

# SCALABLE AUDIO FEATURE EXTRACTION

DEVON LENO BRYANT

A THESIS PRESENTED TO THE FACULTY OF  
UNIVERSITY OF COLORADO AT COLORADO SPRINGS  
IN CANDIDACY FOR THE DEGREE OF  
MASTER OF SCIENCE IN COMPUTER SCIENCE

ADVISER: DR. RORY LEWIS

APRIL 2014

© Copyright by Devon Leno Bryant, 2014.

All rights reserved.

Recommended for Acceptance by  
The Department of Computer Science

---

Dr. Rory Lewis

---

Date

---

Dr. Jugal Kalita

---

Date

---

Dr. Terrance Boult

---

Date

# Abstract

Feature extraction provides the foundation for many systems and research projects dealing with machine learning. Extracting features from audio data can be computationally expensive and time consuming, particularly with larger sets of audio data.

This paper describes *Safe*, a system for scalable and efficient audio feature extraction in the Music Information Retrieval domain. The system builds upon previous research in efficient audio feature extraction, taking advantage of both multicore processing and distributed cluster computing to provide a scalable architecture for feature extraction algorithms.

Lastly, the system's performance is compared with current leading extraction libraries and a model for the system's scalability is developed.

# Contents

Abstract . . . . .	iv
List of Tables . . . . .	vii
List of Figures . . . . .	viii
<b>1 Introduction</b>	<b>1</b>
<b>2 Background and Related Work</b>	<b>3</b>
<b>3 System Description</b>	<b>6</b>
3.1 Feature Representations . . . . .	6
3.2 System Interfaces . . . . .	7
<b>4 Efficient and Scalable Extraction</b>	<b>11</b>
4.1 Efficient Feature Extraction . . . . .	11
4.2 Parallel Feature Extraction . . . . .	14
4.3 Distributed Feature Extraction . . . . .	17
4.3.1 Localized Data . . . . .	18
4.3.2 Distributed Data . . . . .	18
<b>5 Evaluation and Results</b>	<b>21</b>
5.1 System Evaluation . . . . .	21
5.2 Dataflow Analysis . . . . .	28
5.3 Scalability Analysis . . . . .	29

5.3.1	Multi-Processor Scalability . . . . .	31
5.3.2	Multi-Node Cluster Scalability . . . . .	32
<b>6</b>	<b>Conclusions</b>	<b>37</b>
6.1	Future Work . . . . .	38
<b>A</b>	<b>Implemented Features</b>	<b>39</b>
A.0.1	Frame . . . . .	39
A.0.2	Window . . . . .	40
A.0.3	Fast Fourier Transform . . . . .	40
A.0.4	Power Spectrum . . . . .	41
A.0.5	Constant-Q Transform . . . . .	41
A.0.6	Mel-Frequency Cepstral Coefficients . . . . .	42
A.0.7	Spectral Shape . . . . .	43
A.0.8	Spectral Flux . . . . .	44
A.0.9	Onset Detection . . . . .	45
<b>B</b>	<b>Evaluation Dataset</b>	<b>47</b>
	<b>References</b>	<b>115</b>

# List of Tables

4.1	Plan level parallelism . . . . .	15
4.2	Feature level parallelism . . . . .	15
5.1	Evaluation Dataset . . . . .	22
5.2	Evaluation Dataset Genre Statistics . . . . .	22
5.3	Extraction Libraries and Versions . . . . .	22
A.1	CQT Parameters . . . . .	42
A.2	MFCC Parameters . . . . .	43
A.3	Spectral Shape Parameters . . . . .	44
A.4	Spectral Flux Parameters . . . . .	45
A.5	Spectral Onset Parameters . . . . .	46
B.1	Full Evaluation Dataset . . . . .	48

# List of Figures

3.1	Safe Web Interface . . . . .	10
4.1	Sequential dataflow for MFCC, CQT, and Spectral Shape features . .	12
4.2	Optimal dataflow extraction plan . . . . .	12
4.3	Safe Distributed Deployment . . . . .	20
5.1	Feature extraction times (1332 songs, 5120 minutes of audio) . . . .	25
5.2	Feature extraction times for increasing number of songs . . . . .	26
5.3	Feature extraction times for single audio files of increasing length . .	27
5.4	Performance increase from dataflow analysis (single-threaded) . . . .	28
5.5	Percentage of total time taken by individual sub-feature actors . . . .	32
5.6	Feature extraction processor speedup . . . . .	33
5.7	Feature extraction processor scalability . . . . .	34
5.8	Feature extraction cluster/node scalability (local audio files) . . . . .	35
5.9	Feature extraction cluster/node scalability (HDFS distributed audio files) . . . . .	36
A.1	Sequential dataflow of the Constant-Q transform . . . . .	42
A.2	Sequential dataflow for Mel-Frequency Cepstral Coefficients . . . . .	43
A.3	Sequential dataflow for Spectral Shape . . . . .	44
A.4	Sequential dataflow for Spectral Flux . . . . .	45
A.5	Sequential dataflow for Spectral Onsets . . . . .	46



# Chapter 1

## Introduction

The *Music Information Retrieval* (MIR) domain spans a wide variety of disciplines and applications. MIR techniques are being leveraged by businesses and academics for recommendation systems, classification, identification, automatic transcription, similarity searching, and more. Despite the seemingly different nature of these problems, many of these systems actually leverage similar audio feature extraction algorithms at their core. These feature extraction algorithms can range from low-level digital signal processing techniques to high-level machine learning algorithms. Most of these algorithms are computationally intensive, both in resource usage and running times.

The amount of audio data and music being produced today is significant. Companies such as Spotify are adding over 20,000 songs per day to their existing catalog of over 20 million songs [39]. The current Apple iTunes catalog has over 26 million songs [33]. Most of the existing MIR libraries and algorithms are not easily scalable to work with larger datasets such as these.

Numerous libraries exist for audio feature extraction and many have focused on algorithmic optimizations for efficient extraction, often using C++ for its performance benefits in numerical computing. However, as modern computing continues to shift towards more parallel architectures [3], it is clear that different programming models

and techniques are needed to take full advantage of these systems. Often, the imperative techniques used for optimal execution on a single processor are ill-suited or difficult to transition to parallel environments [40].

Additional research has been done in extending existing libraries to work in distributed computing environments [28, 15, 5]. These systems are all based on a master/worker division of nodes, which suffers from two main drawbacks. The primary drawback is that a master node in any system provides a single point of failure, meaning these systems do not address issues with fault-tolerance. The second drawback is that a master node in a system often enforces bounds on the scalability; introducing an upper bound when throughput is limited by the master node and forcing a lower bound of two nodes from the master/worker separation.

This paper describes a high-performance concurrent system for audio feature extraction based on modern techniques in parallel computing and reactive programming. Scalability of the system is fault-tolerant and addresses both vertical scalability through multicore processing and horizontal scalability through distributed clustering. While the primary focus of this research is on performance and scalability, there is a strong secondary goal towards providing a general extensible MIR framework for others to re-use and build upon.

## Chapter 2

# Background and Related Work

There have been many MIR feature extraction libraries developed over the last decade, each with different feature sets and focus. This section outlines some of the most popular and relevant libraries in audio feature extraction, though many more exist.

One of the earliest libraries to provide audio feature extraction that is still used today is Marsyas [41]. Marsyas is an efficient C++ framework for general dataflow audio processing that has been used for various analysis and synthesis tasks. Marsyas provides both a command-line interface and a graphical editor for building data flows. Marsyas has also been extended to perform batch extraction in distributed environments [5]. The distributed model relies on a custom dispatcher node sending audio clips over TCP to known worker nodes for feature extraction.

Yaafe [27] is a fast and efficient library for audio feature extraction written mostly in C++ with a Python interface. The focus of Yaafe is on efficiency, utilizing dataflow graphs to eliminate redundant calculations between different features. Yaafe is mostly a command line tool and supports output in CSV or HDF5 formats.

jAudio [30] is a Java-based audio extraction framework developed primarily for MIR researchers. The framework provides a GUI for selecting features and filling out parameters. Results can be exported to XML or Weka's ARFF format for further

experimentation or machine learning. jAudio also provides a mechanism for describing dependencies between features, similar to Yaafe, for the purpose of eliminating duplicate calculations.

OMEN [28] is a distributed extraction framework that leverages jAudio as its base extraction engine. The distribution model for OMEN is based on a hierarchy of different node types: a master node provides the overall coordination, library nodes store collections of audio data, and worker nodes perform the actual feature extraction. All communication in OMEN is handled through SOAP-based web services.

Sonic Annotator [8] is a command-line tool for running batch feature extraction on large numbers of audio files. Sonic Annotator is based on VAMP [19] plugins, a general framework and C++ API for audio feature extraction algorithms. Numerous VAMP plugin libraries have been developed by different research groups and are available for use. Sonic Visualiser, a complimentary tool to Sonic Annotator, provides a helpful user interface for feature exploration and many different graphical displays for visualizing features. Unfortunately, algorithms and results in VAMP cannot be shared between plugins which leads to some inefficiencies during extraction.

iSoundMW [15] is a distributed feature extraction framework and similarity search engine. The distribution model uses a single master node that sends small segmented frames of audio data to registered client worker nodes for feature extraction.

MIRtoolbox [26] is a Matlab-based MIR feature extraction library that takes advantage of existing visualizations and algorithms available in the Matlab ecosystem. MIRtoolbox provides some explicit mechanisms for composing features in stages from lower-level or intermediary calculations. However, memory management is an issue since the entire file and all feature calculations are held in memory. MIRtoolbox provides some parallel extraction capabilities, allowing concurrent extraction of separate files.

openSMILE [17] is a C++ based library focused on real-time Speech and MIR feature extraction. Batch extraction capabilities are provided as well as multi-threaded support for parallel extraction on a single machine. openSMILE is based on a complex shared data memory system which allows single-component writes and multi-component reads of matrix data and leverages ring-buffers to manage memory. Different output formats are provided including CSV, ARFF, LibSVM, and HTK.

# Chapter 3

## System Description

### 3.1 Feature Representations

The primary abstraction for any extraction library is the description of a *Feature*. Within the Safe system, each feature is described by a set of required and optional parameters needed to perform its calculations. Features in audio processing are often built on top of other features or share common steps in their calculations. For example, the *Fast Fourier Transform* (FFT) is generally a shared step for any algorithms working in the frequency domain. For that reason, each feature also describes its own dataflow as a sequence of smaller computational steps. This dataflow representation provides two major benefits. The first benefit is algorithm reuse; new algorithms can leverage existing code for common calculations. The second benefit is that duplicate calculations between features can often be eliminated through simple dataflow analysis on the provided feature sets. Section 4.1 describes this dataflow analysis technique in more detail. For a full list of implemented features, parameter descriptions, and dataflow sequences see Appendix A.

Externally, features are described through a simple syntax similar to the syntax used by Yaafe [27]. Listing 1 shows a simplified Backus-Naur Form (BNF) of the

feature extraction syntax used by the system and listing 2 shows an example entry of this syntax. Each entry contains three primary sections:

1. *name* - A unique name for the feature extraction.
2. *feature* - The feature to be extracted and any feature parameters such as the step size, window type, etc.
3. *output* - Optional output parameters such as the directory to write to or the precision of the results.

---

**Listing 1** Simplified Feature Syntax BNF

---


$$\begin{aligned}
 \langle \text{identifier} \rangle & \models \{ A \dots Z \mid a \dots z \mid 0 \dots 9 \} \\
 \langle \text{name} \rangle & \models \langle \text{identifier} \rangle \\
 \langle \text{feature} \rangle & \models \langle \text{identifier} \rangle \\
 \langle \text{parameter} \rangle & \models \langle \text{identifier} \rangle "=" ( \langle \text{quoted string} \rangle \mid \langle \text{number} \rangle ) \\
 \langle \text{parameters} \rangle & \models \langle \text{parameter} \rangle \{ ", " \langle \text{parameter} \rangle \} \\
 \langle \text{feature definition} \rangle & \models \langle \text{name} \rangle ":" \langle \text{feature} \rangle [ \langle \text{parameters} \rangle ] [ "-out" \langle \text{parameters} \rangle ]
 \end{aligned}$$


---



---

**Listing 2** MFCC Feature Extraction Description

---

mfcc: MFCC frameSize=256, stepSize=256, windowType="hamming"

---

## 3.2 System Interfaces

Within the system, there are two primary interfaces for running feature extraction over existing datasets. The first interface provides command-line execution for running bulk extraction on a single machine. Listing 3 outlines the syntax and parameters used in the command-line interface.

The two required parameters for any extraction are:

---

**Listing 3** Command Line Syntax

---

```
-i <file> | --input <file>
    input path (file or directory) for audio file(s) to process
-r | --recursive
    flag to process audio data in sub-directories (default = false)
-p <file> | --plan <file>
    path to feature extraction plan file
-f <value> | --feature <value>
    description and parameters for a single feature to extract
-s <value> | --sample-rate <value>
    sample rate in Hz of all audio files (default = 44100)
-o <file> | --output-dir <file>
    directory to write featre output to (default = './')
-m | --metrics
    flag to capture/print metrics (default = false)
```

---

1. *Input* - The individual audio file or directory containing audio files to run extraction on.
2. *Plan File* or *Feature* - A file containing the feature set and parameters or an inline description of the feature and its parameters.

The remaining command-line parameters are optional and use the specified defaults if no input is provided. One particular parameter of interest is the *sample rate*. Safe currently requires all audio data to be encoded with the same sample rate. This limitation exists because several features use the expected sample rate to pre-compute values for use in their calculations. For example, the *Mel-Frequency Cepstral Coefficients* (MFCC) algorithm uses the sample rate along with other parameters to pre-compute and cache its mel filter bank. In cases where a dataset contains audio with different sample rates, the audio data needs to be pre-processed and re-sampled into a common rate.

The Safe system also has the ability to capture and print out metrics for a given extraction run. If enabled, Safe will capture the following metrics for every sub-feature computation:



- *Total Messages* - The total number of times the sub-feature calculation was called during extraction.
- *Total Time* - The accumulated total time spent calculating the sub-feature.
- *Min, Max, Median, Mean Times* - The minimum, maximum, median, and mean times spent in a single calculation of the sub-feature.

The second system interface, used primarily for controlling extraction in distributed environments, is a web-based user interface. The web interface uses REST [18] communication for executing extraction and monitoring the progress and system status. Each extraction request is assigned a unique id that can be used for querying the status of the extraction. There are three possible responses for extraction status queries:

1. *Ongoing* - Specifies the number of audio files that have been processed along with the total number of files.
2. *Failed* - Gives a description of any failures that occurred during extraction.
3. *Finished* - Specifies the total number of files processed and the time taken to run the extraction (in milliseconds).

Figure 3.2 below shows a screenshot of the web interface for the system. This example screenshot shows the three different status results for extraction requests.

# Scalable Audio Feature Extraction

Audio Directory

/home/safe/music/wav

Output Directory

/home/safe/out/mir/csv

Features

`mfcc: MFCC windowType='hamming'  
flux: SpectralFlux windowType='hamming', diffLength=2`

➔ Run

7e11cbc4-bc81-4a26-886a-d8b49b7fb864

Extracted features from 200 files in 189.769 seconds. ✕

0636e327-6ff4-4d5b-bb6f-ce7ac5496232

Failed to parse plan from features 'bad: BadFeatureName someParameter=2'. ✕  
No feature named 'BadFeatureName'

a63ffac7-1ee5-46f7-83c5-a94cba9a25e5

Extracted features from 68 of 200 files.

Figure 3.1: Safe Web Interface

# Chapter 4

## Efficient and Scalable Extraction

The primary goal of this research is to provide an efficient framework for audio feature extraction that can easily scale in both vertical and horizontal directions. This is achieved by extending the techniques and algorithms used in other MIR libraries and adapting them to work with functional, asynchronous and reactive programming models. Safe is implemented in Scala [25] and leverages the Akka [2] library for parallel and distributed computing.

### 4.1 Efficient Feature Extraction

As mentioned in chapter 3, features can often be described by dataflow sequences of smaller computational steps or sub-features. Figure 4.1 shows an example of the step sequences for calculating three different features: *Mel-Frequency Cepstral Coefficients* (MFCC) [12], *Constant-Q Transform* (CQT) [6], and *Spectral Shape* [21].

By breaking down features into smaller steps, efficiencies can be gained by eliminating shared calculations. A set of multiple features in the system is combined to form a *Feature Plan*. When shared calculations between feature sequences are eliminated in a feature extraction plan, the plan naturally forms a directed acyclic dataflow graph. This is a common technique in dataflow analysis that is used by other

MIR feature extraction libraries [29, 27] to eliminate redundant calculations. This technique is similar to the problem of Common Subexpression Elimination [10] in compiler optimization. Figure 4.2 below shows an example of the optimized dataflow extraction plan for the same three features described earlier.

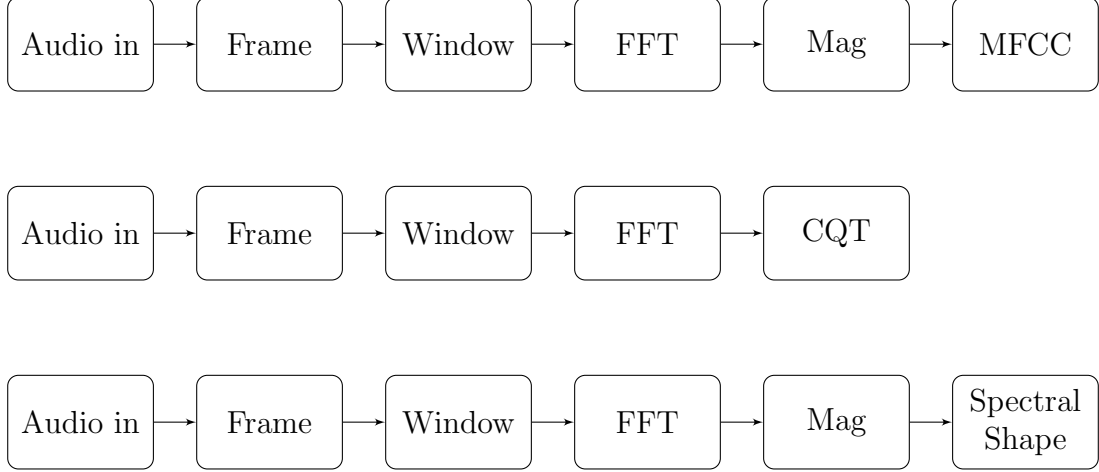


Figure 4.1: Sequential dataflow for MFCC, CQT, and Spectral Shape features

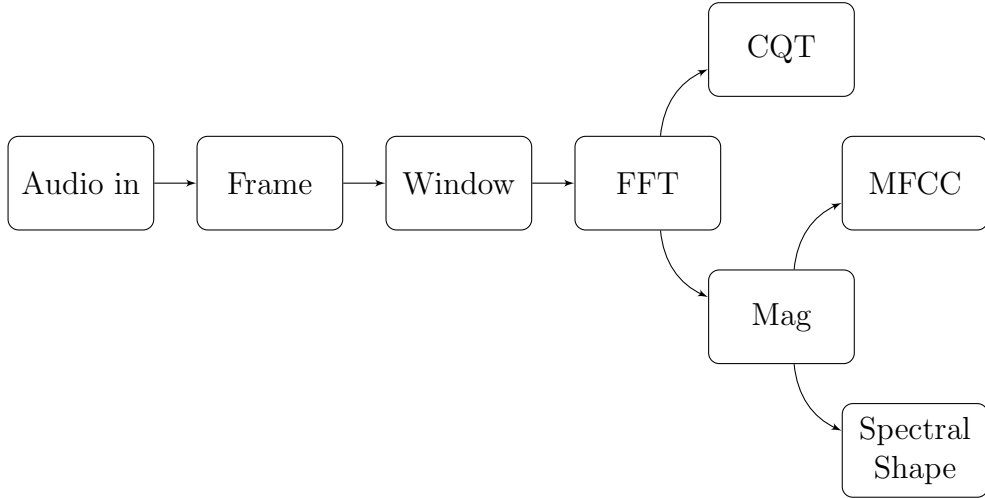


Figure 4.2: Optimal dataflow extraction plan

Feature extraction plans in Safe are encoded using *adjacency lists*. Each plan holds a single feature or sub-feature computation and zero or more downstream plans to pass results to. Algorithm 1 shows the basic data representation for feature extraction

plans. Algorithm 2 shows the heuristic algorithm that is used to combine multiple features or plans into optimal dataflow graphs.

