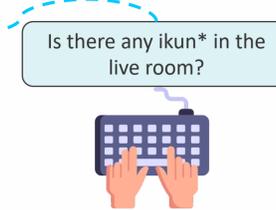


Esports Games



Livestreaming Platforms

- Esports, short for electronic sports, is a form of competition using video games and has attracted more than 530 million audiences worldwide by 2022.
- Many Esports games can be watched on live streaming platforms.



* Fans of Cai Xukun, a Chinese singer-songwriter, dancer, and rapper.

- Recently, a novel interaction method, namely "bullet chats," is introduced on livestreaming platforms.
- Bullet chats are scrolling comments posted by audiences that are synchronized to the livestreaming timeline, enabling audiences to share and communicate their immediate perspectives.
- The real-time nature of bullet chats, therefore, brings a new perspective to esports analysis.

1. Collected Data

- We focus on one of the most popular Esports game, **League of Legends** (LoL), and two major livestreaming platforms (**Bilibili** and **Huya**) in China with millions of active users.
- Overall, more than **21 million** bullet chats covering **328 matches** between **17 teams** in League of Legends Pro League (LPL), the top-level professional league for LoL in China, are collected. [Table 1]

Dataset	# Bullet Chats	Filtered # Bullet Chats	# BO3	# Matches	# Teams	Time Range
Bilibili	12,902,940	6,931,433	136	328	17	2023.01.14-2023.03.26
Huya	8,105,173	3,928,780				

Table 1: Overview of the collected data.

2. Main Findings

- In both platforms, teams with higher rankings are prone to obtain a greater quantity of bullet chats, which are likely to be more toxic. [Figure 1]
- Traditional methods face significant challenges in identifying toxic bullet chats, with an F1-Score below 0.1. Hence, we fine-tune a pre-trained model for our needs and achieve an F1-Score of 0.66. [Table 2]
- There is a significant **disparity** in the toxicity levels between users on the two platforms. [Table 3]
- Bullet chats not only revolve around **in-game** (toxic) topics like players and teams but also touch upon societal topics (**beyond games**) such as genders. [Table 4]

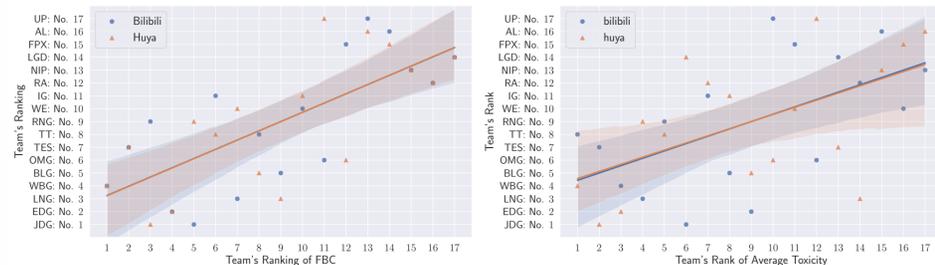


Figure 1: Each team's ranking of the FBC (frequency of bullet chats) and average toxicity vs. ranking in the regular season of LPL 2023.

Method	Acc	Prec	Recall	F1
Perspective API	0.63	1.00	0.01	0.02
COLD	0.62	0.75	0.03	0.06
Fine-tuned COLD	0.74	0.67	0.65	0.66

Table 2: Performance of toxicity detectors.

Platform	# Samples	# Toxic	% Toxic	Mean	Var
Bilibili	346,560	69,412	20.03%	0.22	0.13
Huya	196,437	75,084	38.22%	0.39	0.20

Table 3: Statistics of toxicity on two platforms.

Theme / Code	Example (Translation)	Description	Bilibili	Huya
Games and their stakeholders	rng算个毛啊 (RNG is bullshit)	Toxic bullet chats that target game assets and games' stakeholders, e.g. players, teams, etc.	91.66%	92.41%
Celebrities outside of the games	詹姆斯给科比提鞋吗? (Is James even fit to carry Kobe's shoes?)	Toxic bullet chats that target celebrities outside of the games, e.g. entertainment stars, non-esports famous athletes, etc.	4.17%	8.86%
Genders	好浪荡的孕妇 (What a fucking slutty pregnant woman)	Toxic bullet chats that target different gender groups, e.g. women.	6.25%	3.80%
Professions	体育生都是黑猩猩 (Athlete students are all gorillas ^a)	Toxic bullet chats that target people with different professions, e.g. sports students, deliverymen, etc.	0.00%	5.06%
Regions	广东广西蛮子不吃老鼠可怎么活 (How can barbarians from Guangdong and Guangxi ^b live without eating mice)	Toxic bullet chats that target regions or the people live in these regions.	0.00%	3.80%
Others	素质品味修养都很低 (Extremely low in both quality, taste, and cultivation)	Toxic bullet chats that do not belong to any themes above.	4.17%	1.27%

^a Here LeBron and Kobe are LeBron James and Kobe Bryant respectively, they are both professional basketball players.
^b This implies that they have physical prowess but lack intelligence.
^c Guangdong and Guangxi are two provinces of China.

Table 4: The codebook on toxic bullet chats.

TL; DR The bullet chats enables real-time interaction for esports audiences. This work analyzes more than 21 million bullet chats from League of Legends on two popular livestreaming platforms (Jan.-Mar. 2023). Findings show that 1) higher-ranking teams attract more, often toxic, bullet chats, and 2) the content of bullet chats has gone far beyond games, including hate speech targeting various social groups.

 The image after the name corresponds to the author's representative champion in League of Legends.