YM2413-MDB: A Multi-Instrumental FM Video Game Music Dataset with Emotion Annotations

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Introduction

- Propose a new music dataset
  - Multi-instrumental 80s FM Game Music
  - Multi-modal (MIDI / WAV)
  - Emotion annotation

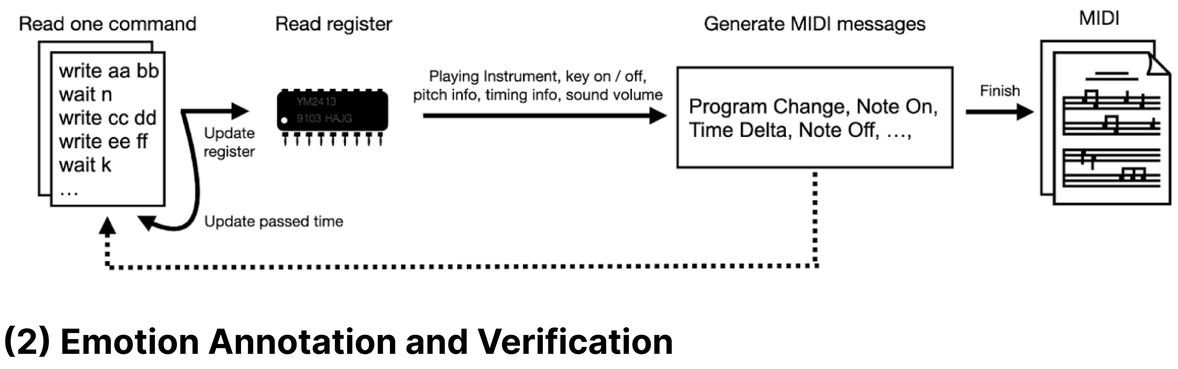
The YM2413-MDB

Dataset Description

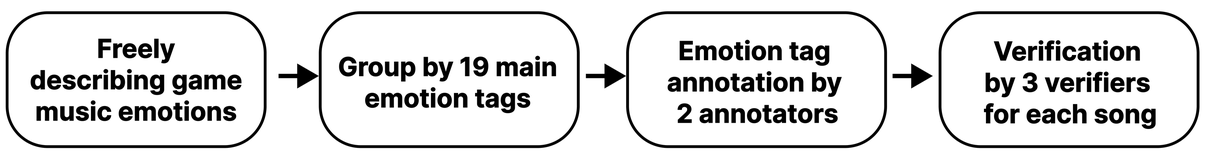
- 669 audio and MIDI files of the late 1980s game music played by Yamaha sound chip, YM2413
- Improved sound quality due to the FM synthesis and HW development
- Emotion annotation with 19 emotion tag vocabularies
- 15 monophonic instruments and one drum instrument, max 9 instruments simultaneously played