---

**Algorithm 1** Feature Extraction Plan Representation

---

```
case class Plan(feature: Feature, children: Seq[Plan])
```

---

---

**Algorithm 2** Dataflow Graph Optimization

---

```
def dataflow(plans: Seq[Plan]): Seq[Plan] =  
  plans.foldLeft Nil)((merged, plan) => merge(merged, Seq(plan)))  
  
def merge(as: Seq[Plan], bs: Seq[Plan]): Seq[Plan] = {  
  val merged = for {  
    a <- as  
    b <- bs if (a.feature == b.feature)  
  } yield Plan(a.feature, merge(a.children, b.children))  
  
  (as ++ bs).filterNot(  
    p => merged.exists(_.feature == p.feature)) ++ merged  
}
```

---

## 4.2 Parallel Feature Extraction

With the processing model expressed as a directed acyclic dataflow graph, audio data can be streamed through the pipeline to extract the various features. This approach lends itself to numerous levels of parallelism:

- *File Level* - Extraction can be run concurrently on multiple files.
- *Plan Level* - Any time a plan branches into separate paths, each path can run concurrently on the results of the parent calculation.
- *Feature Level* - When audio data is split into separate chunks (frames), each stage of a feature extraction sequence can concurrently operate on a different section of the data.

File level parallelism is a fairly self-explanatory concept and is the approach used in [26]. It is the most obvious form of parallelism and requires little to no coordination between processes. Tables 4.1 and 4.2 show examples of plan level and feature level parallelism where each row represents a different processor and each column represents possible computations over time. With plan level parallelism, different steps can run concurrent calculations on the same data outputs of a parent step. For example, table 4.1 shows that the CQT and Magnitude calculations can run concurrently on the output of the FFT. With feature level parallelism, a given calculation may be executing on a section of audio data concurrently with downstream calculations running off previous results. In table 4.2, the example highlights that a Window function can pass its output to the FFT function and immediately begin working on the next frame. *Note:* These tables are used for illustrative purposes of where parallelism can occur and do not represent the actual thread scheduling and division within the system. In the actual running system, some steps will take much longer than others and a single thread may finish multiple steps in the time another thread takes to execute

one. Additionally, different combinations of file, plan, and feature level concurrency may occur together.

FFT( $window_1$ )	Magnitude( $fft_1$ )	MFCC( $mag_1$ )
	CQT( $fft_1$ )	Spectral Shape( $mag_1$ )

Table 4.1: Plan level parallelism

$frame_1$	Window( $frame_1$ )	FFT( $window_1$ )	CQT( $fft_1$ )
	$frame_2$	Window( $frame_2$ )	FFT( $window_2$ )
		$frame_3$	Window( $frame_3$ )
			$frame_4$

Table 4.2: Feature level parallelism

Managing these different levels of concurrency with traditional thread scheduling and lock management would be complicated and difficult. Instead, an Actor model [1] for concurrency is used.

Actors are objects that encapsulate state and behavior and communicate exclusively through messaging. Messaging between actors is never direct. Instead, communication occurs through the use of recipient mailboxes. Each actor has exactly one mailbox and messages are dequeued and processed by the actor in a serial fashion. This serial processing guarantee helps eliminate synchronization and locking concerns within the actor’s actual processing logic. Conceptually, actors can be thought of as having their own light-weight isolated threads. It is the responsibility of the actor container to manage the actual scheduling and execution against real threads.

Actors also provide a rich hierarchy and supervision system. Each actor can create any number of child actors to execute sub-tasks. When an actor creates another actor, it becomes a supervisor and is responsible for delegation and control of the child actor. When a child actor fails for any reason, the supervisor (parent) is notified of the failure and is responsible for handling the failure. When a subordinate fails, the supervising actor has the option to resume the subordinate (keeping any existing state), restart the

subordinate (clearing out any previous state), terminate the subordinate, or escalate the failure (failing itself).

Actor models, being asynchronous and message-based, provide a natural encoding for stream based dataflow processing. Within Safe, each computational step in the dataflow graph is represented by an actor and the intermediary results (messages) between actors are immutable. By encoding the feature extraction dataflow graphs as actor hierarchies in this fashion, all three levels of parallelism mentioned (file, plan, and feature) are provided with no additional components required. The dynamic nature of Akka’s actor system make it simple to create complex fault-tolerant feature extraction hierarchies. Within a feature extraction plan, each actor usually takes on one of four common messaging roles described in [24]:

- *Splitter* - Actors that take a single message or result and split the work into smaller pieces for downstream processing. Splitters provide much of the parallelism in feature extraction. File level parallelism is provided by splitting a message with multiple file locations (or a directory) into individual messages for each file. Feature level parallelism is provided by a Frame actor, splitting an individual file into smaller chunks (frames) to perform further computations on.
- *Transform* - The most common actor type in a feature extraction plan is a transform actor. These actors provide simple mapping functions from one type to another and send the result on for further processing. Examples of transforms are Windowing functions, FFT, Power Spectrum, MFCC, Spectral Shape, etc.
- *Resequencer* - Actors that take a stream of potentially unordered messages and send them out in an ordered sequence. Sequencing is important when writing out frame-based extracted features. For example, when writing out to a CSV



file the features need to be in the same order as the frames in the source audio file.

- *Aggregator* - Aggregators are used to calculate features that go across multiple frames in an audio file or across an entire dataset. Some example aggregate functions are Spectral Flux or any max/min/average/total/etc. calculation across audio files.

By default, a single actor is created for each node in the dataflow graph and the actor messaging hierarchy mirrors the arcs in the graph. For many systems, the concurrency provided by the file, plan, and feature level divisions is sufficient. However, for highly concurrent systems (systems with a large number of processors), the Splitter and Transform actors can be replaced with actor pools and a round-robin routing strategy. This strategy allows concurrent execution of the same computational step on different frames. For example, multiple FFT calculations could be run concurrently on different frames. In the current system, Resequencers and Aggregators cannot be placed into pools because they need to maintain a temporary state across multiple messages. Because of this requirement, scalability is often limited by features that require aggregate calculations.

## 4.3 Distributed Feature Extraction

The distribution model for the system leverages Akka's clustering framework [9]. Akka's cluster system provides a fault-tolerant decentralized membership service based on Amazon's Dynamo [14] store. The cluster architecture uses gossip protocols [42] to manage node membership within the cluster. Using the gossip protocol, the current state of the cluster is gossiped between nodes and preference is given to members that have not yet seen the latest version. Initiation into a cluster is handled by a node sending a join message to one of the existing nodes in the cluster. In order

to provide a fault-tolerant solution, failures in the cluster need to be detected and communicated to the rest of the system. For this, Akka uses a Phi Accrual Failure Detector [23].

While previous research in distributed audio feature extraction exists [28, 15, 5], they are all based on a master/worker division of nodes. By leveraging a decentralized and masterless clustering framework, there is no single point of failure or single point bottlenecks in the system. Since the clustering framework is Actor based as well, it is simple to scale the feature extraction framework from a single machine to multiple nodes.

#### **4.3.1 Localized Data**

The simplest form of distributed feature extraction assumes that a collection of audio files is already distributed across the cluster onto the local file systems. This configuration is similar to the library node concept used by OMEN [28]. From there, bulk extraction can be performed across the cluster through a simple broadcast message to all nodes in the cluster. While this provides a simple and scalable solution, this approach is not fault-tolerant or flexible. This distribution model couples the extraction execution to the machines containing the data. If a node is down or fails, there is no way to run extraction over the audio data stored on that node.

In this case, the time taken to extract all features will be limited by the longest running node in the cluster. For optimal extraction times, the data needs to be evenly balanced across the cluster and nodes within the cluster should be homogeneous, i.e. each machine should have an equal number of computing resources.

#### **4.3.2 Distributed Data**

A more robust and fault-tolerant model for distributed extraction requires a distributed file system such as Hadoop HDFS [38]. Hadoop provides a whole suite of

capabilities for distributed analysis and transformation of data using the MapReduce [13] paradigm. However, Safe’s cluster extraction only leverages the distributed file system from Hadoop.

In HDFS, there are two types of nodes: *NameNodes* and *DataNodes*. *NameNodes* provide the overall management and coordination of directory hierarchies and location of the data within HDFS. File content is split into chunks, typically 128 mb in size, and those chunks are stored on the local file systems of *DataNodes*. Fault-tolerance in HDFS is provided through replication. Individual chunks are replicated and distributed onto multiple *DataNodes*. In a standard configuration *NameNodes* in a hadoop cluster provide a single point of failure, though a High Availability (HA) feature is provided that allows redundant *NameNodes* to be configured for fast failover. HDFS clients typically access files through a TCP protocol, but a short-circuiting mechanism [34] is provided for cases when the data and processing are co-located on the same machine.

Figure 4.3.2 shows the distributed deployment architecture of the system using HDFS. Since the Safe cluster is masterless, any number of nodes in the cluster can be configured to serve http requests. Safe nodes can be co-located with HDFS nodes or run on separate clusters.

When an extraction request is made to one of the nodes in the Safe cluster, the receiving node will query the *NameNode* for all the paths of the audio data and route extraction of individual audio files to different nodes in the cluster. The primary routing logic uses a Round-Robin routing strategy to distribute the extraction workload across the cluster. Some experimentation with routing strategies that take data locality into account was also performed. In this case, the routing logic favors sending extraction requests to the same machine where the data is located, taking advantage of the HDFS short-circuit reads. When different nodes in a cluster are unbalanced, i.e. some nodes have a larger heap, more CPU, etc., an adaptive load balancing router

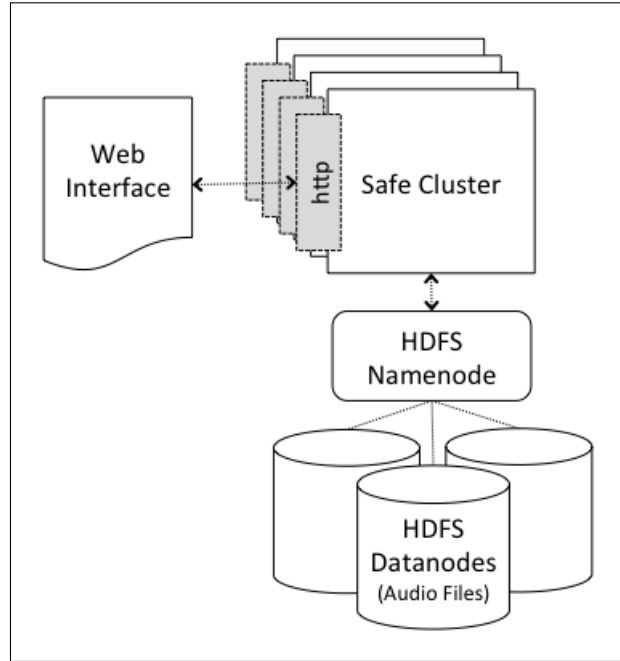


Figure 4.3: Safe Distributed Deployment

should be used instead to distribute feature extraction. Akka provides a probabilistic router based on weighting from the following metrics:

- *Heap* - Remaining JVM heap capacity.
- *Load* - System load average over the past minute.
- *CPU* - Percentage of CPU utilization.

# Chapter 5

## Evaluation and Results

### 5.1 System Evaluation

In order to evaluate the system’s performance and scalability, a large dataset of music audio was required. The dataset used for testing was a private collection of 1,332 songs, approximately 5,120 minutes of audio. All files were encoded in CD-quality 44.1 KHz 16-bit stereo WAV format. The overall dataset was split into smaller subsets to allow for testing on varying sized datasets. Tables 5.1 and 5.2 show some general statistics about the datasets used in testing. For a full listing of all the songs, see Appendix B.

Safe was compared with three other feature extraction libraries for performance: Yaafe, openSMILE, and Sonic Annotator. Yaafe and openSMILE in particular were chosen because of their strong performance characteristics. Table 5.3 shows the versions of each library used for this evaluation. Initial evaluations also included MIR-Toolbox, though its performance was significantly worse and the results have been left out of these benchmarks.

Audio Files	Total (minutes)	Max (minutes)	Min (minutes)	Avg (minutes)
1	2.5	2.5	2.5	2.5
2	5.0	2.5	2.5	2.5
4	10	3.49	1.51	2.5
9	20	4.04	1.09	2.22
17	40	4.56	0.92	2.35
35	80	4.56	0.59	2.29
61	160	5.91	0.59	2.62
107	320	6.98	0.41	2.99
200	640	11.35	0.41	3.2
371	1280	11.35	0.41	3.45
707	2560	15.72	0.23	3.62
1332	5120	32.25	0.11	3.84

Table 5.1: Evaluation Dataset

Genre	Song Count
Progressive Metal	19
Folk Rock	2
Pop Rock	3
New Wave	32
Indie Rock	223
Metal	79
Jazz	171
Punk	386
Swing	22
Stoner Metal	27
Alt-Country	10
Folk	30
Rockabilly	3
Rock	31
Alternative	213
Blues	6
Hip-Hop	74

Table 5.2: Evaluation Dataset Genre Statistics

Library	Version
Yaafe	0.64
openSMILE	2.0-rc1
Sonic Annotator	1.0
Safe	0.1

Table 5.3: Extraction Libraries and Versions

The benchmark used for comparing the different libraries was a measure of the total time taken to extract six different features and output the results to CSV files. The six features picked for the benchmark were:

- Mel-Frequency Cepstral Coefficients (13 coefficients, 40 filters)
- Spectral Flux
- Spectral Centroid
- Spectral Spread
- Spectral Skewness
- Spectral Kurtosis

This particular feature set was chosen because each library has support for these features and the algorithms are fairly standard and not likely to vary between implementations. For all features, the frame size was 1024 samples and the step (hop) size was 512. All of the scripts and configuration used for this evaluation are available online [37]. In the interest of fairness, attempts were made to provide configurations for optimal performance with each library.

Yaafé was compiled with FFTW [20] for fast FFT calculations. Since Yaafé performs dataflow analysis to optimize execution, no other special configuration was required. Since openSMILE has support for multi-threaded concurrency, experimentation was performed to find an optimal number of threads for the test. Ultimately, openSMILE was configured to run with a single thread because all tests with multi-threaded configurations appeared to degrade the performance. For openSMILE, the dataflow graph is encoded explicitly into the configuration since there is no dataflow analysis support. For Sonic Annotator, the LibXtract [7] plugins were used to calculate the spectral shape features (centroid, spread, skewness, and kurtosis), while the

BBC plugins [11] and Queen Mary University plugins [32] respectively were used to calculate the Spectral Flux and MFCC features. Sonic Annotator does not provide any support for dataflow optimizations, so many of the algorithms are running redundant calculations. For this benchmark Safe was configured using Akka’s default Fork-Join executor, which calculates its thread pool size based on the number of processors  $p$  and a parallelism factor  $\nu$  (default 3.0):

$$poolsize = \lceil p\nu \rceil \tag{5.1}$$

All evaluations were run on a Macbook Pro, OS X 10.7.5, with a 2.5 GHz Intel Core i7 processor 8 GB 1333 MHz DDR3 RAM. For each evaluation, the mean time and standard deviation were calculated from ten iterations. The standard deviation for each library was relatively small. In many of the plots, the standard deviation is left out because the bars are indistinguishable from the plotted points.

Figure 5.1 shows the overall time taken by each library to run extraction over the full dataset. Figure 5.2 shows a plot of each libraries performance as the number of songs increases. Yaafe, openSMILE, and Safe (single-threaded) are all very close in terms of performance. In this benchmark, the multi-threaded version of Safe is roughly four times faster than the other solutions.



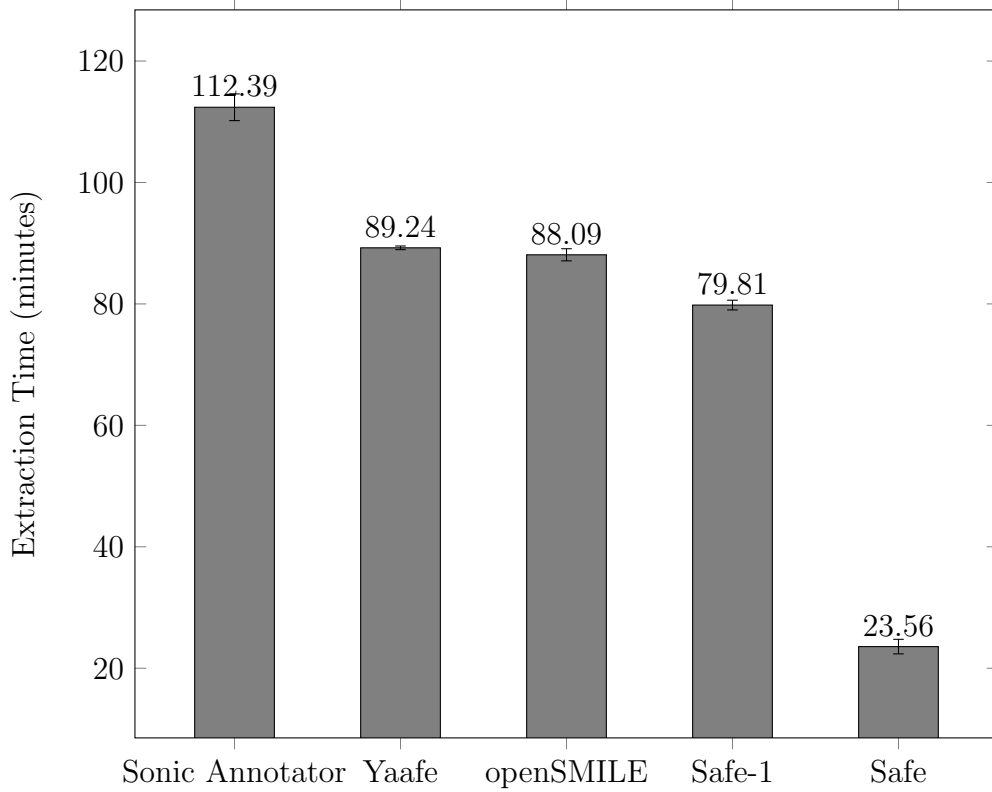


Figure 5.1: Feature extraction times (1332 songs, 5120 minutes of audio)

In order to verify that the parallelism in Safe is not limited to concurrent extraction of multiple files, a benchmark was setup to measure extraction times on single audio files of increasing length. Figure 5.3 shows the results of this benchmark. For this benchmark, Safe was configured to use Akka’s fixed thread pool dispatcher with five threads. These results indicate that the Safe system has a more significant fixed startup cost than the other libraries but better variable performance with increasing recording lengths.

