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MULTI-CLASS SUPPORT VECTOR MACHINE ACTIVE LEARNING FOR MUSIC ANNOTATION

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Abstract. *Music annotation is an important research topic in the multimedia area. One of the challenges in music annotation is how to reduce the human effort in labeling music files for building reliable classification models. In the past, there have been many studies on applying support vector machine active learning methods to automatic multimedia data annotation, which try to select the most informative examples for labeling manually. Most of these studies focused on selecting a single unlabeled example in each iteration process for binary classification. As a result, the model has to be retrained after each labeled example is solicited, and the user is likely to lose patience after a few rounds of labeling. In this paper, we present a novel multi-class active learning algorithm that can select multiple music examples for labeling in each iteration process. The key of the multi-sample selection for multi-class active learning is how to reduce the redundancy and avoid selecting the outliers among the selected examples such that each example provides unique information for model updating. To this end, we propose the distance diversity and set density in the support vector machine feature space as the measurement of the scatter of the selected sample set. Experiment results on two music data sets demonstrate the effectiveness of our method. Moreover, although our criterion is designed for music annotation, it can be used in a general frame work.*

Keywords: Support vector machine, Active learning, Relevance feedback, Music annotation

1. **Introduction.** Rapid development in speed and capacity of computers and the Internet has led to the amount of music increase explosively. This fact gives rise to a need for making all these music easily accessible to listeners. At present, applications that manage music data usually utilize textual meta-data, so that computers can understand. The meta-data often contains meaningful descriptions of the music, such as title, artist, genre, emotion and so on. While manually annotating these music data, which has been using, is time-consuming, costly and subjective. In recent years, content-based music information retrieval has received widespread research interest in the field of multimedia retrieval and pattern recognition. It is now possible to annotate the music collections in a semi-automatic way [1]. That is, randomly select some music data and annotate them by hand as the training set, and propagate the labels to the whole collection using a supervised learning algorithm. However, we still need to manually annotate a part of music data to output the model. Intuitionally, we hope this part of necessary music data to be as