Dataset Collection

(1) VGM to MIDI Conversion

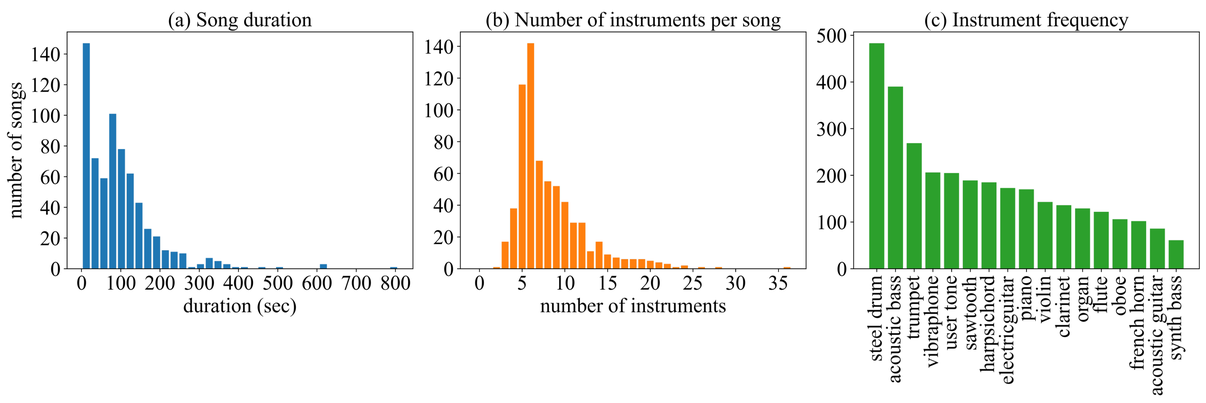


(2) Emotion Annotation and Verification



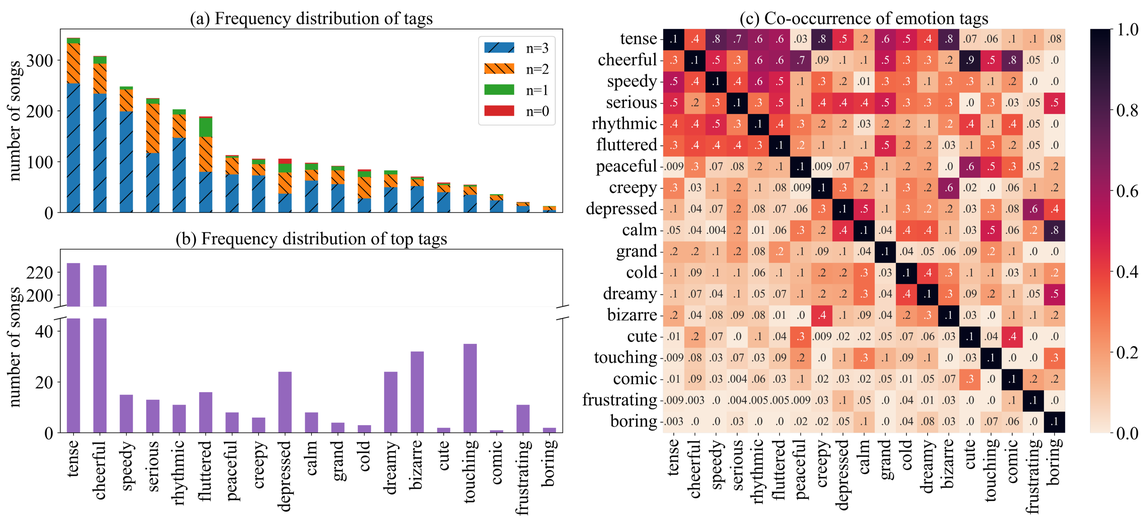
General Statistics

- Short (< 30s) music files are dominant
- Program change occasionally occurs
- Frequent monophonic instrument such as trumpet



Emotion Annotation and Verification Results

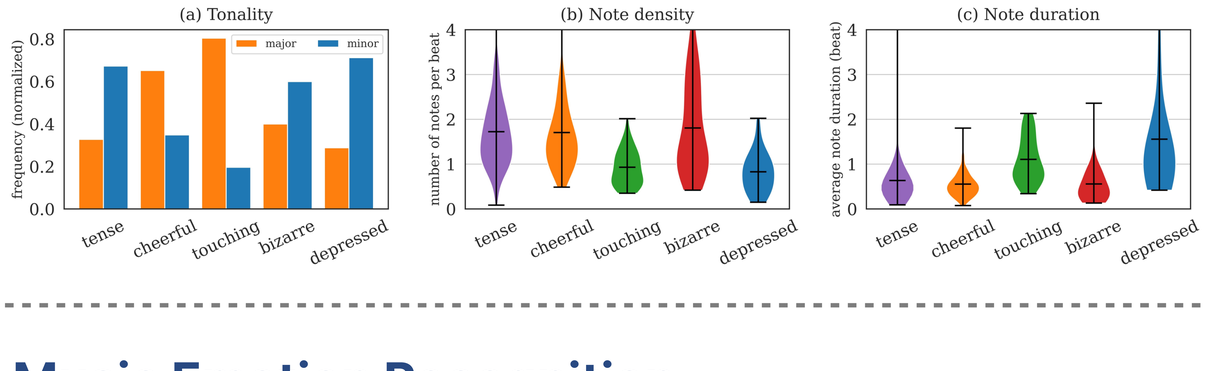
- Different agreement pattern of emotion tags
- Dominant top tags such as ‘tense’ and ‘cheerful’
- Tag groups with high co-occurrence such as ‘cheerful’, ‘cute’, and ‘comic’