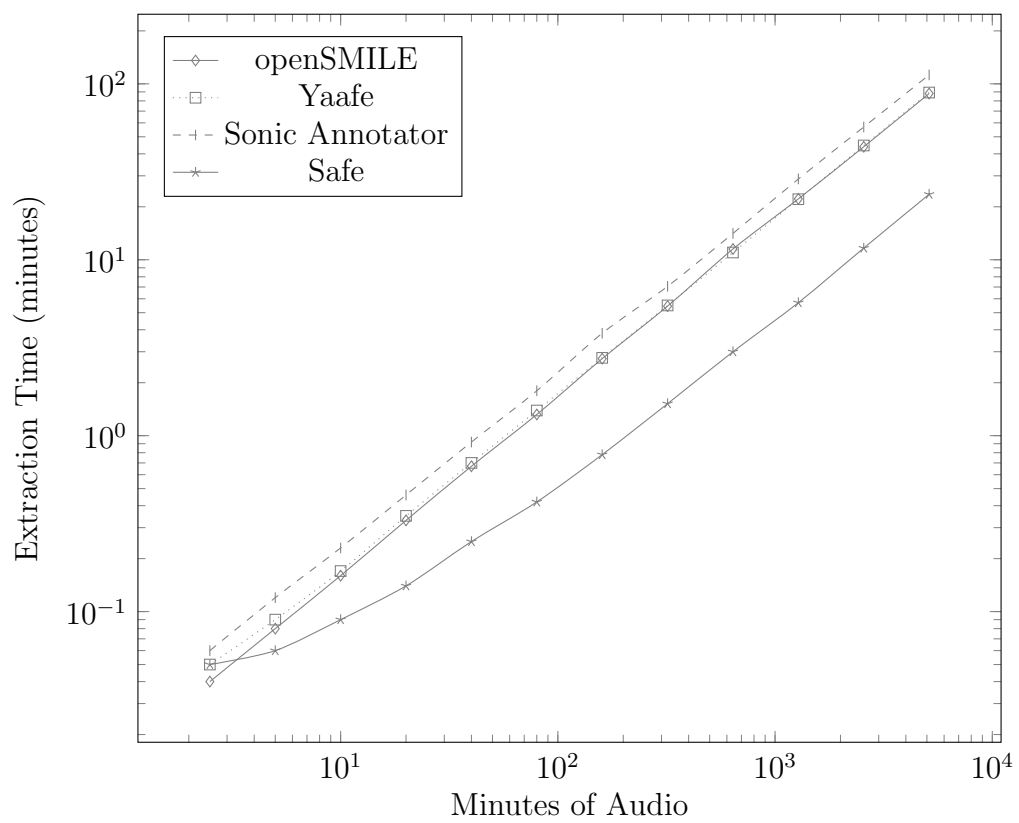


Figure 5.2: Feature extraction times for increasing number of songs

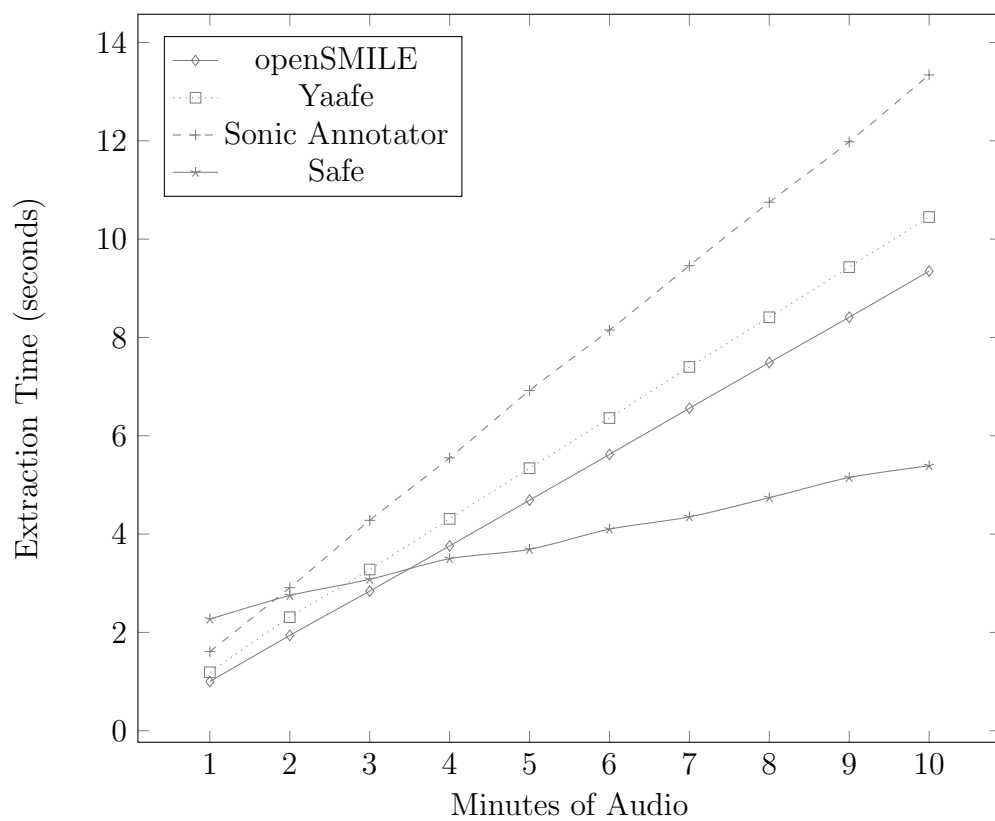


Figure 5.3: Feature extraction times for single audio files of increasing length

## 5.2 Dataflow Analysis

In order to test the benefits of dataflow analysis, Safe’s performance was measured both with and without dataflow optimizations. Testing was performed using the same dataset and feature set described previously in section 5.1. For the sequential case, each audio file was loaded only once but the individual extraction algorithms were run independently with no shared calculations. This setup is very similar to the way many feature extraction libraries (including Sonic Annotator) work. Figure 5.4 shows the extraction times both with dataflow optimizations and without (sequential). For this particular feature set, we see a 33% decrease in the overall extraction time when dataflow optimizations are applied. However, the benefits can vary significantly depending on the selected feature sets and input parameters.

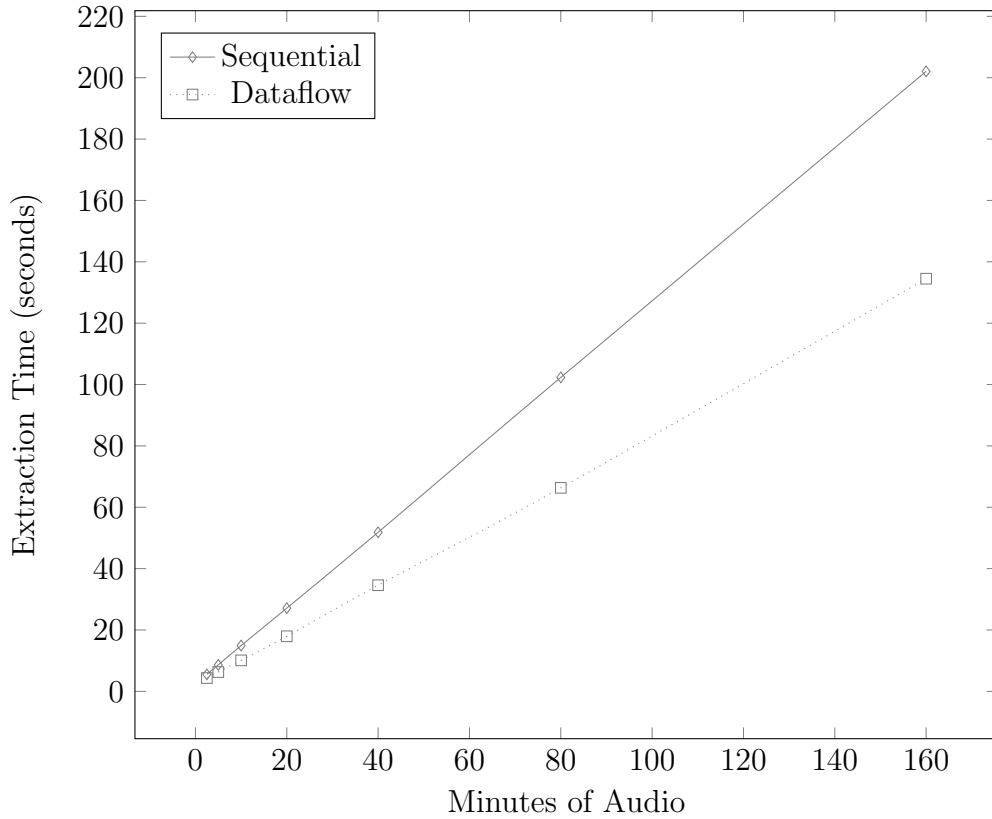


Figure 5.4: Performance increase from dataflow analysis (single-threaded)

### 5.3 Scalability Analysis

The techniques used to measure and describe scalability of the system are all based on Gunther's Universal Scalability Law (USL) [22]. Within this model, one of the primary measurements for parallelism in a system is the system's *speedup* factor. Speedup is defined as the ratio of elapsed time on a single processor  $T_1$  to the elapsed time on  $p$  processors  $T_p$ .

$$S(p) = \frac{T_1}{T_p} \quad (5.2)$$

Speedup measurements are taken by executing a fixed workload on increasing numbers of processors (or machines). The result is a quantification of the reduced execution time for adding more processors to the system. Another important measurement of a system's parallelism, based on speedup, is *efficiency*. Efficiency measures the average speedup per processor, which is defined as:

$$E(p) = \frac{S(p)}{p} \quad (5.3)$$

In theory, a system that is perfectly parallel will have linear speedup  $T_1/p$ . In practice, however, there are other factors that make linear speedup in systems unrealistic. The Universal Scalability Model was developed to take these additional factors into account and give a realistic description of a systems true scalability. The two primary factors involved in this model are:

- *Contention* ( $\sigma$ ) - The serial fraction of the total execution. This represents the portion of an algorithm that cannot be split up and needs to run serially.
- *Coherency* ( $\kappa$ ) - The additional overhead of managing extra processors and interprocessor communication.

Taking these factors into account, the Universal Scalability equation for system capacity  $C(p)$  is defined as:

$$C(p) = \frac{p}{1 + \sigma(p - 1) + \kappa p(p - 1)} \quad (5.4)$$

Equation 5.4 describes a *concave* function. Under this model, most systems will have a maximum capacity at  $p^*$ . Adding more processors beyond  $p^*$  will only degrade performance. The maximum capacity can be obtained through the following equation:

$$p^* = \left\lfloor \sqrt{\frac{1 - \sigma}{\kappa}} \right\rfloor \quad (5.5)$$

The  $\sigma$  and  $\kappa$  parameters in the USL are calculated by performing regression analysis on the measured system throughput  $X(p)$ . The full procedure for calculating these parameters is outlined in [22].

All scalability testing of the system was performed on the University of Colorado at Colorado Springs virtual cloud infrastructure [31] running a VMWare vSphere 5 hypervisor. The particular cluster used consisted of 8 physical HP machines w/ 2.4GHz Intel Xeon E5530 CPUs. The total available resources in the cluster consisted of:

- 64 Processor Cores
- 153 GHz total CPU
- 512 GB Memory
- 55 TB Connected Storage

All virtual machines used in testing were running a 64-bit CentOS 6.4 operating system.

### 5.3.1 Multi-Processor Scalability

In addition to providing a simple model for developing concurrent applications, the Actor model provides a simple theoretical foundation for estimating scalability. Since each actor processes messages from its inbox serially, the contention factor  $\sigma$  in an actor system can be estimated by running the system with a single processor (or single-threaded) and measuring the percentage of time spent in each actor. The largest percentage of time spent in a single actor should be very close to the overall contention factor.

Using the same features and dataset described in section 5.1, figure 5.5 below shows the percentage of time spent computing each step (sub-feature) for different pool sizes. In the case where a single actor is dedicated to each sub-feature computation (pool size of 1), reading in the input audio and creating the frames takes approximately 21% of the time on a single processor. Therefore, the theoretical serial contention factor  $\sigma_1$  should be  $\approx 0.21$ . In the current system, features that require aggregation (such as Spectral Flux) cannot be pooled and only a single actor is created regardless of pool size. Therefore, these features will often become the dominant factor in scalability when pooling is used. With this feature set, the Spectral Flux calculation takes approximately 13% of the time on a single processor. For pool sizes of two or more, the contention factor  $\sigma_n$  should be  $\approx 0.13$ .

In order to test the system’s actual multi-processor scalability, the same extraction test was run on virtual machines with an exponentially increasing number of single-core processors  $p = 1, 2, 4, 8, \dots, 64$ . Multiple tests were run to capture the impact of increasing actor pool sizes. Figure 5.6 shows the measured system speedup. As expected from the theoretical model, no performance increases were seen for pool sizes greater than two.

Figure 5.7 shows the measured throughput and modeled curve fits based on the USL calculations. From these equation parameters, our maximum capacity  $p^*$  for

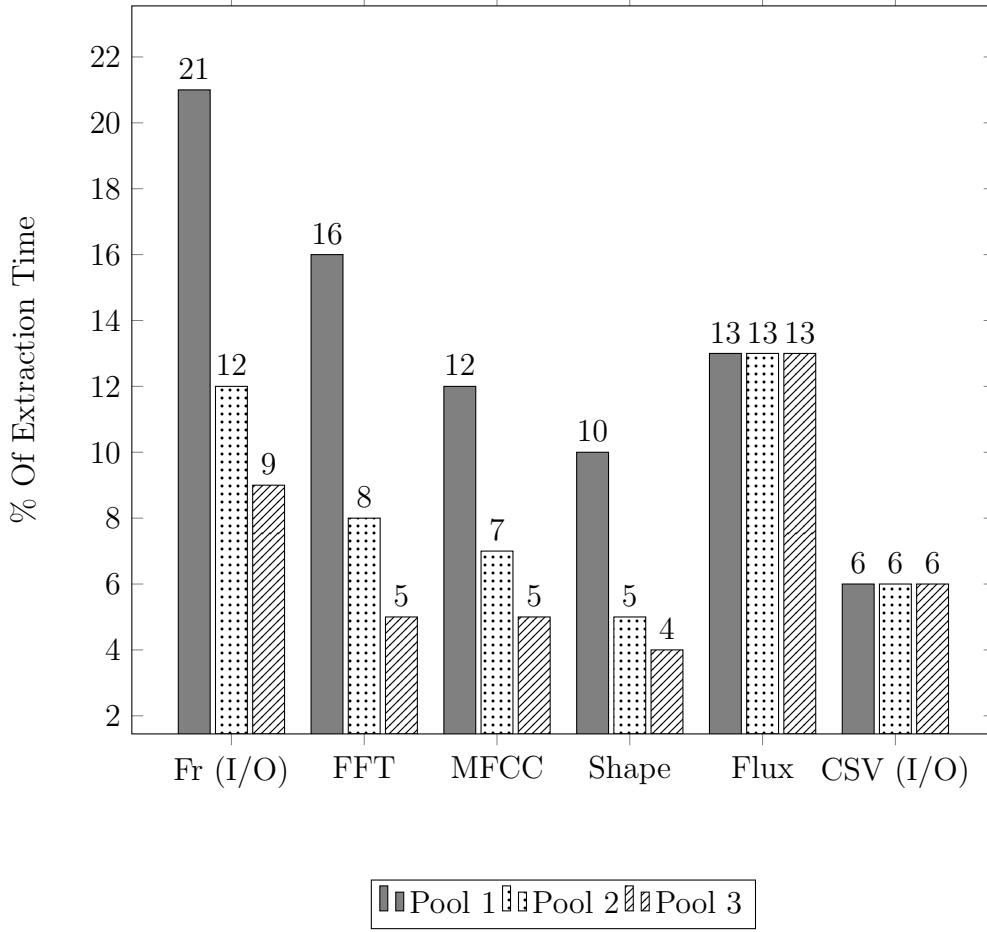


Figure 5.5: Percentage of total time taken by individual sub-feature actors

this particular feature set is 20 processors for a pool size of one (single actor per sub-feature computation) and 28 processors for a pool size of two. The calculated contention factors  $\sigma_1 = 0.203$  and  $\sigma_2 = 0.123$  were very close to the theoretical expected values of 0.21 and 0.13.

### 5.3.2 Multi-Node Cluster Scalability

The same USL model used to evaluate Safe’s multi-processor scalability was used for measuring the distributed cluster scalability. Instead of increasing the number of processors on a single virtual machine, tests were run on increasing numbers of virtual machines. Each node (VM) in the cluster was given the same number of resources



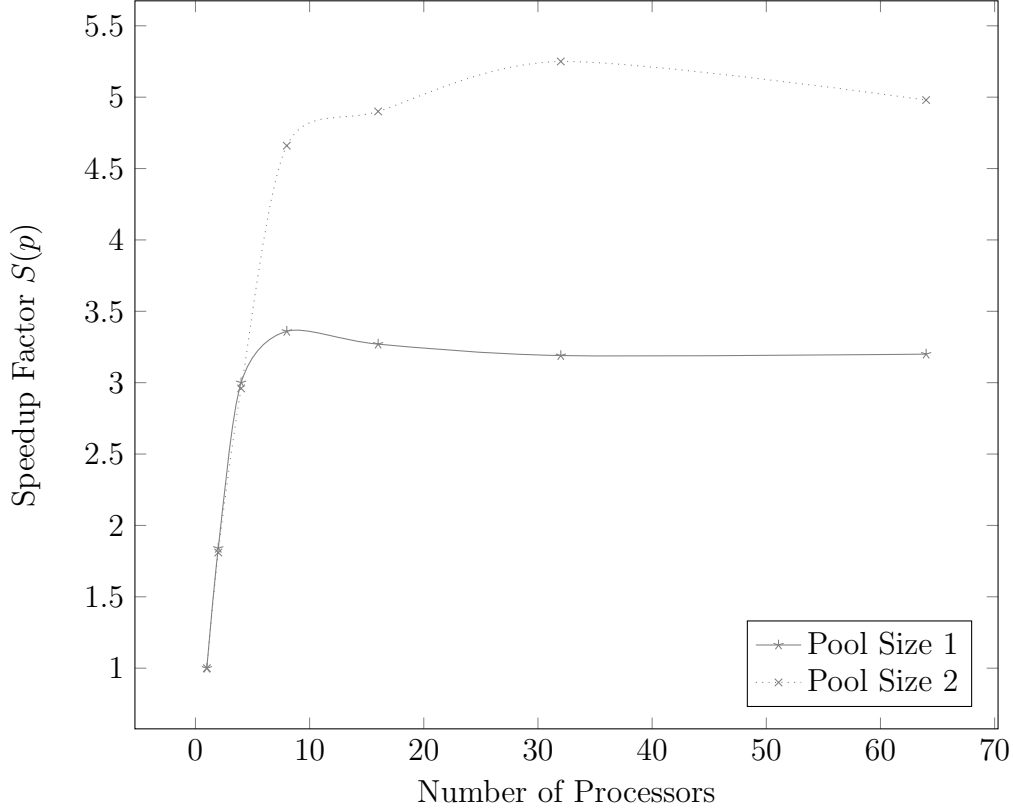


Figure 5.6: Feature extraction processor speedup

(processors, disk space, etc.). In most hosted VM environments, multiple VM's will often share and compete for physical resources such as disk space and processors. In an attempt to minimize this contention for these tests, each VM was mapped to a separate physical hard drive and processor. Since the physical cluster only provided six separate disk partitions and eight separate processors, the maximum number of nodes tested was six.

The first test, as outlined in section 4.3.1, relied on the dataset being distributed evenly across the cluster onto the local drives. For this test, the audio files were distributed across the cluster and placed in the same directory location on each node. Communication between nodes in this configuration is minimal and only relies on the initial broadcast message to perform extraction and the final aggregation step determining when all nodes have finished.

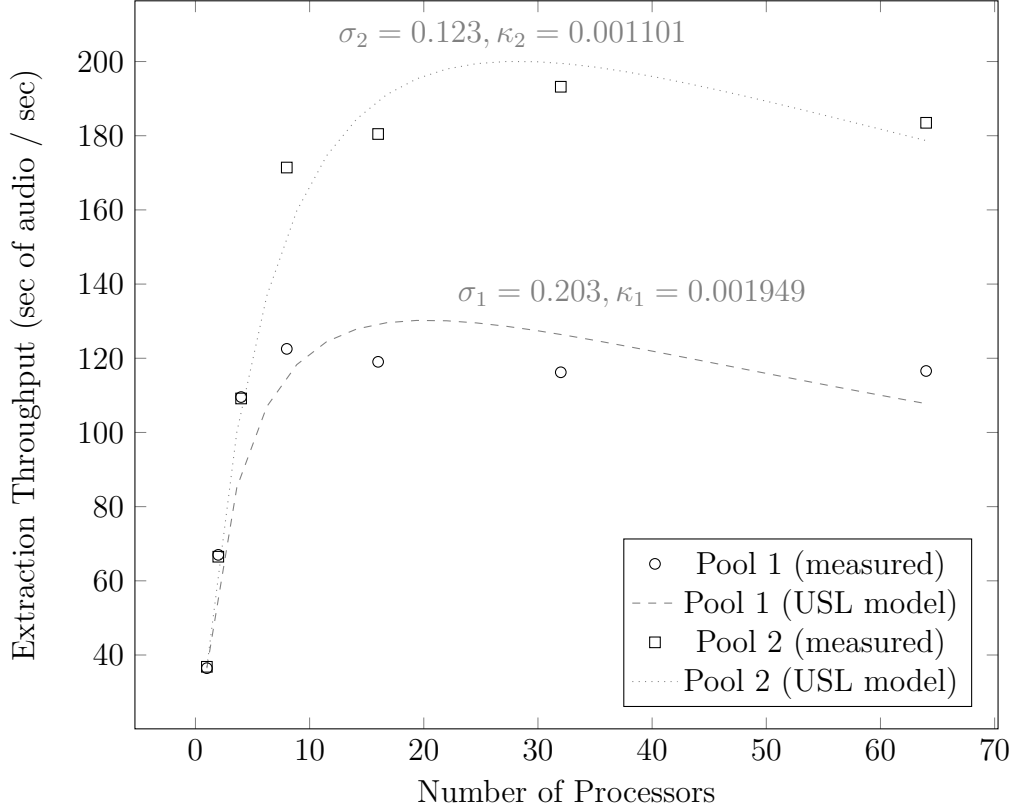


Figure 5.7: Feature extraction processor scalability

Figure 5.8 shows the measured and USL calculated scalability of this model. As expected, because of the minimal coordination between nodes, the scalability is close to linear. Based on the calculated contention and coherency, the maximum capacity  $p^*$  of this configuration is 82 nodes.

