Supplementary Information

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Section S1.   Gender Difference in Audience Chat

Data from female streamers had been excluded from the main analysis, along with non-English streaming chats. Out of the 255 popular streamers, note that non-English streamers (N=21) and female streamers (N=21) accounted for a relatively small fraction. The final data analyzed in this paper are N=213. The excluded data take up the following proportions: 8.23% channels, 7.67% clips, and 8.67% videos. Here we provide additional information about the gender difference in the audience chat characteristics.

To examine the gender difference in chat content between the excluded female streamers and the included male streamers, we report statistical test (t-test) results for the proposed chat features in Section 5. The t-test results in Fig. S1 indicate that female streamers receive fewer messages (i.e., utterance frequency), fewer emotional messages (i.e., sentiment), more emoted messages (i.e., emote number by utterance), and more coherent messages (i.e., semantic incoherence) compare to male streamers. All features showed substantial significance ($p < 0.001$). Also, the audience seems more active (i.e., average utterance count per user, subscriber participation ratio) in the chat for female streamers than for male streamers.
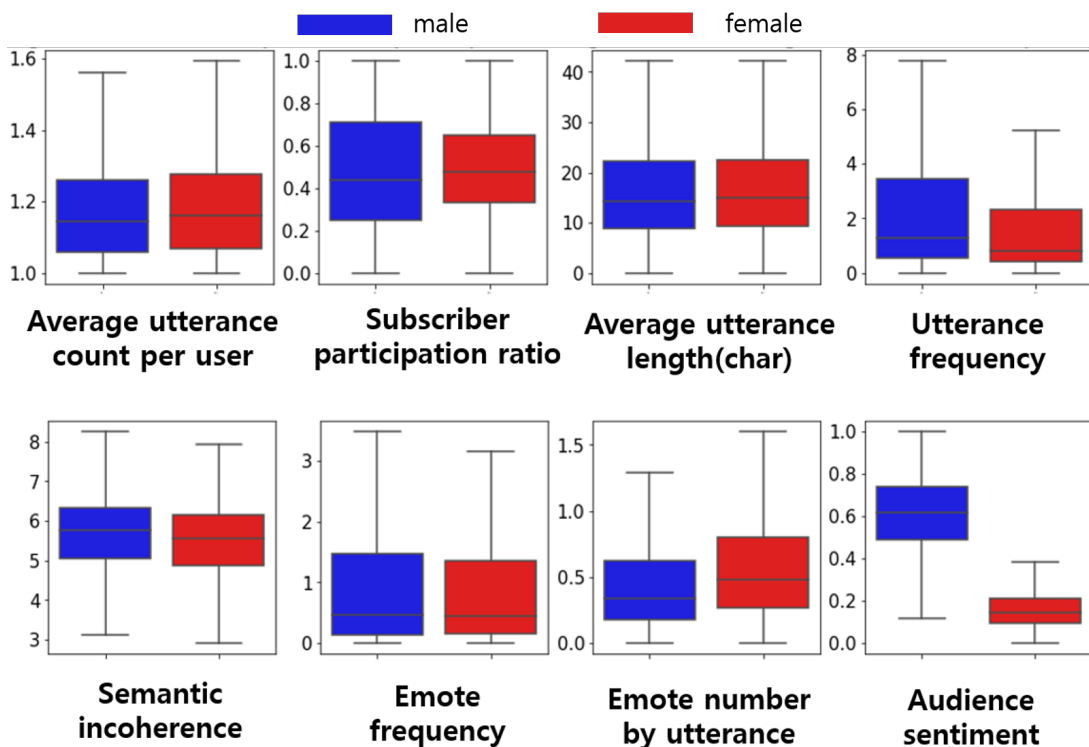

Fig. S1.   Boxplot of t-test feature difference by streamer gender. All features marked significance difference of $p < 0.001$.

Section S2. Additional Evaluation Results

Expanding the description in Section 5.3 and its Table 6, we present evaluation results of the classification performance of the proposed models. Due to the skewed viewcount distribution of the clip dataset, we performed balanced sampling to obtain the train, test, validation set. Here we report the classification results by F1-score, Precision, and Recall values.

Type	Model	F1-score		
		Train	Dev	Test
Feature-based	Freq	0.6479	0.6635	0.6644
	Chat	0.6735	0.6781	0.6769
	Image	0.6804	0.6787	0.6787
Deep learning	Freq	0.7921	0.7953	0.8023
	Chat	0.711	0.6948	0.6929
	Image	0.8322	0.8106	0.8117
Multi-modal	MINT	**0.8302**	**0.8279**	**0.8221**
	No attention	0.8247	0.8106	0.8044

Table S1. F1-score values of the models.

Type	Model	Precision		
		Train	Dev	Test
Feature-based	Freq	0.6554	0.6642	0.6679
	Chat	0.699	0.6969	0.6923
	Image	0.5273	0.5259	0.5259
Deep learning	Freq	0.8308	0.822	0.8332
	Chat	0.7373	0.72	0.7169
	Image	0.8391	0.8224	0.8206
Multi-modal	MINT	0.8455	0.8429	0.8405
	No attention	**0.8714**	**0.8661**	**0.8641**

Table S2. Pricision values of the models.

Type	Model	Recall		
		Train	Dev	Test
Feature-based	Freq	0.6406	0.6628	0.661
	Chat	0.6498	0.6602	0.6622
	Image	0.9588	0.9566	0.9565
Deep learning	Freq	0.7568	0.7703	0.7736
	Chat	0.6864	0.6713	0.6704
	Image	0.8255	0.7991	0.803
Multi-modal	MINT	**0.8154**	**0.8135**	**0.8045**
	No attention	0.7638	0.7617	0.7525

Table S3. Recall values of the models.

Section S3.   Code and Data Release

We share the pre-trained model, embedding training code, and the embedding vectors. To facilitate efficient analyses, we only upload the embedding vectors for top-1000 most frequently used words and make the full embedding vectors available on demand. Researchers interested accessing the full embedding vectors can visit the GitHub repository at `https://github.com/dscig/twitch-highlight-detection`.

- **twitch_emote_models.py**: Pre-trained final models in PyTorch in two types: feature- and deep-learning-based.

- **twitch_emote_embedding_train.py**: Implementation code for training the emote and text embedding using Gensim's Word2Vec.

- **twitch_emote_embedding_male_top1000.kvmodel**: Trained embedding vectors for most frequently used 1,000-word tokens for the popular male streamers used in the study. To access it, you can use the python Gensim KeyedVectors class as follows:
  ```
  v1 = KeyedVectors.load('twitch_emote_embedding_male_top1000.kvmodel').
  ```

- **twitch_emote_embedding_all_top1000.kvmodel**: Trained embedding vectors for most frequently used 1,000-word tokens for streamers including both genders.