Dataset Analysis

Data Distribution for Different Top Tag Classes

- Songs with positive and negative affect top tag have different tonality, note density and note duration pattern



Music Emotion Recognition

- 4-way AV-quadrant mapped emotion tags and top tags recognizd by the baseline models
- Followed the experiment condition of [2] and adapt it to multi-instrumental music

Symbolic-domain Classification

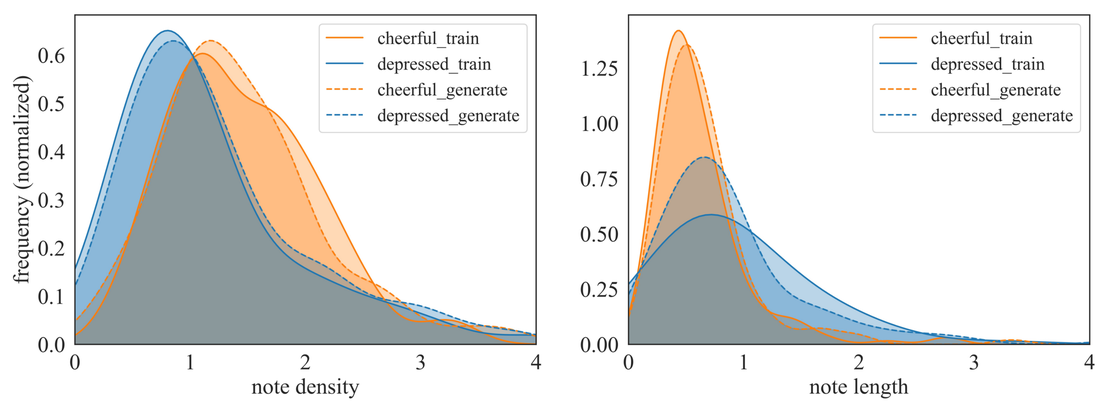
Model	Emotion			Top Tag	
	4Q	Arousal	Valence	Tense	Cheerful
Logistic regression	0.48	0.76	0.56	0.66	0.66
LSTM-Attn + MMM	0.44	0.69	0.59	0.68	0.70

Audio-domain Classification

Model	Emotion			Top Tag	
	4Q	Arousal	Valence	Tense	Cheerful
Logistic regression	0.38	0.72	0.54	0.60	0.66
Short-chunk ResNet	0.65	0.78	0.60	0.69	0.65

Emotion-conditioned Symbolic Music Generation

- Fine-tuned the LMD-pre-trained GPT2 model(MMM representation)
- In-attention mechanism + pre-trained W2V embedding
- Generated samples have a similar note density and note length distribution with the train dataset



Conclusion

- Multi-instrumental late 1980s FM video game music dataset with 19 emotion tags
- Provide baseline results
  - Music emotion recognition in both audio and MIDI domain
  - Emotion-conditioned symbolic music generation

Reference

[1] C. Donahue, H. H. Mao, and J. McAuley, “The NES Music Database: A multi-instrumental dataset with expressive performance attributes,” 2018 ISMIR.
[2] H.-T. Hung, J. Ching, S. Doh, N. Kim, J. Nam, and Y.- H. Yang, “EMOPIA: A multi-modal pop piano dataset for emotion recognition and emotion-based music generation,” 2021 ISMIR.