While the previous localized data configuration has close to ideal scalability, it is a poor choice for fault-tolerance or flexibility in the distribution model. The second test, as described in 4.3.2, relied on the audio data being distributed through HDFS. The HDFS configuration for these tests specified a replication factor of 3 and a block size of 128 MB. For CD quality wav files (44.1 KHz, 16-bit stereo), 1 minute of audio is approximately equal to 10 MB. Therefore, most songs under 12 minutes in length were stored in a single block. Each node ran an instance of the Safe software

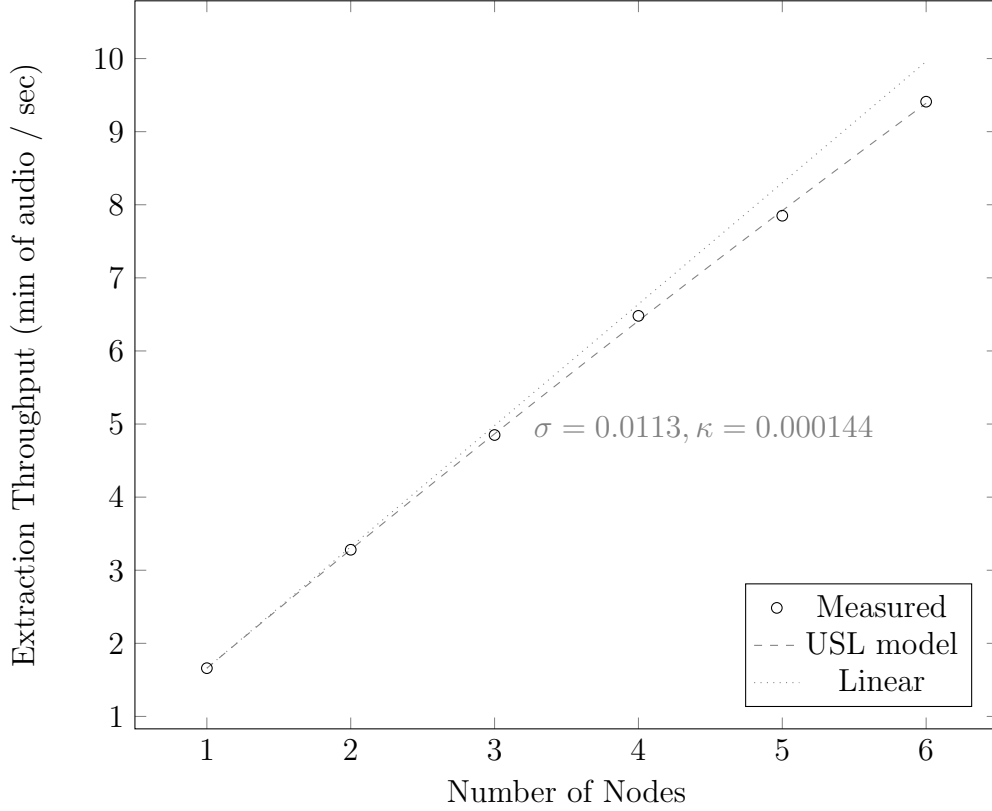


Figure 5.8: Feature extraction cluster/node scalability (local audio files)

and doubled as an HDFS data node. With each new node added, the cluster was re-balanced to more evenly distribute the audio files.

Initial testing leveraged a cluster-aware router that attempted to route extraction of individual files based on data locality. In this case, preference was given to nodes where the physical audio files and processing were co-located in an attempt to take advantage of HDFS short-circuit local reads. However, testing revealed that the HDFS re-balancing algorithm did not provide a truly even distribution of the data, causing the distributed workload to become unbalanced. Instead, a standard round-robin routing strategy was used which gave better overall performance.

Figure 5.9 below shows the measured and USL calculated scalability of the HDFS-based distribution. Not surprisingly, the contention and coherency factors are slightly higher in this configuration, but the fault-tolerance and flexibility make this a more

appealing option for most systems. With this model, the maximum capacity  $p^*$  is 28 nodes.

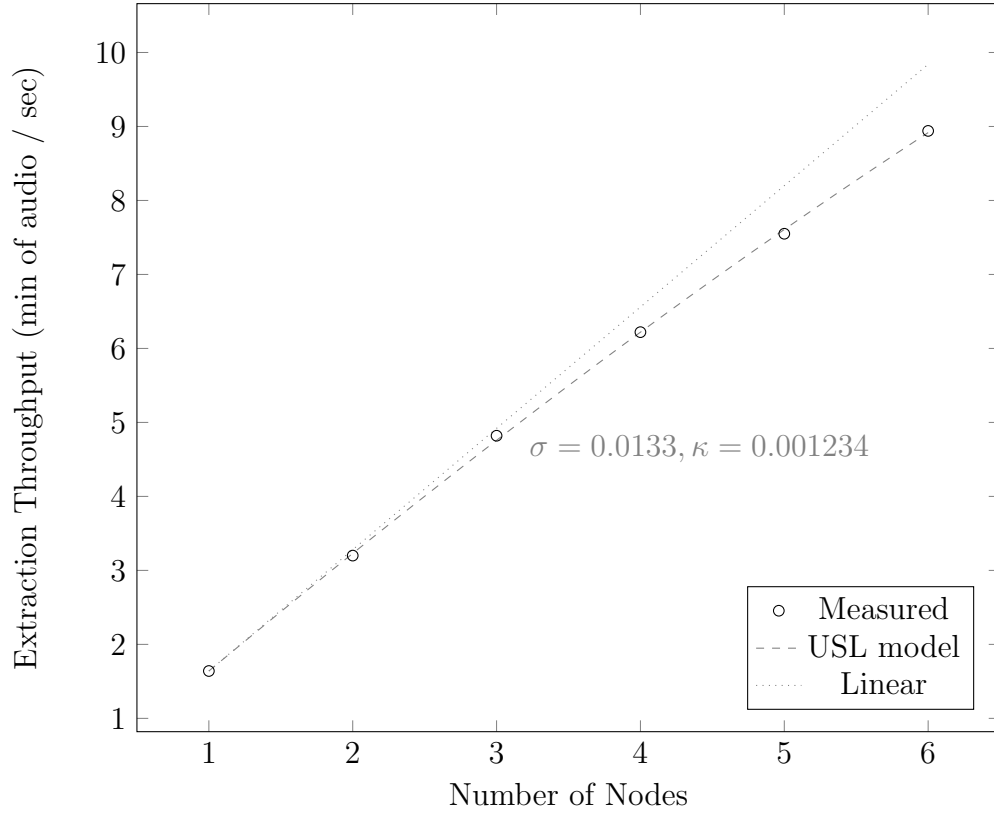


Figure 5.9: Feature extraction cluster/node scalability (HDFS distributed audio files)

# Chapter 6

## Conclusions

Many of the current frameworks for audio feature extraction have focused on algorithms and optimization techniques for serial execution. Dealing with larger datasets requires a more scalable model for extraction. In this paper, the Safe system for high-performance concurrent audio feature extraction was outlined. In comparison benchmarks with current leading MIR extraction libraries, Safe outperformed the existing solutions for all datasets with more than 3 minutes of audio.

Scalability analysis provided models for the system’s multi-processor and multi-node cluster scalability. The actor model of concurrency used in Safe provides a simple theoretical model for predicting the vertical (processor) scalability with any given feature set. Further scalability testing demonstrated that the measured contention factors lined up with the expected theoretical values.

Two different models for multi-node cluster scalability were evaluated. The first model relied on the dataset being distributed across the cluster onto the individual node’s local file systems. The second, more flexible and fault-tolerant model, leveraged a true distributed file system. Using the Universal Scalability Law to estimate the system’s contention and coherency factors, the local file system based approach

was shown to have close to ideal scalability. Although slightly less performant, the system’s scalability using the distributed file system was still very strong.

All of the source code for Safe is available online [35] and released under the Eclipse Public License version 1.0 [43].

## 6.1 Future Work

In addition to adding more algorithms and features to Safe, there are certain areas where scalability of the system can be improved. Many of the current aggregation features in the system are un-necessarily limited to a single actor. In cases where aggregation is performed on a per-file basis, a smarter routing component can use the origin file information to appropriately route messages. More specifically, a consistent hashing router can be used that takes the origin file’s path as the hash key.

All of the cluster scalability tests were performed on a homogenous cluster. Additional research into smarter distributed routing for unbalanced or inhomogeneous clusters would help in optimizing extraction times. Akka provides an adaptive probabilistic load balancing router that can be leveraged or extended for this task.

Lastly, future enhancements should address more aspects of fault-tolerance within the system. While minimal support for fault-tolerance is built into the system through the libraries being used, additional logic needs to be incorporated for handling failures during extraction. Ideally, the extraction system should be able to recover from node failures or network partitions.

# Appendix A

## Implemented Features

A large portion of this research consists of analyzing MIR feature extraction algorithms and breaking them down into smaller sequential components for dataflow analysis. The following sub-sections describe the various feature extraction algorithms implemented in the system, along with any common or shared sub-feature computations.

### A.0.1 Frame

The framing function produces an iterator of fixed-size, potentially overlapping, frames from an audio input stream. Each frame is normalized based on the encoding bit-depth and multiple channels are combined to produce a single frame of normalized audio. The following algorithm shows the combination for a single sample  $S$  based on the number of channels  $n$  and bit-depth  $d$ :

$$S = \frac{\sum_{i=1}^n s_i}{(2^d - 1)n} \tag{A.1}$$

### A.0.2 Window

Safe provides a common set of windowing functions, including *Hann* (A.2), *Hamming* (A.3), *Blackman* (A.4), *Blackman-Harris* (A.5), and *Bartlett* (A.6) windows.

$$w(n) = 0.5 \left( 1 - \cos \left( 2\pi \frac{n}{L-1} \right) \right), \quad 0 \leq n < L \quad (\text{A.2})$$

$$w(n) = 0.54 - 0.46 \cos \left( 2\pi \frac{n}{L-1} \right), \quad 0 \leq n < L \quad (\text{A.3})$$

$$w(n) = 0.42 - 0.5 \cos \left( 2\pi \frac{n}{L-1} \right) + 0.08 \cos \left( 4\pi \frac{n}{L-1} \right), \quad 0 \leq n < L \quad (\text{A.4})$$

$$w(n) = a_0 - a_1 \cos \left( \frac{2\pi n}{L-1} \right) + a_2 \cos \left( \frac{4\pi n}{L-1} \right) - a_3 \cos \left( \frac{6\pi n}{L-1} \right), \quad 0 \leq n < L$$

$$a_0 = 0.35875, a_1 = 0.48829, a_2 = 0.14128, a_3 = 0.01168 \quad (\text{A.5})$$

$$w(n) = \begin{cases} \frac{2n}{L-1} & 0 \leq n \leq \frac{L-1}{2} \\ 2 - \frac{2n}{L-1} & \frac{L-1}{2} \leq n < L \end{cases} \quad (\text{A.6})$$

### A.0.3 Fast Fourier Transform

The FFT algorithm used in Safe is a JVM-optimized version of the standard *Cooley-Turkey* algorithm. The standard *Cooley-Turkey* algorithm is described as:

$$X_k = \sum_{m=0}^{N/2-1} x_{2m} e^{-\frac{2\pi i}{N/2} mk} + e^{-\frac{2\pi i}{N} k} \sum_{m=0}^{N/2-1} x_{2m+1} e^{-\frac{2\pi i}{N/2} mk} \quad (\text{A.7})$$



Further information on the implementation and optimization techniques used can be found online [36].

#### A.0.4 Power Spectrum

Safe provides various spectrum functions, including *Power*  $P(k)$ , *Magnitude*  $A(k)$ , and *Phase*  $\phi(k)$ . Each function is based on the *spectral coefficients*  $a_k$  and  $b_k$  computed by the FFT.

$$P(k) = a_k^2 + b_k^2 \quad (\text{A.8})$$

$$A(k) = \sqrt{a_k^2 + b_k^2} \quad (\text{A.9})$$

$$\phi(k) = \tan^{-1} \frac{b_k}{a_k} \quad (\text{A.10})$$

#### A.0.5 Constant-Q Transform

The Constant-Q transform (CQT) is similar to the Fourier transform, but uses logarithmic spacing instead of linear spacing. This is beneficial in audio analysis since notes in western music are spaced logarithmically. The basic CQT algorithm is given by:

$$X_k = \frac{1}{N_k} \sum_{n=0}^{N_k-1} w_{k,n} x_n e^{\frac{-j2\pi Qn}{N_k}} \quad (\text{A.11})$$

The CQT algorithm used in Safe is based on the Brown and Puckette [6] algorithm, which leverages the standard FFT algorithm for faster computations. Figure A.1 shows the dataflow for the CQT algorithm.



Figure A.1: Sequential dataflow of the Constant-Q transform

Name	Description	Default Value
sampleRate	Target (expected) sample rate of audio inputs	44100
stepSize	The step size (number of samples) for the framing function	512
windowType	Windowing function (bartlett, blackman, blackmanHarris, hamming, hann)	hann
binsPerOctave	The number of CQT bins/octave (default 24 = quarter-tone spacing)	24
maxFreq	Maximum frequency (hz) to look for (default is G10, MIDI note 127)	12543.854
minFreq	Minimum frequency (hz) to look for (default is C1, MIDI note 12)	16.351599
threshold	Minimum threshold	0.0054

Table A.1: CQT Parameters

## A.0.6 Mel-Frequency Cepstral Coefficients

The *mel-frequency cepstrum* provides a description of an audio signals power spectrum based on the *mel scale*, a perceptually driven frequency scale. In this scale, the mel representation  $m$  of a frequency  $f$  (hz) is given by:

$$m = 1127 \log_e \left( 1 + \frac{f}{700} \right) \quad (\text{A.12})$$

The MFCC computation is based on the Davis and Mermelstein [12] algorithm, which is described as:

$$Y_k = \sum_{f=0}^{N/2-1} A(k) w_k(f) \quad (\text{A.13})$$

$$MFCC_n = \sum_{k=0}^{K-1} \log Y_k \cos \left( \frac{(2k+1)n\pi}{2K} \right)$$

Where  $Y_k$  represents the application of  $K$  overlapping triangular (mel-scale spaced) filters on the magnitude spectrum of the signal  $A(k)$  and  $n$  number of MFCC coefficients are calculated through a discrete-cosine transform on the log-energy outputs of  $Y_k$ . Figure A.2 shows the dataflow for the MFCC algorithm.

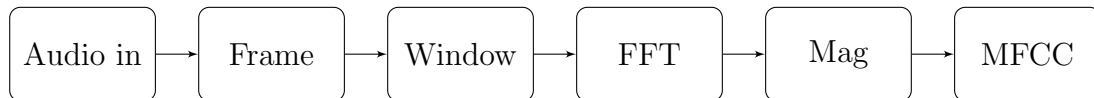


Figure A.2: Sequential dataflow for Mel-Frequency Cepstral Coefficients

Name	Description	Default Value
sampleRate	Target (expected) sample rate of audio inputs	44100
frameSize	Frame size (number of samples) for the framing function	1024
stepSize	Step size (number of samples) for the framing function	512
windowType	Windowing function (bartlett, blackman, blackmanHarris, hamming, hann)	hann
numCoeffs	Number of cepstral coefficients to extract	13
melFilters	Number of mel filter banks to use	40
minFreq	Minimum frequency (hz) for the filter bank	130.0
maxFreq	Maximum frequency (hz) for the filter bank	6854.0

Table A.2: MFCC Parameters

### A.0.7 Spectral Shape

Spectral shape is an aggregate of four separate spectral features: *Centroid*, *Spread*, *Skewness*, and *Kurtosis*. The calculations for these features are described in [21], and are defined by the following equations:

$$S_{centroid} = \mu_1 \quad (\text{A.14})$$

$$S_{spread} = \sqrt{\mu_2 - \mu_1^2} \quad (\text{A.15})$$

$$S_{skewness} = \frac{2\mu_1^3 - 3\mu_1\mu_2 + \mu_3}{S_{spread}^3} \quad (A.16)$$

$$S_{kurtosis} = \frac{-3\mu_1^4 + 6\mu_1\mu_2 - 4\mu_1\mu_3 + \mu_4}{S_{spread}^4} - 3 \quad (A.17)$$

Where  $\mu_i = \frac{\sum_{k=0}^{N-1} k^i A(k)}{\sum_{k=0}^{N-1} A(k)}$  and  $A(k)$  represents the magnitude spectrum of the signal.

Figure A.3 shows the dataflow sequence for the spectral shape algorithm.

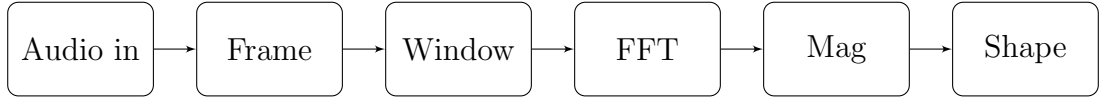


Figure A.3: Sequential dataflow for Spectral Shape

Name	Description	Default Value
sampleRate	Target (expected) sample rate of audio inputs	44100
frameSize	Frame size (number of samples) for the framing function	1024
stepSize	Step size (number of samples) for the framing function	512
windowType	Windowing function (bartlett, blackman, blackmanHarris, hamming, hann)	hann

Table A.3: Spectral Shape Parameters

### A.0.8 Spectral Flux

The spectral flux algorithm is based on the algorithm for measuring change in the power spectrum described by Dixon in [16]. The algorithm computes the flux between consecutive frames  $(n, n - 1)$  as the summation of the positive differences between the magnitude at each frequency bin, as shown in the following equation.

$$SF(n) = \sum_{k=0}^{N-1} H(|X(n, k)| - |X(n - 1, k)|) \quad (A.18)$$

In this equation,  $H$  represents a half-wave rectifier function where  $H(x) = \frac{x+|x|}{2}$ . Figure A.4 below shows the dataflow for the spectral flux extraction algorithm.

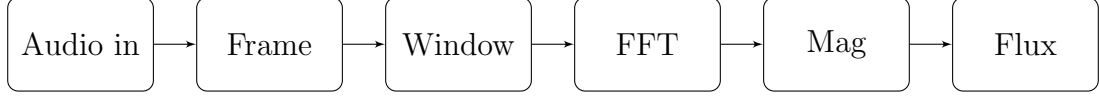


Figure A.4: Sequential dataflow for Spectral Flux

Name	Description	Default Value
sampleRate	Target (expected) sample rate of audio inputs	44100
frameSize	Frame size (number of samples) for the framing function	1024
stepSize	Step size (number of samples) for the framing function	512
windowType	Windowing function (bartlett, blackman, blackmanHarris, hamming, hann)	hann
diffLength	Compare frames spaced $n$ length apart, 1 = consecutive frames	1

Table A.4: Spectral Flux Parameters

### A.0.9 Onset Detection

Safe implements the spectral onset detection described in [4]. The algorithm extends the standard spectral flux calculation by applying a logarithmically spaced filter-bank (similar to the Constant-Q transform spacing). The onset detection function is given by:

$$O(n) = \sum_{k=1}^{k=N/2} H\left(|X_{filt}^{log}(n, b)| - |X_{filt}^{log}(n-1, b)|\right) \quad (\text{A.19})$$

Peaks in the onset detection function are selected if all of the following conditions are satisfied:

1.  $ODF(n) = \max(ODF(n - w_1 : n + w_2))$

$$2. ODF(n) \geq \text{mean}(ODF(n - w_3 : n + w_4)) + \delta$$

$$3. n - n_{last\_onset} > w_5$$

Where  $\delta$  is a fixed threshold value and  $w_1, w_2, \dots, w_5$  are various tunable parameters. Figure A.5 shows the dataflow for the onset detection algorithm.

