IMPROVING MUSIC GENRE CLASSIFICATION FROM MULTI-MODAL PROPERTIES OF MUSIC AND GENRE CORRELATIONS PERSPECTIVE

平安科技 PING AN TECHNOLOGY

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Introduction

Music genre classification (MGC) is one of the oldest and most important tasks in music information retrieval (MIR), and has become a research hotspot in both the academic and industrial communities due to its wide application prospects.

Problem in previous researches:

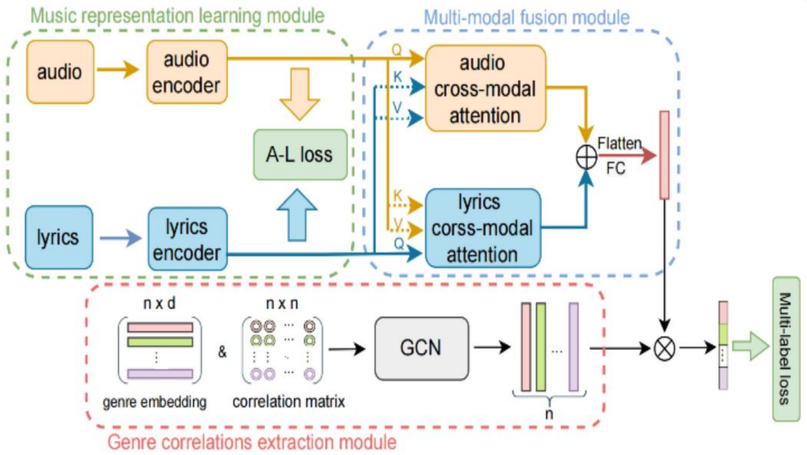
- The uni-modal methods cannot fully utilize the multimodal properties of music, thus leading to prone to performance bottlenecks.
- The existing multi-modal methods ignore that features from different modalities reside in different embedding spaces that are inherently heterogeneous and misaligned.
- Focusing only on single label classification task and lacking research on multi-label music genre classification.

Our contributions:

- We propose a novel multi-modal approach leveraging audio-lyrics contrastive loss and two symmetric cross-modal attention, to align and fuse the features from audio and lyrics.
- Based on the nature of the multi-label classification problem, we design a genre correlations extraction module which can capture and model the potential genre correlations.

Proposed Method

Our proposed model consists of three modules: music representation learning module, multi-modal fusion module, and genre correlations extraction module



Music representation learning module:

The music representation learning module consists of an audio encoder and a lyrics encoder, which takes audio and lyrics as input and outputs corresponding features respectively. In addition, we present an audio-lyrics contrastive loss to align features obtained from different modalities before sending them intothe multi-modal fusion module.

Multi-modal fusion module:

We design a novel multi-modal fusion module which consists of two symmetric cross-modal attention to effectively fuse multi-modal features.

Genre correlations extraction module:

- Considering that the correlations between genres are essentially a topological structure, we design a graph convolution network to model the genre correlations.
- We use a pre-trained BERT model to encode genre names as semantic embedding and treat them as genre node features.
- The correlation matrix is obtained by calculating the co-occurrence conditional probability and the cosine similarity between node features.

Experiments

Dataset: Music4All

- Filtered out music tracks with missing information or non-English lyrics.
- 43650 samples with 87 genre categories are finally selected.
- Approximately 70%, 10%, and 20% samples respectively for the training set, the validation set, and the test set.

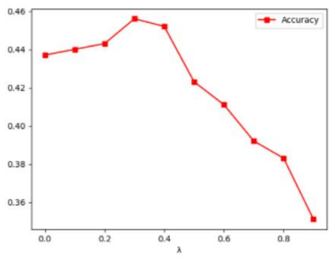
Evaluation metrics: Accuracy and F-measure

Objective evaluation

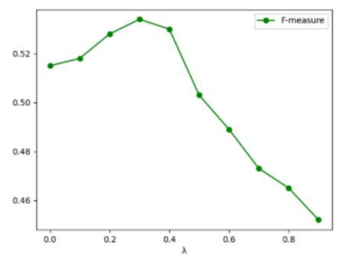
Method	Accuracy	F-measure
Santana's model [21]	0.354	0.419
Pandeya's model [13]	0.387	0.442
Our proposed model	0.456	0.534

Ablation study

A-L loss	SCMA	GCEM	Accuracy	F-measure
			0.372	0.438
✓			0.396	0.475
	✓		0.408	0.491
		✓	0.403	0.487
✓	✓		0.425	0.513
✓		✓	0.419	0.508
	✓	✓	0.437	0.515
✓	✓	✓	0.456	0.534



(a) accuracy



(b) F-measure