Recommendation System

'음악 다중 레이블 자동 분류' 도메인에서
연구된 GA 기반 특징 선별 기법들의 포인트 요약

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1. Neuro-genetic programming for multi-genre classification of music content

In this paper, in order to solve the problem that most music genre classifiers focus on classifying into a single genre, three new classifier models have been proposed with a significant reduction in the number of features, but fail to 'secure population diversity' in terms of multi-label accuracy up to 30% difference over single-label.

2. Music Genre Classification of audio signals Using Particle Swarm Optimization and Stacking Ensemble

In this paper, in order to solve the problem of low accuracy when simply selecting a feature with the PSO method, a technique of additionally calculating the Stacking Ensemble was used in the classification step, but fail to 'secure population diversity' in terms of early convergence and increased computation of PSO.

3. Analysis of Structural Complexity Features for Music Genre Recognition

In this paper, in order to solve the problem of not being able to explain why the classifiers were classified into the corresponding genre, kNN and RF classifiers were proposed for Structural Complexity, but fail to 'secure population diversity' in terms structural complexity works smoothly only in small window size with specific values.

4. Music genre classification based on local feature selection using a self-adaptive harmony search algorithm

In this paper, in order to solve the problem of time-consuming individual tagging problems, local feature selection using SAHS and classification with SVM were proposed, but fail to 'secure population diversity' in terms of whether accuracy is better than global even in the small dataset.

5. Compact feature subset-based multi-label music

In this paper, in order to solve the problem of various limitation problems in small mobile devices, a compact feature subset-based multi-label music categorization is proposed, but fail to 'secure population diversity' in terms of increasing overfitting possibilities and whether accuracy is higher compared to a single-label approach.

6. Classification of vocal and non-vocal segments in audio clips using genetic algorithm based feature selection (GAFS)

In this paper, in order to solve the vocal vs. non-vocal segmentation problem, the Genetic Algorithm based Feature Selection(GAFS-ANN) technique in the frequency domain has been proposed, but fail to 'secure population diversity' in terms of not considering time-domain and less training data.

7. A novel feature selection method for speech emotion recognition

In this paper, in order to solve the problem that the success rate of emotion recognition was ambiguous compared to the increase in the workload of the existing feature selection methods in speech emotion recognition, a new statistical feature selection method was used to reduce the number of features and workload, but fail to 'secure population diversity' in terms of the success rate is proportional to the number of features.

2 Related Work

In the past years, a number of works have been focused on feature selections and classifications on the research of music genre classifications. However, music genre classifications based on multi-population algorithms are yet to be studied.

Huang et al. [4] proposed a self-adaptive harmony search algorithm to extract features locally. After selecting features, the datasets are transfered to Support Vector Machine (SVM) to be classified. However, the results do not clarify whether the accuracy is still better than global feature selection in the small datasets. Another approach have made from Lee et al. [5]. In the study, a compact feature subset was proposed due to low computational complexity and limitation in the maximum number of acoustic features. In order to evaluate the quality of a feature subset obtained through each method, the Multi-label Naive bayes (MLNB) classifier and holdout cross-validation were considered. The problem was that the accuracy was not higher than the conventional method (i.e. Restrictive Genetic Operator (RGA)) and the holdout cross-validation can highly overfitted. Murthy et al. [6] proposed a new genetic algorithm based feature selection (GAFS). Artificial Neural Network(ANN) was applied because it can handle non-linear data well. However, not much training data were used. ANN shows less error values, but Random Forest (RF) results in higher accuracy. More experiments should be done to support basis why ANN was adopted in the study. Turgut Özseven [7] proposed three steps while selecting features. In the pre-processing step, framing and windowing have been done. Feature selection based on acoustic analysis method. Normalization and attribute selection method in the post-processing step. The study has been done due to current methods preferred in many fields are not specific to Speech Emotion Recognition (SER). However, the success rate is proportional to the number of features.

Campobello et al. [1] proposed three new multi-label classifiers with low computational complexity and reduced number of audio features. However, the proposed classifiers differed in accuracy by up to 30% compared to existing single-label classifiers. Krittika Leartpantulak and Yuttana Kitjaidure [2] combined feature selection using Particle Swarm Optimization(PSO) with classification using Stacking Ensemble. Although the result shows good accuracy, early convergence and increased computational complexity were not solved. Ginsel et al. [3] joined k-Nearest Neighbor and RF to Strucural Complexity. Structural Complexity worked well in the proposed environment, but the question remains whether it works well in environments other than small window size with specific values.

[1]Campobello, G., Dell'Aquila, D., Russo, M., & Segreto, A. (2020). Neuro-genetic programming for multigenre classification of music content. Applied Soft Computing, 106488. doi:10.1016/j.asoc.2020.106488
[2]Leartpantulak, K., & Kitjaidure, Y. (2019). Music Genre Classification of audio signals Using Particle Swarm Optimization and Stacking Ensemble. 2019 7th International Electrical Engineering Congress (iEECON). doi:10.1109/ieecon45304.2019.8938995
[3]Ginsel, P., Vatolkin, I., Rudolph G. (2019). Analysis of Structural Complexity Features for Music Genre Recognition. 2020 IEEE Congress on Evolutionary Computation (CEC). doi: 10.1109/CEC48606.2020.9185540
[4]Huang, Y.-F., Lin, S.-M., Wu, H.-Y., & Li, Y.-S. (2014). Music genre classification based on local feature selection using a self-adaptive harmony search algorithm. Data & Knowledge Engineering, 92, 60–76. doi:10.1016/j.datak.2014.07.005
[5]Lee, J., Seo, W., Park, J.-H., & Kim, D.-W. (2018). Compact feature subset-based multi-label music categorization for mobile devices. Multimedia Tools and Applications. doi:10.1007/s11042-018-6100-8
[6]Srinivasa Murthy, Y. V., & Koolagudi, S. G. (2018). Classification of vocal and non-vocal segments in audio clips using genetic algorithm based feature selection (GAFS). Expert Systems with Applications, 106, 77–91. doi:10.1016/j.eswa.2018.04.005
[7]Özseven, T. (2019). A novel feature selection method for speech emotion recognition. Applied Acoustics, 146, 320–326. doi:10.1016/j.apacoust.2018.11.028