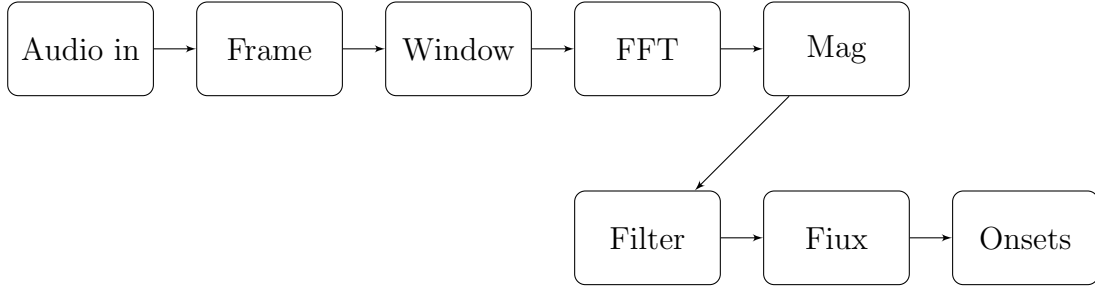


Figure A.5: Sequential dataflow for Spectral Onsets

Name	Description	Default Value
sampleRate	Target (expected) sample rate of audio inputs	44100
frameSize	Frame size (number of samples) for the framing function	1024
stepSize	Step size (number of samples) for the framing function	512
windowType	Windowing function (bartlett, blackman, blackmanHarris, hamming, hann)	hann
ratio	Minimum activation ratio for windowing function	0.22
threshold	Minimum threshold ( $\delta$ ) for peak-picking	2.5

Table A.5: Spectral Onset Parameters

# Appendix B

## Evaluation Dataset

Table B.1: Full Evaluation Dataset

Song	Artist	Album	Genre	MD5
Hanging Tree	Counting Crows	Saturday Nights &...	Alternative	7882ab09d5a2330e86d184410d985db1
Draw Me Down	Pat Martino	Mission Accomplished	Jazz	c7a198ffe99ea05166fe6dd11fedb461
Summertime Rolls ( ... (Foreword)	Jane's Addiction	Nothing's Shocking	Alternative	35d132b0d7fbf24946fc1df989f437d
2000 Light Years Away	Pain Of Salvation	Entropia	Prog. Metal	a2eb3846951687377255b6f127f9d1bb
3 Weeks In	Green Day	Kerplunk!	Punk	74523401139759d223ad3007f3545b59
3rd Planet	Laymen Terms	3 Weeks In	Indie	921855a0f3f5d36afd92bdc37741b943
Holidays	Modest Mouse	The Moon & Antarc...	Indie	560c973b19c12e267f53d4b544c173e4
A Feedbag of Trucks...	John Scofield	Out Like A Light	Jazz	1819b9f7c38695823fedeecc4151ed3ba
Aces High	Lagwagon	Let's talk about ...	Punk	d53f2e3c8fa924bf840cd40601a1a3a8
Add Vice	Iron Maiden	Powerslave	Metal	05018d11e50f0f88861cff9bb5c2cc9
Advent	Love Me Destroyer	Black Heart Affair	Punk	6db19b64bd9de5f91c41ecc2a70b28b1
After You My Friend	Opeth	Morningrise	Prog. Metal	c945b0880f4ae97a2d7b49d34ca6ac
All At Sea (Live at...	Lagwagon	Let's Talk About ...	Punk	5caa8e2d3cf29814f6e0e7cb7c737396
All For You	Jamie Cullum	Catching Tales	Jazz	75e3ba8b0bc892d6b443f163c57b6a33
Angels Holocaust	Our Lady Peace	Gravity	Alternative	f79de432e501c4cf5ba7595fd42d2733
Angels Losing Sleep	Iced Earth	Night Of The Stor...	Metal	2ec8aca5025f35cbddae8d2e877d0a8f
Animae Partus ('I Am')	Our Lady Peace	Healthy In Parano...	Alternative	35e320a0f72bc40671f50e1fb2dd2254
Babel	Pain Of Salvation	Be	Prog. Metal	abff5389ac96129ef49cf7c94d0a34cb
	Mumford & Sons	Babel	Folk Rock	3e2bb42925550b0927cb8231f0dca352



Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Bag It Up	Oasis	Dig Out Your Soul	Alternative	cbee488a1963bac48efd3248b85ae3d4
Beginnings	Pain Of Salvation	Remedy Lane	Prog. Metal	66a883b72d781714139fb00b15cc717c
Bidin' My Time	Joe Pass	Ira, George And Joe	Jazz	b423da7c4c76fe9834830b7ab6d7689b
Black Dog	Led Zeppelin	Led Zeppelin IV	Rock	cfe72b189d267cb3df70f4e246f92ec6
Blizzard Of '77	Nada Surf	Let Go	Indie	d576420f021075a870c695fc1fc32ddb
Brickwork, Part 1 -...	Pain Of Salvation	12-5	Prog. Metal	2ed924223217cc63794e044bbccf47a5
Bullion	Millencolin	Life on a Plate	Punk	c6f56d5fd81d255c71e4cfd317c76a3d
Burn	Lagwagon	Blaze	Punk	3b4e4adcf0a755d6d32bcc00044ac17
Burnout	Green Day	Dookie	Punk	3482230bf80309c260bfd2285708222e
Caught Somewhere in...	Iron Maiden	Somewhere in Time	Metal	6139ee48bd373a4161a614c77b2b402e
Choked And Charmed	Love Me Destroyer	The Things Around...	Punk	81d16925f66c17d962f73ef6bbefdd94
City Boy Blues	Mtley Cre	Theatre Of Pain	Metal	2a6e65c72f195cee17f5dcc7a51e86c8
Concrete Bed	Nada Surf	The Weight is a Gift	Indie	0992d43f5050d929e3b4b697795ab223
Cowboys From Hell	Pantera	Cowboys From Hell	Metal	82f5ebcde5ee9b77df953cc73828cfe9
Crazy Train	Ozzy Osbourne	The Essential Ozz...	Rock	483d7c8b54313a2332d933ab24a0694e
Crop Circle	Monster Magnet	PowerTrip	Stoner Metal	b04953804746160cc89f628d095e5326
Cry Tough	Poison	Look What The Cat...	Metal	2f874db33cfbc20469f74c1372c2247
Cyclops Revolution	Monster Magnet	Superjudge	Stoner Metal	fc60f8e77deb9c7cafb43e133b17b67
D'You Know What I M...	Oasis	Be Here Now	Alternative	3aa9ab947c558154537cb5c48f52b7b
Danny's Song (Loggi...	Me First And The Gi...	Have A Ball	Punk	31f693dadd240d890b3461e809d08ceb

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Dark Saga	Iced Earth	The Dark Saga	Metal	b5ealeefb2ae0e474dfa91bb79acf63
Day Job	Gin Blossoms	Congratulations I...	Indie	9dcae09a35fd5fbf4ab30de0a57efbad
Desert Skies	Laymen Terms	Drive To Nowhere...	Indie	181a33da8a378a78042e48fec65a4a57
Disappear	Mazzy Star	Among My Swan	Alternative	50901c34a28584fd1c27114345cf69c8
Doing It For The Kids	Nobodys	Generation XXX	Punk	4bf4a35c41a8ed21b72c1d65e07de445
Dopes To Infinity	Monster Magnet	Dopes To Infinity	Stoner Metal	2590f9b0c6ea1a7fdbc88f92338d55e8
Fade Into You	Mazzy Star	So Tonight That I...	Alternative	afc6c7db005538a9a305a2b2a34e2b21
fever	Michael Buble	With Love	Jazz	e15c2f7610f1575336e627c394f0dbc4
Follow Through (Str...	Gavin DeGraw	Chariot - Stripped	Pop Rock	0c8acb8cb883b730fda713580a670a94
Follow Through	Gavin DeGraw	Chariot	Pop Rock	ac745e9d798d527aa9f78882b886cce2
Force-Fed	God Forbid	Gone Forever	Metal	27334a7ecb14f35c127eccfcc9c6078e
Forget Her	Jeff Buckley	Grace Disc 2	Indie	c4e429faeb6bae6feb166190dc0a6b90
From The Rooftop Down	Nada Surf	The Weight Is A G...	Indie	a56ed273d62e7dc5377a30cb97d32f70
F***in' In The Bushes	Oasis	Standing On The S...	Alternative	c3460c00ed084bd6686b99be81111584
Futures	Jimmy Eat World	Futures	Indie	0226a02155098c18d2e74fd327cc4cb3
Gasoline Kisses For...	Park	It Won't Snow Whe...	Punk	c419ccdf475fd179a12ce3ac410f20a49
Give me the Night	George Benson	Very best of - Gr...	Jazz	48b9935c31d4c14398517a4064a5e78a
Go	Pearl Jam	Vs.	Alternative	6089d775728ed129690b56109a4bbee1
God Knows I Love Yo...	Lorene Drive	Romantic Wealth	Punk	17b75029b08b0f6378fc22c9ad07b27b
Gonna See My Friend	Pearl Jam	Backspacer	Alternative	109ce76ebf124f8d0eee277afdddbae2

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Good Times Bad Times	Led Zeppelin	Led Zeppelin	Rock	03d1519d4b58180e300fd247a49c246d
Intro	Gorillaz	Demon Days	Hip-Hop	cf197cdef57e0b8ce0ca7aef5ab7e3a9
Heart is Hard to Find	Jimmy Eat World	Invented	Indie	a23d7f765afa6ad1bdd7e091bdd9b345
Heartbreaking Music	Lagwagon	Resolve	Punk	4f7e11833e3b39e3de0db0cbce78c4cf
Hello	Oasis	(What's The Story...	Alternative	7391d6e0413f9a5c4149b41ecdd0754b
Holy F***	I Am The Avalanche	Avalanche United	Punk	7986cef40b4c420e95a53e1d277f9268
Holy Wars... The Pu...	Megadeth	Rust In Peace	Metal	7515b288ed22a3302458e300badc49ca
How We Get Along	Jurassic 5	Quality Control	Hip-Hop	2a9bbb93f3edad1cdc288e65781c9075
I Don't Know	Ozzy Osbourne	Blizzard of Ozz	Rock	631f51c75e878043ea8ce42786dda81e
Immigrant Song	Led Zeppelin	Led Zeppelin III	Rock	0bce4fabc47aa3be3a40dc2aef61f812
In The Evening	Led Zeppelin	In Through The Ou...	Rock	d62e0c9c06c35849807ea480926b126c
In The Meantime	Helmet	Meantime	Alternative	7fde7ea084ec9b21ce89cc6769cb901f
Independence Day	No Motiv	Daylight Breaking	Punk	e08d8206c3c54e73f6dada8031df1a9d
Into Your Eyes	Lucero	The Attic Tapes	Alt-Country	1769f3f2ca9cdc155cbec363d1e54b64
Introduction	Panic! At The Disco	A Fever You Can't...	Punk	f9680585c8f690468f307e9dd977452d
Invaders	Iron Maiden	The Number Of The...	Metal	5395ccd950fb6598b76684b0cd7a91f1
What A Difference A...	Jamie Cullum	Twentysomething	Jazz	b73afabf438c66fc957905471c20f446
Jaws of Life	John Petrucci	Suspended Animation	Prog. Metal	a1da6fcb4622c67a22f377ef2ee77f04
Just One Of Those T...	Jamie Cullum	The Pursuit	Jazz	81belcfab53c86bd37025f67950967af
Justified Black Eye	No Use For A Name	Leche Con Carne	Punk	268f90c69ec7dd57ce71b5665b3eae2

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Kids Don't Like To ...	Lagwagon	Hoss	Punk	c4d9d0425d9331b2bc471e7fd32715d4
Last of the Anti-Fa...	Kane Hodder	The Pleasure to R...	Punk	f7fc3f64ef2b7a60e4ba61293ec5e981
Life on a Chain	Pete Yorn	musicforthemornin...	Alternative	989580a25ef66c9b52ea6ccd57d25793
Life Wasted	Pearl Jam	Pearl Jam	Alternative	b29e979ba2baa9d95f3f0d343c70f39d
Linoleum	NOFX	Punk In Drublic	Punk	5bd99e5956dca06c714b3a040d678d80
Little Dipper	Hum	You'd Prefer an A...	Alternative	16538e3b8d2b49645e87e480b62b35f5
Living After Midnight	Judas Priest	Breaking the Law	Metal	14ce49dbd5ba191f7112e7cc67a9f454
Lost Horizons	Gin Blossoms	New Miserable Exp...	Indie	1c2b4ee7c5a65334e17d0265b251a2ce
Mama, I'm Coming Home	Ozzy Osbourne	The Essential Ozz...	Rock	d604c797ac69ab1fccf6128da2e0e425
Matt Skiba - Good F...	Matt Skiba	Split	Indie	da9145f936209f0b2ed6c10649e8845e
Melt	Monster Magnet	God Says No	Stoner Metal	8c8e99fcec6949fe71a5ab2dfd23ff1a
Mojo Pin	Jeff Buckley	Grace Disc 1	Indie	694848469f3fcb83a0feed9d51f4b6cf
Mouth For War	Pantera	Vulgar Display of...	Metal	f4c2dd7063cde0e7ac6617a2cbbdac719
Electrocution	Nada Surf	If I Had a Hi-Fi	Indie	a8af064b061132493103001934bddcdf
New Direction	Gorilla Biscuits	Start Today	Punk	af14b030b1a5e9325542e80a94da7a27
Nightmares by the Sea	Jeff Buckley	Sketches for My S...	Indie	db3f2e02f16d2187549dddb6d9ac0675
Dive	Nirvana	Incesticide	Alternative	d57e3f21444445f8a6d537295d13679f
Serve The Servants	Nirvana	In Utero	Alternative	77ea1b418d359423988ad9174762d37
Smells Like Teen Sp...	Nirvana	Nevermind	Alternative	2d5c046e66cee3bf4baef48ad9d2c3d7
No Cigar	Millencolin	Pennybridge Pioneers	Punk	8472f6ad2e95cd19e7bc72f94b4760b7

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Acquiesce	Oasis	The Masterplan	Alternative	f52ff6c7f62996ff0c0784fab881a678
Once	Pearl Jam	Ten (Deluxe Edition)	Alternative	0638cfb17485bb98874a76bbbec1bb40
One Man Army	Our Lady Peace	Happiness... Is N...	Alternative	59f9bf2708af9d6d7656efbe925245b9
One Quiet Night	Pat Metheny	One Quiet Night	Jazz	049d0a205f5a6f9a7f9947107915cd33
Orchestral Intro (f...	Gorillaz	Plastic Beach	Hip-Hop	9fd734c1a4ef52016c370560eecd03df
Over The Rainbow (W...	Me First And The Gi...	Are A Drag	Punk	93c2c56e0e0663adcaab8a61cb12b077
Pause	Kid Dynamite	Kid Dynamite	Punk	16541e87688202bdcc255ab38a10ba92
Peaceful Day	Pennywise	About Time	Punk	4d6aee60436141ba1ead7d28f1f9a8c7
Breakerfall	Pearl Jam	Binaural	Alternative	5d6732b76d5d81e1c940355be1c9d213
Can't Keep	Pearl Jam	Riot Act	Alternative	db1cce4bf7e32571bea3318cf9098edc
Last Exit	Pearl Jam	Vitalogy	Alternative	3a6ead2d99da072bde696c52f3f5f565
Pill Shovel	Monster Magnet	Spine of God	Stoner Metal	173c42e73a3cf1063618de7541bdb606
Pits And Poisoned A...	Kid Dynamite	Shorter,Faster,Lo...	Punk	e952c3f26ab0cf12d1a6dc5a4212b837
Pure	Helmet	Aftertaste	Alternative	9d90abd1c64347c5988a75458adffa77
R.K. Intro	Our Lady Peace	Spiritual Machines	Alternative	ad3d70a679991e38ad93e0560ecb6486
Re-Hash	Gorillaz	Gorillaz	Hip-Hop	3d79f7f00e104798cbf8685c5af3a827
Reminder	Grey Area	Fanbelt Algebra	Punk	d1a4aee1b6994a13049881716c1ceaab
Repetition	Helmet	Strap It On	Alternative	d2df5b029c552c727b63a1081c676893
Right Now!	Grey Area	Greyarea	Punk	af30aea5bf868a9ef00f9c8d89a16df6
Rip It Out	Kiss	Ace Frehley	Rock	c2a011ee7360b01ef112f9414e4d71cd

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Rock 'N' Roll Star	Oasis	Definitely Maybe	Alternative	ef874bedfb5f2b73ef06005681f31bd6
Ruby	Kaiser Chiefs	Yours Truly, Angr...	Indie	a996a7415b6de75a3e214a9640a7776c
Rumble Young Man Ru...	Pinhead Circus	The Black Power o...	Punk	c50cdaacbb5cf9a5a11e7eab915bac28
Salt Sweat Sugar	Jimmy Eat World	Bleed American	Indie	44e3dcc41606c0f24ba8d2bbe8e7a0b8
Satellite Skin	Modest Mouse	No One's First, A...	Indie	af70514bf6616337cfcfe2d06cfd6d4
Scarsick	Pain Of Salvation	Scarsick	Prog. Metal	8bdf14b7c1aa06c5ccda29dbb36be2a
Screaming For Venge...	Judas Priest	Metal Works '73 '...	Metal	606191afc0ad9aa19e21d784236ca3a9
See The Wind	Polar Bear Club	Chasing Hamburg	Punk	4b86cb11b1a072c80d3a4e9fa4c885e2
Shadows Of Defeat	Good Riddance	Operation Phoenix	Punk	8836205c1ff8bb8b6afdfceb1f3e1aa5
Shambles	Make Do And Mend	Bodies Of Water	Punk	95e094e0f6adeaba164c97c5ec9d2e05
Sigh No More	Mumford & Sons	Sigh No More	Folk Rock	c05ce9f529280072b89f94a9c88d98b0
Skin O' My Teeth	Megadeth	Countdown To Exti...	Metal	c7bea386a7c9c40412a7a376202b9614
Slut Machine	Monster Magnet	Monolithic Baby!	Stoner Metal	6757d7ca7c43ae86c6427153527bdbfa
Smart	Helmet	Size Matters	Alternative	95866e0d750e571710b086f529dffc8
Smoke	Lucero	1372 Overton Park	Alt-Country	918f52f8deb2963111e8d79174f8bf83
Snake Dance	Monster Magnet	Monster Magnet	Stoner Metal	f939675835166102fafb507ffda2df02
So Long	Helmet	Seeing Eye Dog	Alternative	a84d6c9540c026b5d718fcf365f0ad4f
So What	George Benson	Beyond The Blue H...	Jazz	18a438bd509ce76ae04d4d952822584e
Sometimes	Pearl Jam	No Code	Alternative	dfec22ef117528e681271722380810c
Speak To Me / Breathe	Pink Floyd	Dark Side of the ...	Rock	37bd9e92c0006f3db005ddc1d8f9e94a

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Spirit of the Land	Pain of Salvation	One Hour by the C...	Prog. Metal	634ae3fd140915d231bf688e7d146ec6
Superman's Dead	Our Lady Peace	Clumsy	Alternative	a21aa4c5a2bdaf4d5443e6d20c7660c8
Swallowing Everything	Helmet	Monochrome	Alternative	35f3a1564481b68554a88c88bc7ffdc9
Sweet Little Thing	Lucero	Tennessee	Alt-Country	cc0d251979bf311cc2bf9c9082c99243
Sweet Home Alabama	Lynyrd Skynyrd	Gold (Remastered)	Rock	70c2eb2b4c94a33575c6e1e910635f96
T.n.T. (Terror 'n T...	Mtley Cre	Dr. Feelgood	Metal	745773416fbda3fb04f7f11d480b313e
Tab...	Monster Magnet	Tab...25	Stoner Metal	cf036f5acc3012f106cecc14354d5721
Table For Glasses	Jimmy Eat World	Clarity	Indie	6c384a9b9063406cd8f4710f18f203a3
Thanks for the Kill...	Minus the Bear	Highly Refined Pi...	Indie	1b117531a7f315b7046efbe06d731f26
That Much Further W...	Lucero	That Much Further...	Alt-Country	d0ea8868fcd2e9334f9ffc54a9ed385c
That Much Further West	Lucero	That Much Further...	Alt-Country	d8d2b53e9b95b84fa75d44fdd4891ab9
The Birdman	Our Lady Peace	Naveed	Alternative	7312438a18174ed944c3c37c102af5ea
The Boat Dreams fro...	Jawbreaker	24 Hour Revenge T...	Punk	dc9b5e1fb5fd46636aa4f557b507d764
The Frowning of a L...	Hey Mercedes	Everynight Fire W...	Indie	17a7dafbfa07add20765ded7f3aaadaa
The Game Needed Me	Minus The Bear	Menos El Oso	Indie	668aa697d883d30b6b7fddcb5b486a72
The Ghost You Are	Park	No Signal	Punk	81413bf9577090d1a5c3bd7c3bade10e
The Hellion	Judas Priest	Metal Works '73-' ...	Metal	73f09a25376de132cf0ab387549f3e38
The Hindu Times	Oasis	Heathen Chemistry	Alternative	a0833248bbeb54ad28d7043ff5fdbd2
The Sky Is a Landfill	Jeff Buckley	Sketches for My S...	Indie	cca31e758e4cffe3c9daa1d1bdc12e32
The Song Remains Th...	Led Zeppelin	Houses Of The Holy	Rock	56b5839857d02dc8fe22fa9fb4004fa2

