

PROJECT PHASE 1

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ABSTRACT

Automatic chord recognition is a well-established problem in the music information retrieval research community. In 2009, there were 18 different approaches to this task submitted by 10 different teams to the MIREX Audio Chord Detection competition. This means even amongst a single team there are multiple approaches – indeed one team submitted no less than four distinct entries to the competition[1].

With so many different approaches to the same task, sifting through the options becomes non-trivial. In this paper we explore the results of the 2009 MIREX competition in detail to answer the primary question of what to look for when beginning to examine such a myriad of options, and to explore the potential of aggregating a variety of different approaches to improve overall accuracy of the task.

1. PROPOSED PROJECT

We propose to investigate the errors of various automatic chord recognition systems in detail and in comparison with one another. In particular, we will assess the results of the MIREX' 09 (Music Information Retrieval eXchange) chord detection competition. MIREX has 13 different results sets for chord estimation on the Beatles data set [1], each generated by a different chord detection algorithm. Our goal is to answer six research questions:

1. Which algorithm was most accurate when averaged across the entire data set?
2. For each results set, what is the variance and standard deviation by song versus by data set?
3. Which songs in the set caused the most errors across all algorithms?
4. For songs with higher than normal error rates (as defined by a standard deviation cut off to be decided in consultation with George at a later date), is there some unifying feature or set of features which causes this?
5. Can a more accurate algorithm be created by combining the outputs of some subset of the results sets and applying appropriate statistical techniques?
6. Does the accuracy rate follow a normal distribution?

2. TIMELINE

Our project will run in six phases:

1. Gather data
2. Solidify questions
3. Build analysis framework
4. Run analysis
5. Build graphs
6. Write up results

2.1 Gather Data – Feb 29 – Mar 3

This phase is centered around the expansion of our resource pool with which we will complete our project. Here we will gather all relevant data sets, including the annotated ground truth and 13 results sets from the MIREX automatic chord recognition competition, and ensure they are easily accessible for development and testing in phase three.

2.2 Solidify Questions — Mar 3 - Mar 7

Here we will fill in all details of the questions we wish to answer during this project. This will include discussion with Professor Tzanetakis.

2.3 Build Analysis Framework — Mar 7 - Mar 14

In this phase we will focus our efforts on building a set of tools in Python 3, which will take as input the data gathered in phase one and return various analytics aimed toward answering our questions as determined in phase two.

2.4 Run analysis — Mar 14 - Mar 17

This phase is entirely devoted to the execution of the framework developed in phase 3 on our data sets. Data will be run through all relevant analytic systems, and outputs will be captured and stored.

2.5 Build Graphs — Mar 17 - 21

In this phase we will create visualizations of the results of our analysis. In particular, we will focus on graphs which illuminate some aspect of one or more of our research questions.

2.6 Write Up Results — Mar 21 - 31

In the final phase of our project, we will focus our efforts on interpreting our results, and putting these findings into written form. This will include synthesis of our results with respect to the various algorithms that produced them, and therefore will include delving into the papers listed in our references.

3. ROLES

As a small, two-person project, we will share the responsibilities of each of the six phases. We may subdivide tasks as they come up within a phase, rather than distributing the phases as wholes to each team member.

4. TOOLS

We will use ipython notebook [2], and matplotlib [3] to analyze the results-sets and generated graphs of the results of our analysis.

5. DATA SETS

We will use the annotated Beatles data set for ground truth analysis [4], as well as the 13 result-sets from the MIREX 09' competition previously mentioned, as described in [4-13]

6. REFERENCES

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