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Tip Your Bartender	Glassjaw	Worship & Tribute	Punk	00474572a89c728d9c1fb9344bafc00f
True Nature	Jane's Addiction	Strays	Alternative	2650462909dc31cbad5d9e2a5da4566a
Trust	Megadeth	Cryptic Writings	Metal	67c6a883f0fc2c4771c8a2efc4b25e8f
Unknowingly Strong	Make Do And Mend	End Measured Mile	Punk	fbad2d86bb7ec210d520dbf0d82ad506
Used	Pain Of Salvation	The Perfect Eleme...	Prog. Metal	4608dc0f9ff4a0359e6a291d0d5cae36
Walk Don't Run	Johnny Smith	Kaleidoscope	Jazz	ee6730a7d6d2e3315589e3a78e3ec49c
Waves	Guthrie Govan	Erotic Cakes	Prog. Metal	d4fc92cc644305484d3116c6fd9e907c
What's Your Name	Lynyrd Skynyrd	Street Survivors	Rock	ecc99ac01b7506f823c022c83fedc9ee
Whats Your Name	Lynyrd Skynyrd	Gold (Remastered)	Rock	23082a884b0fd85dea6be8f8cd201789
Where Eagles Dare	Iron Maiden	Piece Of Mind	Metal	690461920c7fae0d140aff451ce778d8
Whole Lotta Love	Led Zeppelin	Led Zeppelin II	Rock	2e5e7fc2c8e3dead04dbf0fda994566e
Wild Side	Mtley Cre	Girls, Girls, Girls	Metal	b936570b3106a5b6a7beba75711992a4
You Know You're Right	Nirvana	Nirvana	Alternative	5746991922a151ee29fdb48c08e3ec9a
You Move Me	Hello	The Glam Singles ...	Rock	6be07858918db4123d73a0612dcaa916
Bells	Hey Mercedes	Hey Mercedes EP	Indie	c1355228219212ae14e1d6001c199eea
Dead And Gone	I Am The Avalanche	I Am The Avalanche	Punk	4b7defc49d437f7b47b08cb9311f9bd8
Dramamine	Modest Mouse	This Is A Long Dr...	Indie	6bdf240cb978870ce2ce8aec36d06c1c
Automatic Systemati...	Garbage	Not Your Kind Of ...	Alternative	4fc346edc7b2993931c3810f21973ec5
Roulette Systems	Hey Mercedes	Unorchestrated EP	Indie	6ecf141bda642203cc0169026df3ad9c
Little Silver Heart	Lucero	Lucero	Alt-Country	a277665c7c32f9f2459554c6af61043a



Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
March into the Sea	Modest Mouse	We Were Dead Befo...	Indie	936c445a20b5b2e78657455ae577e5fa
Halah	Mazzy Star	She Hangs Brightly	Alternative	c72c66036d6f403befa6528ce38628d2
Feeling Good	Michael Buble	It's Time	Jazz	b819d22452066ff255dad48074110d60
Never Ending Math E...	Modest Mouse	Building Nothing ...	Indie	a8ea5bcbb7cb8687d57bae2ad01f6e1d
Dirty Paws	Of Monsters and Men	My Head Is an Animal	Indie	83961dd90b5b9febffcaea786425d001
Old Devil Moon	Jamie Cullum	Heard It All Before	Jazz	ee18120eee9837b78525bd729f2aeb7f
Phoner To Arizona	Gorillaz	The Fall	Hip-Hop	2382ce1e1b4b434aee7881bddb322384
Quality Revenge At ...	Hey Mercedes	Loses Control	Indie	699f03db7954678a83bca97623f702ee
See These Bones	Nada Surf	Lucky	Indie	adb2d841a96f309b51a67d81d5de58d
Sunspots	Modest Mouse	The Fruit That At...	Indie	584c455138eec097c358cf91bcca2efa
Teeth Like God's Sh...	Modest Mouse	The Lonesome Crow...	Indie	329a5d6a45039092f662c4ebf7b1cee9
The Fire, The Steel...	Hot Water Music	"The Fire, The St...	Punk	bdac7e9f5fb9204c45264591f5dd6615
Tonight Ain't Gonna...	Lucero	Dreaming In America	Alt-Country	8dd8e1456d5fc1803a494f7297d5fbb1
Turn Up The Sun	Oasis	Don't Believe The...	Alternative	54f977bfe610ec2b1e7519aea7183fd1
Watch It Burn	Lucero	Nobody's Darlings	Alt-Country	2aa45680e5f138c1e5daccc9a9931cae
What Else Would You...	Lucero	Rebels, Rogues & ...	Alt-Country	ac1a6a9f009151d6512496336539ec3c
Willful Suspension ...	Modest Mouse	Everywhere And Hi...	Indie	d5ab9f0993b9cfe9b08f456db7d205d3b
Worms vs. Birds	Modest Mouse	Sad Sappy Sucker	Indie	d4ddcd1622019750148067341fd90c3a
220 Years	Hot Water Music	Fuel for the Hate...	Punk	a9c7aac29f2fe4bbcbde55ad12d906bf
A Flight and a Crash	Hot Water Music	A Flight and a Crash	Punk	a575c1f1e08406178653418ba2f86c98

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
A Foxy Chick	Joe Pass	Eximious	Jazz	39a89330b0fd5d5e90c537cb6be9e46e
A Map of the World	Pat Metheny	A Map of the World	Jazz	fb43fb7863599b29475971aeb71cd55e
A Streetcar Named D...	Kenny Burrell	'Round Midnight	Jazz	547ec9d449082749862141273aca7ea2
Acoustic Blues	Joe Pass	Virtuoso No 4 Disc 2	Jazz	c712512bec6b53d709b72c23a38ee0c2
Alachua	Hot Water Music	Never Ender	Punk	373cf5d7dc530bd2e4f5e2584c4b0826
All You Did Was Sav...	Our Lady Peace	Burn Burn (Deluxe...	Alternative	4188772d888675e4def57313a180801c
Angel With The Blues	Kevin Eubanks	Promise Of Tomorrow	Jazz	636305b470e20bfe1b79fde0fd7c9c1b
Big Casino	Jimmy Eat World	Chase This Light	Indie	c75d2768cb2049ccb9ec821a78ae7d09
Bittersweet	Jimmy Bruno	Concord Jazz Guit...	Jazz	987694d6192f4beca8edea5c748ff1da
Blood And Thunder	Mastodon	Leviathan	Stoner Metal	ad391776917de576c4e43c0f49a432a2
Celebrate	No Motiv	Diagram for Healing	Punk	150b40ca6c8f4ed9a47fceb7e592544
Cheek to Cheek	Oscar Peterson	The Song Is You	Jazz	2477869aa702a0fd3caaa866628b9cde
Chitlins con carne	Kenny Burrell	Midnight Blue	Jazz	eff46af94899c44d650d546a3b3d6e4b
Ciribiribin	Harry James	Harry James	Jazz	f6f3a1c41008bbc920727741b4f18403
Come Rain Or Come S...	Johnny Smith	The Sound Of The ...	Jazz	6453119137792693a92a49e4069aba8b
Contrasts	Jimmy Dorsey	Jimmy Dorsey	Jazz	456a4ec3ef6be783c31842e67c310f68
Crusher Destroyer	Mastodon	Remission	Stoner Metal	cbffec05840b1b1728d80177cd6a9ecd
Downstairs	Kenny Burrell	Guitar Forms	Jazz	03e59b223c37fcc6fe41c43c773665b8
Dr. Jackle	Miles Davis	Milestones	Jazz	7e0defc50ed55217a09f9edea042a5b
E.V.	Jimmy Bruno	Like That	Jazz	2b8d0e6fec50dd29675e11544d9661a4

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Lucky Street	Go Radio	Lucky Street	Punk	45bf0a7ce11e421e9afb504640d5e216
When Dreaming Gets ...	Go Radio	Do Overs And Seco...	Punk	a8c9b90cdc1ebd3ecb69a7a91093bb1a
Hold On, Hold Tight	Laymen Terms	Since Last December	Indie	001a9636382a78ca17ea832bf59617f1
Horn Intro	Modest Mouse	Good News For Peo...	Indie	328a9a53a8d4a6fbd75473ecf9a26503
Mainline	Hot Water Music	Exister	Punk	6e2e8bc3f3500fe0d085fce9aca8611b
I Only Have Eyes fo...	Oscar Peterson	The Song Is You D...	Jazz	65559638e10e845a9a323bcfe59cb3cf
I'm Old Fashioned	Johnny Smith	Legends: Solo Gui...	Jazz	84aba68f896061c4057657036225d7c0
Imagine	John Lennon	Lennon Legend: Th...	Rock	fcabc7850f303c153c513773fe301452
In A Mellow Tone	Herb Ellis	Arrival Disc 2	Jazz	82f06dec9cfa9923c93fd979e3872a1c
In The Mood	Glenn Miller	Glenn Miller	Jazz	dff8ec35a5a5a786053ac6651b8dce017
Iron Clad Lou	Hum	Electra 2000	Alternative	a47e4b427f9116f6cad262af25cde39
Isle of the Cheetah	Hum	Downward Is Heave...	Alternative	4eee70a7a3bd0d97fdedc23bf5cda640
Opener	Jimmy Eat World	Singles	Indie	539c201cbdf99d8c6aa7fd55f78af99d
Thinking, That's All	Jimmy Eat World	Static Prevails	Indie	c17491363a1a57fef97e335b841e03c8
Look for the Silver...	Herb Ellis	Arrival Disc 1	Jazz	b3c78a9f107a9c1d6b9a61d9174d91be
Downtown (Intro)	Lucero	Women & Work	Alt-Country	ce6d3489c7d5861184642e8b6df6ed4c
Lush Life	Joe Pass	Virtuoso No 4 Disc 1	Jazz	fb1155dc0cec345418f51d5c8e691db3
Blur	Make Do And Mend	Everything You Ev...	Punk	a9e3f4d9d86e6cdc8469ba39899d2397
Black Tongue	Mastodon	The Hunter	Stoner Metal	1678231282dd253efc2cf264261645f8
Moments Pass	Hot Water Music	Moonpies For Misfits	Punk	c95bf50a1cba144c2ad40c5211061e30

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
New Instrumental	Hot Water Music	Never Ender Demos	Punk	4bb13b07af769ba313f5e50c56ee6cfc
Night and Day	Joe Pass	Virtuoso	Jazz	99db2a8b625275fa2d9750f704d078ae
Nostalgia	No Motiv	And The Sadness P...	Punk	9ff1e3d318d3bdae424dc08e3e6ad30f
Oblivion	Mastodon	Crack the Skye	Stoner Metal	6eb21abc6f4629f979eb43bb115ec5e5
Orchestrion	Pat Metheny	Orchestrion	Jazz	54c5a526e46a85f6e04388171dd50f0a
Pap's Blues	Herb Ellis	Nothing But the B...	Jazz	7a0332c62fd406519954646cfeb34c91
Planet Of Sound	Pixies	Death To The Pixies	Alternative	05d37c2252c9758e20aabbfc5e281247
Play	Mike Stern	Play	Jazz	770abc304dd540713bdc30c37270ac19
Poison	Hot Water Music	The New What Next	Punk	9dbbd1b46b6013f32b423dc0566c27dd
Remedy	Hot Water Music	Caution	Punk	ba4956dba1a0673a719c10422e67351a
Shine	Herb Ellis	The Concord Jazz ...	Jazz	fc34c9cae44c606a7ee3f06e9caa7662
Songhouse	Kevin Eubanks	Shadow Prophets	Jazz	bd04468e3ba5d960554dbec3682d2ad8
SouthEast First	Hot Water Music	No Division	Punk	a629874a67ce03424cd98bea84584c3f
Stop!	Jane's Addiction	Ritual de lo habi...	Alternative	d1722486ec7240b9e39369652f8e5c44
Techno	John Scofield	Still Warm	Jazz	1a78842da6cc94b4f165320be1bc89f5
Tell You What	John Scofield	Loud Jazz	Jazz	2760cc66254b942704962d9d3d676301
Temptation Waits	Garbage	Version 2.0	Alternative	91fd2caba6f48f024b7bb31ea20776e1
The Phineas Trane	Pat Martino	Think Tank	Jazz	70dd674ca3a11607352e806dd2f539c9
The Sound Of Silence	Pat Metheny	What's It All About	Jazz	4097e5a9b8ef6757d2b48e41028f4977
The Story Teller	Kevin Eubanks	The Searcher	Jazz	3502f7daff6115b5d167c452a84521b0

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
The Visit	Pat Martino	Footprints	Jazz	898911e08e2ffb2031d3220cceb2d6bb
The Wolf Is Loose	Mastodon	Blood Mountain	Stoner Metal	d39d268d1543a14401cbf6dbc03d2b3f
Tony's Girl	Laymen Terms	An Introduction	Indie	e29b82b6efd4e7a1cde5e26171e59f
Translocation	Hot Water Music	Forever and Counting	Punk	5c983bb4488ed47828866512c02eea14
Tumble Home	Mike Stern	Who Let The Cats ...	Jazz	eb1e687754b7d50ab596faa8b02504bc
Turning Point (Part 1)	Kevin Eubanks	Turning Point	Jazz	ac1c02a1d358659d2df8b821a7907a68
Wabash III	John Scofield	Time on My Hands	Jazz	b9cf0e197e5ecc6d527b7069e66a447a
Walk, Don't Run!	Johnny Smith	Walk, Don't Run	Jazz	6a630423b6c404f14b911dc318fd604
Where Or When	Johnny Smith	Moonlight In Vermont	Jazz	9e8648757e53fab0befe2a4f383315b6
Wilma's Rainbow	Helmet	Betty	Alternative	c769711927c2f38057c5811a90a48587
Blew	Nirvana	Bleach	Alternative	b84df3fe188586c79804cb068d67a373
Bodom After Midnight	Children of Bodom	Follow The Reaper...	Metal	98d78b1f09ba0435ef1ada4ecd955260
A Movie Script Ending	Death Cab for Cutie	The Photo Album	Indie	d550fad4ba71e4c04c98a7e9e30b1753
Act Appalled	Circa Survive	Juturna	Indie	8e28361c1b1ba9fc7ec97bc837508e16
Albatross	Corrosion Of Confor...	Deliverance	Stoner Metal	7103dfeed579b8a2a65710e92960e3a2
All Nereids Beware	Chiodos	All's Well That E...	Punk	3ad2dbcdcb85cc28139a98346ebb44adf
All the Things You Are	Charlie Parker	Yardbird Suite Di...	Jazz	9038e56d51702440fe704aebfcc01fe5
Always & Never	Coheed and Cambria	Good Apollo, I'm ...	Punk	8861b6fd96e04ab330529a4c3ef4c3d28
American Girls	Counting Crows	Hard Candy	Alternative	7c36a3ce1e04760b4bad18bb3ab41ae7
Angels of the silences	Counting Crows	Recovering The Sa...	Alternative	68af5f9408658ec12432a15737f7842e

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Another Day	Dream Theater	Images And Words	Prog. Metal	dd9709a7b778c8785fc14b00b5088c66
Are You Dead Yet?	Children of Bodom	Are You Dead Yet?	Metal	5b1a67e73d68d39ad3b1d4a1906bd9bb
Bad Boy (Original mix)	Eric Clapton	Eric Clapton Delu...	Blues	eebeecb6f3a0765ec7179098da1d5909
Bad Boy	Eric Clapton	Eric Clapton Delu...	Blues	b823ff29520d91e1b18e245010d17bee
Before You Accuse Me	Eric Clapton	Unplugged	Blues	7cfa5cf21363336dbf2159128e31a3a6
Benson Hedges	Fun.	Aim and Ignite	Indie	745f7989345ac58a3a7842af5f52ffed
Calidoscopico	Dizzy Gillespie	Afro-Cuban Jazz M...	Jazz	83d5d850183356a0287b88019747a4fd
Caught In A Web	Dream Theater	Awake	Prog. Metal	29e3c87a4c17f08fb5cd4d47b1a5c71c
Choose the One Who ...	Copeland	In Motion	Indie	908f6e6667b894cd0ccb1db25f11c0d4
Dyed On 8	Christie Front Drive	Anthology	Indie	d5c620b9e7b4347f2b11ae187baaf481
Codes and Keys	Death Cab for Cutie	Codes and Keys	Indie	a8c2f618896cfa1fe6230660ee6e4f26
Come Back Home	Pete Yorn	Day I Forgot	Alternative	ba63dbb1c9b87c9d3cb5a27280288d6f
Comfortable Liar	Chevelle	Wonder What's Next	Metal	c38350e2f012ef1f5915b420b02e5ad6
Testing The Strong ...	Copeland	Beneath Medicine ...	Indie	2bc8c7b34cf6ab48016525e2d7ecc679
Damned For All Time	Corrosion Of Confor...	Blind	Stoner Metal	d66203bb71b79af048822d94d43160c4
Fly On The Windscre...	Depeche Mode	Black Celebration	New Wave	19b150fb6e6b07e5c4502dc94fb04c
Shine	Depeche Mode	Exciter	New Wave	fb026573d1e53273a589cba2459a4b0f
The Love Thieves	Depeche Mode	Ultra	New Wave	028960d2efa586e8eb407a24bb809ed
Walking in My Shoes	Depeche Mode	Songs of Faith an...	New Wave	416ba8223dfe81950369aec3b638e8e1
Ding-Dong Daddy of ...	Cherry Poppin' Daddies	Zoot Suit Riot	Swing	00343b8fcfa1eaf306f8d711c5cc4d83

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Cats in a Bowl	Dinosaur Jr.	Dinosaur	Alternative	9bca35bc7b8317a705c7d8919ec6a64a
In a Jar	Dinosaur Jr.	Fossils	Alternative	c1372829957dc7fe2ce48f955bb201be
No Bones	Dinosaur Jr.	Bug	Alternative	fd4a32fcc83d3d248ef1ce755bf27df4e
Sideways	Dinosaur Jr.	Whatever’s Cool W...	Alternative	70fe3a75c5cd85b88e71a8ecf861fcd a
What Else Is New [L...	Dinosaur Jr.	I Don’t Think So	Alternative	898ccf7b6709365f20dc51ee7d5b9d23
God Willing	Dropkick Murphys	The Meanest Of Ti...	Punk	2e04c8d1af0e52c22b70c08219f7e37b
Dude, you have no i...	Harrison Bergeron	Harrison Bergeron	Punk	9315a9651ba7e6042d10df6efeeb78fa
Even Flow	Pearl Jam	Ten (Deluxe Edition)	Alternative	08b621e9480bf6d2275b7c822098ae14
The Only Monent We ...	Explosions In The Sky	The Earth Is Not ...	Indie	0502bfc75ffd552f1dd360d398a66c27
Welcome, Ghosts	Explosions In The Sky	All of a Sudden I...	Indie	8f878a5de9aa063f1844ed7f36d68027
I’m Not Afraid	Face To Face	Don’t Turn Away	Punk	9025eb6599efa5d994bd219959efb85a
Pride War	Further Seems Forever	Hope This Finds Y...	Indie	5bd012b32e67f449aabd762456f01eda
Fury of the Storm	DragonForce	Sonic Firestorm	Metal	85642501f76927f4d7215856dbf27a44
Happy Endings	Counterfit	Super Amusement M...	Indie	ac59e9f2a12177f12143c3cc75f944e0
Hide Nothing	Further Seems Forever	Hide Nothing	Indie	23da715407dc4a61d30122df6986f8b4
Hole To Feed	Depeche Mode	Sounds Of The Uni...	New Wave	17fb0f921a438a56bc946c2bae19cbcd
I Can’t Get Started	Dizzy Gillespie	Dizzy Atmosphere	Jazz	5f7df32641488f35e9b209ee18a0307a
I Feel Better	Frightened Rabbit	The Midnight Orga...	Indie	78186bcfcf11d7ba84c868a1dbee7f22
I Was Born In The Dark	Fireworks	Gospel	Punk	db3eda2c307024bc54196f28d2fab13c
In My Place	Coldplay	A Rush Of Blood T...	Indie	ae117ec4d5ae5c3ff6f3926e1976681a

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
So What Else Is Now	J Mascis	Martin + Me	Alternative	432beff8dc41987cef1ad8af37a6023c
John the Revelator	Depeche Mode	Playing the Angel	New Wave	62a849877bc0fe258f4571d8f1513c1a
Kill The Music	Every Time I Die	Gutter Phenomenon	Metal	e60a5705d6f2e84fd46cd12f1a76bbdb
Lessons	Damiera	MUSIC	Indie	ba640d2cb1fd4d20e3798b5c81cdd775
Lightness	Death Cab for Cutie	Transatlanticism	Indie	db35716ffe8fe1709bbd2edcea65a8b
Long Whip,Big America	Corrosion Of Confor...	Wiseblood	Stoner Metal	5b6c2af2bcc1a795211a4ab04db69935
Low	Foo Fighters	One By One	Alternative	9123574d7d5642ccc0a7a2f65a6e52cd
Millstone	Brand New	The Devil And God...	Punk	64a67b1159aa6b271938bc2d833428a6
Mrs. Potter's Lullaby	Counting Crows	This Desert Life	Alternative	8cbaab8e2439d21ce8d337f3bade8958
Music Music	Eyedeas & Abilities	First Born	Hip-Hop	f6df48e5d9ed495a7e2e8e011aec808d
Music Now	Frightened Rabbit	Sing The Greys	Indie	33da5a6d77e0903c5492e5f57b51436a
My Melancholy Baby	Dizzy Gillespie	Birk's Works	Jazz	68d75f62c84a334f420e4962a1728792
N.S.U.	Cream	The Best Of Cream...	Rock	6d453d0c94f73c2dd686e37274323890
New Year	Counterfit	From Finish to St...	Indie	ae3431d01add91b85a913375a7526567
Nobody Knows The Tr...	Dizzy Gillespie	Impromptu	Jazz	f42aa40d2c54c74d6e38089b037303fa
Nothing With You	Descendents	Cool To Be You	Punk	4a83c6e14575e3c02758a05c8063f5a5
Oblivion Ocean	Pain Of Salvation	The Painful Chron...	Prog. Metal	71b08061407f7e0f67f7c6d5c5119213
Off Broadway	Every Time I Die	Hot Damn!	Metal	f39af5f724f7a35d50afcfa7866b15
Omaha	Counting Crows	August and Everyt...	Alternative	0683ce0a8e61aa411bcff634ada78e5e4
Out of Nowhere	Charlie Parker	Yardbird Suite Di...	Jazz	e9aca351c64430e9ab5639508b5d4b55



Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Overture 1928	Dream Theater	Metropolis Pt.2 S...	Prog. Metal	ce125c96fd2079b3114df6778ef18802
Paranoid Opioid	Corrosion Of Confor...	In The Arms Of God	Stoner Metal	b686fe5d2b1e293bdd599969cd3139e7
President of What?	Death Cab for Cutie	Something About A...	Indie	e6ec56fbd38c7cc3caa8debd7c4bb7d
Prisoner	Dokken	Back For The Attack	Metal	9bd0af239262bf538e93c99debc29b84
Ray's Idea	Dizzy Gillespie	Cool Breeze	Jazz	ca07d37ee5ff89c48054e2e7b103971f
Red Is The New Black	Funeral For A Friend	Seven Ways To Scr...	Punk	fb4179a64e7497e3d6deb9997b907bc2
Rocket	Def Leppard	Hysteria	Metal	c18cc3c9b59869294aacc13f164c0070
Salt Peanuts	Dizzy Gillespie	Salt Peanuts	Jazz	190c37e0431922fe68aa56a70e6198c5
Say It To My Face	Cherry Poppin' Daddies	Kids on the Street	Swing	0e835ae06b34e167a4f4ed7692e8235f
Screaming Infidelities	Dashboard Confessional	The Places You Ha...	Indie	c58e09ab64623b24fea3485bdacae60f
Shine	Faded Grey	A Quiet Time Of D...	Punk	38d332fa0c3c7ee4bd6626463acd34b6
Sixpounder	Children of Bodom	Hate Crew Deathroll	Metal	3071674b36b851a7fc490fc66a8c8055
Snowfall	Emily Remler	East To Wes	Jazz	0e3ab2980763afe8a23affbdd14b6387
Sockable Face Club	Cherry Poppin' Daddies	Rapid City Muscle...	Swing	c292749478c42e496e75cf746489cd0e
Some Nights	Fun.	Some Nights	Indie	551864bc887cc3b2664599166c0f70be
Soundtrack To The Ride	Fairweather	If They Move...Ki...	Punk	2c0a22d04893338f2343efe75200d6ea
Spooky Girlfriend	Elvis Costello	When I Was Cruel	Rock	7074c75ed658eb53325176be532ce29c
Swim Until You Can'...	Frightened Rabbit	The Winter of Mix...	Indie	87fcae84efcef80e65ebef7c262d50c4
Swinging With Tiger...	Cherry Poppin' Daddies	Sould Caddy	Swing	bc041fe323b7108d8c3a3becca6f2c30
Take the "A" Train	Duke Ellington	Best of Duke Elli...	Jazz	ff3d4f4153dffdb6a0c4bee4aa4bb833

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Tears Before Bedtime	Elvis Costello	Imperial Bedroom	Rock	60a175a366c589ba2f46ef5ce689669a
Teenage Brain Surgeon	Cherry Poppin' Daddies	Ferociously Stoned	Swing	320629ab9e9c7cb3d580fbd97a7c5cff
The Answer Lies Within	Dream Theater	Octavarium	Prog. Metal	99a8139bfb61fe6a63afdbdc3bb6bb28
The Boat	Chuck Ragan	Los Feliz	Indie	20b5378aa8b2f823e65e783de129e310
The Bradley	Further Seems Forever	The Moon Is Down	Indie	f94107fa55b383e9e1e44be2ac414cbe
The Employment Pages	Death Cab for Cutie	We Have The Facts...	Indie	708ae611b0116f975e8367f1af40f63b
The Hunter	Dokken	Under Lock And Key	Metal	8ea7a84b0c5d805970a75180e94f96d6
The Sound	Further Seems Forever	How To Start A Fire	Indie	460813d3c9bba12ca4b5983612542e7e
The Take-Away	Face To Face	How To Ruin Every...	Punk	5121493cf260497c716a8601acf282ae
This Year's Girl	Elvis Costello	This Years Model	Rock	5c875951fe5bc831c88474eb81d2afda
Valley Of The Damned	DragonForce	Valley Of The Damned	Metal	523bdb757be279e1e65c9fba1147648
Waiting For A Girl ...	Foreigner	The Definitive Co...	Rock	5bfb480f650dfbaf0fef2f1034a60c72
Yasmin The Light	Explosions In The Sky	Those Who Tell Th...	Indie	5fd43aec7204b09ec7d3194fadeb4f8b
Your Hand In Mine (...)	Explosions In The Sky	Friday Night Lights	Indie	d7d111769c33cc4d793240cd7c68725c
Androgyny	Garbage	beautifulgarbage	Alternative	50ada5a80f785c64c295cce23dd7311d
Backyard Skulls	Frightened Rabbit	Pedestrian Verse	Indie	5221ac8710765dbb549c32866aca8a4c
Blooddrunk	Children of Bodom	Blooddrunk	Metal	b42f93347e6d9ed6c253235e91814dd0
Cemeteries Of London	Coldplay	Viva La Vida	Indie	0ae00c26861a1af4ed5e9df780910da6
A Diamond and a Tether	Death Cab for Cutie	The Open Door EP	Indie	2b295404f9bbd96fe7f74093cd307b53
I Will Possess Your...	Death Cab for Cutie	Narrow Stairs	Indie	4a94ebc76eb96b85a611ead94b0d42d5

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
The Things You Said	Depeche Mode	Music For The Masses	New Wave	2526969d5b7f7f50b36bd52a18a9ba65
Now	Eyedeia & Abilities	E&A	Hip-Hop	1168eb29fa76f449d8d7b25243370b24
Spin Cycle	Eyedeia & Abilities	By The Throat	Hip-Hop	95bbeebcb13164815aecc66b01592fb7
Going Out In Style ...	Droptick Murphys	Going Out In Style	Punk	23579b0c2ba9137ccb8531872a8de66c
Human Qualities	Explosions In The Sky	Take Care, Take C...	Indie	5825a8b04754dba5b6449edd295a1472
I Sometime Wish I W...	Depeche Mode	Speak & Spell	New Wave	4599580ca86ac9640223f7b8215013ef
It's Not All About You	Face To Face	Laugh Now...Laugh...	Punk	dd2001395a74223e7427fcd6b4ff402a
Monument	Depeche Mode	A Broken Frame	New Wave	7f5a80298d954d29604bccafb3081c9f
More Than a Party	Depeche Mode	Construction Time...	New Wave	1f5b29cd5ac4c1b9f8ba263cea23ff622
Radio	Christie Front Drive	Christie Front Drive	Indie	8127c2a615de6141e777a2859400a280
Run Baby Run	Garbage	Bleed Like Me	Alternative	401fa67cd2611257eefccf8f8516fb64
Show Me Mary (XFM R...	Catherine Wheel	Waydown [1]	Alternative	29d22364f4485e95a1a4d671f96ed9f6
Snow And Lights	Explosions In The Sky	How Strange, Immo...	Indie	ea741ea0f61a0edf07c03dd9bee6107b
Start Again	Counting Crows	Underwater Sunshine	Alternative	5366f1dc92c0fe2ec8d07d6f228be3fb
Why You'd Want To L...	Death Cab for Cutie	The John Byrd E.P.	Indie	a9622b8e5cd3efe507feaf41cce3e09d
3 Chords	Constellation of Cars	Constellation of ...	Indie	1d7e3f4c80b264e86b20d97f138d0953
Blue 'n' Boogie	Dizzy Gillespie	Jazz Collector Ed...	Jazz	bd922eefbce13a2993cd6e31ca0dc114
Hurts Like Heaven	Coldplay	Mylo Xyloto	Indie	81179f4fccb606997f223937e86143f5
The Grey Man	Copeland	You Are My Sunshine	Indie	77a0e7cb790f62e647dbc8aac814cee3
Technicolor Girls	Death Cab for Cutie	Forbidden Love E.P.	Indie	ed7967e5735592a991834b232f2b550be

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Puke + Cry	Dinosaur Jr	Green Mind	Alternative	ceb2613e2d3627ba65a7e257a152223c
Everything to Everyone	Everclear	So Much for the A...	Alternative	9fcae8756a683beb88a14c2f57d44086
I Know You Well	Face To Face	Big Choice	Punk	a7ab7a6844c3209d308e00dc2d4043a5
I Want	Face To Face	Live	Punk	d592c3961690102a4429666957c66780
In Harms Way	Face To Face	Ignorance is Bliss	Punk	8cf0f526939b3c893ee7ad10b695e1b
Out of Focus	Face To Face	Reactionary	Punk	1f021878164ddf300cffe3011762100f
Walk The Walk	Face To Face	Face To Face	Punk	b4e4f247c699f17a84ceebc594ed04ba
Welcome Back To Not...	Face To Face	Three Chords And ...	Punk	0139690a26f63c35a2e75278a67b961c
Come Around	Fireworks	All I Have To Off...	Punk	03ecf00e7e0afd5baa8003b6d623456a
Pumped Up Kicks	Foster The People	Torches	Indie	0f8fd091754a4633e1c20fa9a9474ce7
Rescue Trained	Further Seems Forever	Penny Black	Indie	68b256dc0c965f4c10c5fbbaa867ef9fd
Gasoline	Catherine Wheel	Wishville	Alternative	5f7852412d8cecd19fc8ef6c61e5de9
He Loves and She Loves	Ella Fitzgerald and...	Ella & Louis Sing...	Jazz	22905ef5a9e4e305d60b0b8e3c7e4f87
Here We Go Again	Everclear	Songs From an Ame...	Alternative	e53b6da8a35c0b1b201725a932657265
Heroin Girl	Everclear	Sparkle and Fade	Alternative	df5caa3f7fc96e0d03270f9048127147
How Insensitive	Emily Remler	Retrospective Vol...	Jazz	e85d22175cc217a0103b0befc65d82a8
In Keeping Secrets ...	Coheed and Cambria	In Keeping Secret...	Punk	5f550e6ee34277d0b06059af49879ab4
Love Is Here To Stay	Ella Fitzgerald and...	The Best Of Ella ...	Jazz	19eedd781e49085108be3e6886faa40f
No World for Tomorrow	Coheed and Cambria	Good Apollo I'm B...	Punk	35cac2568267a7fd48d286c877a47d10
Nunca Mais	Emily Remler	Retrospective Vol...	Jazz	1536a82cbcd217576ef4cc42cf45d53a

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Queer	Garbage	Garbage	Alternative	e0967550e0b17837717e17ef37a5b999
Sick and Tired	Everclear	World Of Noise	Alternative	d672cb1bb11709bc0c95163d877290e0
The Jitterbug Waltz	Fats Waller	Portrait Vol.2 - ...	Jazz	cf8244f7bab5f52ae5fe3aa57fe5e635
When Day Is Done	Django Reinhardt	The Best of Django...	Jazz	dedff1fd9feaf93419e48ee1326104ff
Wholly Cats	Charlie Christian	The Original Guit...	Jazz	6b28142d120417034e92651b442f2f58
What If	Coldplay	X&Y	Indie	6b4a69974a92109ad762252e69cc60ac
Shovel Knockout	Children of Bodom	Relentless, Reckl...	Metal	f803c73f10d75e6a10779d84bb19fe5c
At the Bottom	Brand New	Daisy	Punk	fb991d503ff1450b962c75d325decec8
B-Boys Makin' With ...	Beastie Boys	Ill Communication	Hip-Hop	fbd5b25c6ea3f1f33ffdecc39a0fff1c
Best Days	Blur	The Great Escape	Alternative	94d4d39cc7886b7dc3fc92970318285b
Black Metallic	Catherine Wheel	Ferment	Alternative	bccc959a8202fd3017e0447deafdd90f
Standing In The Doo...	Bob Dylan	Time Out Of Mind	Folk	2afe5e2ec48ae20b52349e445564f30
Bomb	Bush	Sixteen Stone	Alternative	1f45c9a12a9f733c5a5e126dd5ccb350
Eulalia, Eulalia	Braid	Movie Music vol. Two	Indie	742ee5ff71db928af38d6d9671452e07
Minuet	Braid	Frankie Welfare B...	Indie	9ca08de8c9862a58d423bd93b51d64f2
Brick	Ben Folds Five	Whatever And Ever...	Indie	be79c195dbb7f3538cfe0364f6d576c6
broken down piece o...	Brian Setzer	13	Rockabilly	5f7e94f1fb50b8599a224543fc1e9703
Country Sad Ballad Man	Blur	Blur	Alternative	0eb7ad6ca06691a285e77b58cd20ea2d
Crank	Catherine Wheel	Chrome	Alternative	e2b68c38e2868cec31eddd088f112771
Delicious	Catherine Wheel	Adam And Eve - Me...	Alternative	14218fe31dc28ae9b9410f450fa91e46

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Sludgefeast	Dinosaur Jr.	You're Living All...	Alternative	b3248a7460bb32f8521b8175ce9c46a6
Drunken Knight	Bigwig	Un-Merry Melodies	Punk	30f0af09a8364caaecb4101c5731211
God Rest ye Merry G...	Bing Crosby Frank ...	Christmas	Jazz	335ab58ad4c3a569ce72e02fc240fad2
Hey You (Batch of L...	Black Label Society	Sonic Brew	Metal	d494aad3bbd0b6aef6386797ac780b2
Hey, Johnny Park	Foo Fighters	Colour & The Shape	Alternative	2ab152e36e0fc14d1901625603acefbc
Justify the Thrill	Blues Traveler	Straight on Till ...	Alternative	036beeb2ea5b931d43c14c79a226f138
Letter From A Friend	Blues Traveler	Save His Soul	Alternative	247c3a344c27bafae64a0d0aa7fef107
Lifetime, A	Better Than Ezra	Before The Robots	Alternative	574a42658e7b235dbbf242a66abab7e5
Little Muscle	Catherine Wheel	Happy Days	Alternative	091f6d9c47388a9e474302d70b027f11
Long Lost	Better Than Ezra	Friction, Baby	Alternative	97676a90d9b070189cc1c2e2b8e4ae32
Look Around	Blues Traveler	Four	Alternative	943e7f1387b4b47246462bab1a9482fa
Lost, Night	Bill Frisell	Disfarmer (Standard)	Jazz	87a4069119ab91ad5bba07e779e912b9
Mess	Ben Folds Five	The Unauthorized ...	Indie	1c7390ba840644988f50a238b0557301
More Than A Feeling	Boston	Greatest Hits	Rock	aa1a5078ce9c0a595d1ab72e6151ecd4
Perfect Pitch	Braid	Movie Music Vol. One	Indie	11fc7661e46e0c9c2a0a3dd71bb76224
She's Crafty	Beastie Boys	Licensed To Ill	Hip-Hop	c3d751de1182dd7ab222536efb8466dd
Sign Of Life	Bill Frisell and 85...	Sign Of Life	Jazz	4ba241c9bf07574ade5962efa59dfbfc
Smile	Bigwig	Stay Asleep	Punk	018a656b5e20a7aaf35ac782baeab139
Southern Grl	Better Than Ezra	Deluxe	Alternative	4830e3b50e52b15d223bddc284e14605
Steppin Stone	Black Label Society	Hangover Music Vo...	Metal	149e045fd7870f7c029e608fe341dd8f

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Suicide Messiah	Black Label Society	Mafia	Metal	1fc82f21c02aa19cce1d72666fdc87a2
The Ninja	Cacophony	Speed Metal Symphony	Metal	acb2e5f7f58cc3180315560aeb8803db
Backwards Guitar	Catherine Wheel	Judy Staring At T...	Alternative	7ac82837de46e411e421e68ec5b2c9bc
Collideoscopic	Catherine Wheel	I Want To Touch You	Alternative	7e021ccb528cd95b5756a340c184b243
Descending Babe	Catherine Wheel	Ma Solituda [Disc 1]	Alternative	6bae2c49d16516cc5bab1abe0458e4c5
Divers	Braid	The Age of Octeen	Indie	86140658751af7ece31c914de4e6c374
Heal (Live Xfm)	Catherine Wheel	Broken Nose [Disc 2]	Alternative	fa92e861b44faaeac243fa963acc0941
Killing A Camera	Braid	Lucky To Be Alive	Indie	4b03ecce71be25a068b12944de3d0116
Masters Of War	Bob Dylan	The Freewheelin' ...	Folk	8ab9c36e5b549da62877eefc6a8fbcdb
Mouthful Of Air	Catherine Wheel	Like Cats And Dogs	Alternative	ace2773dcb0ef06a0783e3de153970a9
Never Will Come For Us	Braid	Frame & Canvas	Indie	d864ba86bcb97a82e3fdffa5fe43d7c
Texture (Live)	Catherine Wheel	Broken Nose [Disc 1]	Alternative	1c9389f4b75547a0aece024e9a38b502
The Quiet Things Th...	Brand New	The Holiday EP	Punk	046fc264f300dd0a8f6c9b657feaf494
Tongue Twisted	Catherine Wheel	Crank	Alternative	7f630e3afdea0e240a918514e2b537e9
Wish	Catherine Wheel	She's My Friend (Ep)	Alternative	189350a70199c0fdb8c6d51efb0a398a
Always Gonna Get Ya	Big Bad Voodoo Daddy	Save My Soul	Swing	a96391251a887fcc7fd959124c87c802
The Call Of The Jit...	Big Bad Voodoo Daddy	How Big Can You Get	Swing	50f72f29371910c91e23baf904211e5c
Blues Etude	Brian Nova	Shadow Of Your Smile	Jazz	8e00b0280412149c3d51a47e0974a110
End Of A Century	Blur	Parklife	Alternative	1d7d6b309b77805a45f82b268bce5fd0
You Are the Reason	Braid	Closer To Closed	Indie	4fd5270fc4797de8f230a6d9b8471d53

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Coffaro's Theme	Bill Frisell with D...	Bill Frisell with...	Jazz	70eeaa21093f7086bc79e29d0b602e58
Come Rain Or Come S...	Billie Holiday	Billie's Best	Jazz	09aae6e14962dab9b963059f34eaf7b0
Godson Song	Bill Frisell	Gone, Just Like a...	Jazz	1390c83974256d8ec499002e5011e18b
Happy Feeling	Barney Kessel	To Swing or Not t...	Jazz	d6b9a57098ef4220019d617a1670ddb5
Happy Little Song	Barney Kessel	Solo	Jazz	84d3cc8c884d6f639f5424ccf6c217f6
It Could Happen to You	Barney Kessel	The Poll Winners	Jazz	57b517a19bc649af890f33e04a5d58a3
It Takes A Lot To L...	Bob Dylan	Highway 61 Revisited	Folk	1e2a0775855425eadd86e398137a1747
King Of Swing	Big Bad Voodoo Daddy	Big Bad Voodoo Daddy	Swing	32e1e622861c731d0422eb289ff8580f
Madhouse	Benny Goodman	Benny Goodman	Jazz	451bee4d3b18737e02a2611ecad7159d
Maggie's farm	Bob Dylan	Bringing It All B...	Folk	d9e91d304ea0a2b36dff34acb9b801d9
Mozambique	Bob Dylan	Desire	Folk	854d47e870c8c3f64f5795d5d14bc53c
Spanish Harlem Inci...	Bob Dylan	Another Side of B...	Folk	1a2efa277ad42a5efba1794f7290ce2
Spring Is Here	Barney Kessel	The Poll Winners ...	Jazz	2c746ee5248a88d0cfe244eebffd8b4
To Be Alone With You	Bob Dylan	Nashville Skyline	Folk	bd7292a3d18acb6ab7518e1f47f66986
Visions of Johanna	Bob Dylan	Blonde on Blonde	Folk	3d2c90c22a37a3bb30c2d9fd1dfb988e
Who's That Creepin'?	Big Bad Voodoo Daddy	This Beautiful Life	Swing	53122352d0e6d9ecbae9435feef218ce
With God On Our Side	Bob Dylan	The Times They Ar...	Folk	7740d47427258176a750dedaf4917ed7
You're A Big Girl Now	Bob Dylan	Blood On The Tracks	Folk	dbb22e1e53c3d0c3fb079158d318ce53
I Will Play My Game...	Brand New	Deja Entendu	Punk	16cbb6959e87b210aaaae0dc14cb372a5
92	Avail	4 AM Friday	Punk	32e6d449b6f3404353abbf0fe40ea8ef



Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Dreamer	Atmosphere	When Life Gives Y...	Hip-Hop	ab4ad954acc06dd92ec564804f515b40
Guns and Cigarettes	Atmosphere	Lucy Ford, The At...	Hip-Hop	1105732dcd789988a5117a566d40ce12
Blue Beard	Band Of Horses	Infinite Arms	Indie	8253fcb5c6c8afa658d795ce2aa3f951
Beautiful	Atmosphere	Sad Clown Bad Win...	Hip-Hop	de177764d819841485d7a267a6d76fdb
Break Your Frame	Bad Astronaut	Houston: We Have ...	Punk	165ca85e523b6d99d1c0dcfd1c6b5e9
Broken	Bad Religion	The Process Of Be...	Punk	5a49305dc77593b6298639f71c7466b1
Complications	Atmosphere	Overcast!	Hip-Hop	60f8670d06ce9079fa1301e11ab138d3
Detlef Schrempf	Band of Horses	Cease to Begin	Indie	64a0b2a2dbc7cfc464e9619858d09ae6
Evil State	Audiocrush	So You Call These...	Indie	e28e8c09628731de4e6ab9156c0e6580
Fall Apart	Avail	Over The James	Punk	e7afe36e0cdaa8c79b121b9871e0740a
Fall In A River	Badly Drawn Boy	The Hour Of Bewil...	Indie	3bb776c0063a12facba36d521f7f6daf
A Fighting Word	As Tall As Lions	Blood And Aphorisms	Indie	ec5f5739504ccb7338960d90ee6a1604
F*** You Lucy	Atmosphere	God Loves Ugly	Hip-Hop	b38ce4f338523fef01d38694d1acca62
Happymess	Atmosphere	Sad Clown Bad Spr...	Hip-Hop	d6315f596e35a35877211da2af7d675e
Heart A Tact	Kid Dynamite	88 Fingers Louie ...	Punk	02d0ae63c09b4b43ee4d27ec201bbbe8
Helitrope	At The Drive-In	VAYA	Punk	62455491d75296f19299962331692590
Leveled	Avail	One Wrench	Punk	da9cfe1c3e6c320894d48b80ab5c0c10
Living Each Day Lik...	Atreyu	Suicide Notes and...	Metal	ff6f00856f73dc5e55b295caf004d2826
Love, Love, Love (L...	As Tall As Lions	As Tall As Lions	Indie	bcd4ade91edc3552273eddee5bc002c7
Moosh	Bigwig	An Invitation To ...	Punk	1835aeb2af8356092522508a25bc080a

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Reflections	Atmosphere	Seven's Travels	Hip-Hop	a5159df935ae343182161e249aaea33
Release The Hounds	Bane	Give Blood	Punk	eb763a1bd2b2d5b1d3811ffb545028c9
Sleepwalk Capsules	At The Drive-In	Relationship Of C...	Punk	47f3cb1034de8dd003266de56a49ea7d
Song	Avail	Dixie	Punk	1d10965f3939db1787fb52f1b58b338f
Superhero	Bane	Holding This Moment	Punk	25f91664ac70462ebeca5ef60d4f702
T.V.	Automatic 7	Automatic 7	Punk	ba1254f9bca069b091e8067b059adbde4
The Funeral	Band Of Horses	Everything All Th...	Indie	c9501a0ad9e1383de5b287855035413
The Paint Chips Away	Bane	It All Comes Down...	Punk	6ef72485a718363934be3bb62a1b3f78
They Looked Like St...	Bayside	Bayside	Punk	21a068d56346acc90a9db506b5a3a63c
Tiny Voices	Bad Religion	Stranger Than Fic...	Punk	f3744d82b0f65ee714a6a749999ea067
Tomorrow	Bad Religion	Generator	Punk	58c01b10c0acedc9988277f5ad7a043b
Until We Fall	Audioslave	Revelations	Alternative	b8e332df816a562a226a94f3c44c840b
When	Bad Religion	Suffer	Punk	e212c19e16b636b3530ccb8506194f56
Mattress	Atmosphere	Sad Clown Bad Sum...	Hip-Hop	7824cd0313681fbb9f7e1850053b73bf
Musical Chairs	Atmosphere	You Can't Imagine...	Hip-Hop	064ce062b471782a15174e5285ec944e
Just For Show	Atmosphere	The Family Sign	Hip-Hop	d30e462afa6e86a0d1078c9650cef2ce
Blues for a Playboy	Barney Kessel	Music To Listen To	Jazz	4ef2fd901f47585804acf67389b6b897
Easy Living	Barney Kessel	Poll Winners Three	Jazz	25d370232efe012cc39b63d207258d11
Go Easy (See the Love)	As Tall As Lions	You Can't Take It...	Indie	910634fe1260a6b8c242710f5e89f209
God Deciding	Hot Water Music	Alkaline Trio, Ho...	Punk	1c946f549405993700a509982494e8ed

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
How Long Has This B...	Barney Kessel	Kessel Plays Stan...	Jazz	bee971c2290d28c10eed91e93e890d64
Make Someone Happy	Barney Kessel	Poor Butterfly	Jazz	dc975e9e7f6893842e2f0a91a085df67
Tiger Rag	Barney Kessel	Let's Cook!	Jazz	8b597810be5d182429037cb3a1b45fle
The Best Day	Atmosphere	To All My Friends...	Hip-Hop	0c4cc791112ed3ae2e02f5854247deee1
A Skeleton In The C...	Anthrax	Among The Living	Metal	04ad80bd5d4c6052e373ff29693d7c81
Acrobat	As Tall As Lions	Lafecadio	Indie	421ec935f432b1611a28b3b4f4684fd0
All On Black	Alkaline Trio	Good Mourning	Punk	cc7d7f44415297b10aa5a49eedf7f0a8
Another Innocent Girl	Alkaline Trio	From Here to Infi...	Punk	cae0ccdcba8357c78745b9fe8b3484bd
As You Were	Alkaline Trio	Goddamnit	Punk	68f5a6eb3a1da4da28ac4263604d6a16
Dethbed	Alkaline Trio	Crimson	Punk	f8150e30180132abe4b65eff16a8c96b
Down In A Hole	Alice In Chains	MTV Unplugged	Alternative	5ac881be5d4912330716b8f8af961289
Fix	Avail	Live at the Botto...	Punk	3f0e62c779c08c8aa5d9dfe712ac84dd
Head Creeps	Alice In Chains	Alice In Chains	Alternative	5523767a343ab9b54c14e1fc3f5f3e91
I Can't Remember	Alice In Chains	Facelift	Alternative	b7f6728e4ec3d8956d9d26258a1410b1
My Friend Peter	Alkaline Trio	Alkaline Trio	Punk	c8996ef44e1e8fbfec6259b5ac05198f
Redeye	All Else Fails	The Chase Of Gain	Punk	674b1fbc821bc09222ca3b343a7dac1e
Sickman	Alice In Chains	Dirt	Alternative	bd241aa1cf34cbdda16f58963694761e
Sleepyhead	Alkaline Trio	Maybe I'll Catch ...	Punk	63b40abefff8c31837105395afcd5b3
The American Scream	Alkaline Trio	This Addiction	Punk	a2f46c32f7f5d374252a4f9c5ee8933a
Was There?	Allan Holdsworth	Road Games	Jazz	8d670e20333c5dcc3b161148ea733acc

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Whale & Wasp	Alice In Chains	Jar Of Flies	Alternative	a4a4022ca1449ea9322a55fc375af33a
Who Cares Wins	Anthrax	State Of Euphoria	Metal	9774b942066508e880ab2fce2c329306
Zone	Allan Holdsworth	All Night Wrong	Jazz	35cd7f295150f39110b0b134eda627bf
Clavicle	Alkaline Trio	Damnesia	Punk	fc466622599b562b220f3c8482c600f7
I Found Away	Alkaline Trio	Agony And Irony	Punk	d6af09cd7e0a87835f1f8c35abce112f
Borne on the FM Wav...	Against Me!	New Wave	Punk	97c0f077edaba7eb1a3a6555df2da5c3
Espiritu	Al Di Meola, Paco D...	The Guitar Trio	Jazz	f7e76c8e9aca49e0fb1e15005aac57c1
Greedy	All	Mass Nerder	Punk	358a8f71c9af2cb4b17f877f6116a705
It Really Sucks Whe...	Against All Authority	Destroy What Dest...	Punk	cbff74077b3851cf20f6f5b3559656c0
Kevin Seconds - Ext...	Kevin Seconds	Split	Punk	4894af21c77456964a0d4602d5640d68
Rice and Bread	Against Me!	As The Eternal Co...	Punk	4b55f12772e76f4875f0fcb113d58ac3
Scorch	Alex Skolnick Trio	Transformation	Jazz	9f10c72ce52b6e30429827f7cbaf7e9a
Stunning Upon	Against Tomorrow's Sky	Jump The Hedges F...	Indie	e00d22f3f2f93e67a7e22e362424972d
The College Try	Against Tomorrow's Sky	The Lost Tapes	Indie	a49dc3bbe636f0fff031a267657e9082
Jordan's First Choice	Against Me!	Reinventing Axl Rose	Punk	80ba058f53431f55d7b738be7df93249
Violence	Against Me!	Searching for a F...	Punk	547879aaa25494228ad733d69d22eba0
Cereal Wars	AFI	Answer That And S...	Punk	ea611937f36f16e9bd40762769fd0419
Death Of Seasons	AFI	Sing The Sorrow	Punk	56804d635133aa0cd61b0fa5a9a45fe0
Retiring	A Wilhelm Scream	Mute Print	Punk	8bde5e7c2074fb78021f0ea728863929
Toby	Against All Authority	All Fall Down	Punk	5fb54c89b18db6655c7ed40d165f6c4d

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Blink	88 Fingers Louie	Behind Bars	Punk	0b4459d06085bd900fd1122e7996619da
Congratulations	A Wilhelm Scream	Ruiner	Punk	18d2f29db3f809f8317ae2d7d05a41da
No Poetic Device	AFI	Black Sails In Th...	Punk	22c9b5af6c3a741d1f2bded37ad14b39
This Secret Ninja	AFI	Very Proud Of Ya	Punk	ca8138537bca4813fd844d143a7eb6f2
Thomas	A Perfect Circle	Mer de Noms	Metal	93ce1a6a4445aba32dafec7f8880dd08
Our Ghosts (contemp...	A Wilhelm Scream	Career Suicide	Punk	1be791b5928ad47525707beddc988f5e
F*** This Place	Frightened Rabbit	A Frightened Rabb...	Indie	a695f46f946e0a155aaa7067bd499f89
After The Laughter	...And You Will Kno...	Source Tags & Codes	Indie	67004931adc13036cda4c2fc3467e03a
Colourblind	7 Seconds	The Crew	Punk	6fd17189f514ba5a07ed135ffcab197e9
Take it and run	Dropkick Murphys	The Warrior's Code	Punk	74a5b819555eacb9878b38b13a21af16
Bastards On Parade	Dropkick Murphys	Blackout	Punk	b4210b41b82634d61f11c1a7f97261b5
Staind Glass And Ma...	Rise Against	Unraveling	Punk	ca08ce5c3559cd1c4a96b45e4fe92bb5
High Pressure Low	Against Me!	White Crosses	Punk	a725dcb1dd072e8f05d8b2215cc41565
Cheek To Cheek	George Van Eps	Legends: Solo Gui...	Jazz	5d59ad03488f7562528e1222bd758dc9
Lie to Me	Depeche Mode	Some Great Reward	New Wave	6eb0a73a43d8b14f991436421011633
People are People (...)	Depeche Mode	Some Great Reward	New Wave	e0a60609fa1838f095831b296078ea4c
See You (Live in Ha...	Depeche Mode	A Broken Frame	New Wave	6762e43e46f933da1e3bdd027d1586f7
Shout	Depeche Mode	Speak & Spell	New Wave	c188f9f1091d99326264624074728fa8
Work Hard	Depeche Mode	Construction Time...	New Wave	a37b7b165911ba2e1883154327542fd5
Crank (Live)	Catherine Wheel	Wishville (Bonus ...)	Alternative	b64a881917298607e7652c663d7cc667

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Willing To Wait	Catherine Wheel	Ma Solituda [Disc 2]	Alternative	cff08a757cd3190686c27cb3cb63aa7
The Rooster	Atmosphere	Sad Clown Bad Fal...	Hip-Hop	75b1a29de76e3006dc9b9e23f17d117a
All Is Full Of Love	Death Cab for Cutie	The Stability EP	Indie	9c00d7bbaeb662ae46a4695588e3818f
The Things That Hat...	Atmosphere	Strictly Leakage	Hip-Hop	e7ce34aa696b6ab1d17ce7780e596417
White Noise	Atmosphere	Leak At Will	Hip-Hop	8a6205b97ee03858a2bffa6323def534
Sudden Death In Car...	Brand New	Your Favorite Wea...	Punk	4f8eaca782dd7f10c5b4e2e246910b29
Careful Now	Copeland	Eat, Sleep, Repeat	Indie	43d4aa5fc4b82605161bc9a9c70c810d
Soul Meets Body	Death Cab for Cutie	Plans	Indie	8ab447d2d2894aebfd9ee6e6c7438b1f
Sweetest Perfection	Depeche Mode	Violator	New Wave	046f3e9b827c1229c2cb9633b29f9041
Never Bought It	Dinosaur Jr	Hand It Over	Alternative	8ff7d7e6f4672c50f1b32de6c4014ca2
Feel The Pain	Dinosaur Jr	Without a Sound	Alternative	0e8b9df549afc2c2e221583459d9776b
Start Choppin	Dinosaur Jr.	Where You Been?	Alternative	c9b2972a74e7393c59554ce43109d8cb
Day Two	Explosions In The Sky	Travels In Consta...	Indie	fe219b7526409c4bd91630d21014ad75
You And The Night A...	Jamie Cullum	Pointless Nostalgic	Jazz	44b2b4e100eac6e5f2502e0f65624fd9
For Jaco	John McLaughlin	Industrial Zen	Jazz	eeceb07522e92b152fd10a35b9d2692aa
After the Fact	John Scofield	Quiet	Jazz	d0ea03832f8e3d24343e3c6222316d13
(Beginning of What' ...	Kyuss	Wretch	Stoner Metal	606689bc8be37893d5f058d42322f0af
100/Space Cadet/Dem...	Kyuss	Welcome to Sky Va...	Stoner Metal	981eca9c9fc468804bc5e55eae41e4f5
50 Million Year Tri...	Kyuss	Blues for the Red...	Stoner Metal	1601d86145eede4c5e5e959d0368b456
A Day Early and a D...	Kyuss	Muchas Gracias: T ...	Stoner Metal	cb944f80a2da9a24b6b290868464b4be2

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Born to Hula	Kyuss	Queens of the Sto...	Stoner Metal	ca7fb5bfd2df8e2dde7d62d39c4d816b
Catamaran	Kyuss	...And the Circus...	Stoner Metal	45f207ff972ad30ed272468c4d84a78b
Above the Treetops	Pat Metheny	Secret Story	Jazz	a284b9a8cac86bce4ec2b9995048d9dd
Brain of J.	Pearl Jam	Yield	Alternative	7977bde2149e51a70cda4baafc4bf318
Hey You	Pink Floyd	The Wall	Rock	6ae08936bbd9695e995e71744b290d8a
In The Flesh	Pink Floyd	The Wall	Rock	014470ccb0e6f192d1e544e40dc708c5
1492	Counting Crows	Saturday Nights &...	Alternative	feeac56556090c596a1361d8dd97c3db
Follow The Reaper	Children of Bodom	Follow The Reaper...	Metal	16ef5a10094e481045f71c1de1c149ab
10.45 Amsterdam Con...	Funeral For A Friend	Seven Ways To Scr...	Punk	dbfa97ff88b0a2374c8e533ae632d87e
45	Elvis Costello	When I Was Cruel	Rock	1659d33909d5ce658bef5985f80d9a27
6-00	Dream Theater	Awake	Prog. Metal	07a74e03be2ef8cfaccfd5f4e6d44d7
A Pain that I'm Use...	Depeche Mode	Playing the Angel	New Wave	360b59cd45981c084959b8488a0a4a2b
All My Life	Foo Fighters	One By One	Alternative	92f13e3a70a50324aabc5488d4856eda
Apocalypse Now and ...	Every Time I Die	Gutter Phenomenon	Metal	7db4ebb50d91ae9299c4c54bdcc9f72
Arrows	Fireworks	Gospel	Punk	0f4ba523f3eefcacad1f1701576e1e67
Be Calm	Fun.	Aim and Ignite	Indie	1641aa42c74ac8c18fea983301369727
Bend to Squares	Death Cab for Cutie	Something About A...	Indie	d472b8b81d0702b6fb6abe76e290d639
Beyond Belief	Elvis Costello	Imperial Bedroom	Rock	190ad3131987729aa260ad1d8afdd140
Bill Of Goods	Face To Face	How To Ruin Every...	Punk	17611d31bcf93e3f8caa29f80364e6cc
Blomdido	Dizzy Gillespie	Birk's Works	Jazz	c1dd7da7ed8e3708085f78d401211698

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Catapult	Counting Crows	Recovering The Sa...	Alternative	cf6261c6ac13de52ddfa7dacfeaf0613
Turn	Christie Front Drive	Anthology	Indie	39111dea88c8295ada614f537f1878ee
Cold As Ice	Foreigner	The Definitive Co...	Rock	7ff0d82b8f701ee05acabafdc5e973be
Brightest	Copeland	Beneath Medicine ...	Indie	ab73b0ca526452ce950fd1c6229fc347
Daahound	Emily Remler	East To Wes	Jazz	d76199f8f541b40639a52902aac94e41
Barrel of a Gun	Depeche Mode	Ultra	New Wave	4609d255a061cda985482865282b326b
Black Celebration	Depeche Mode	Black Celebration	New Wave	cfc28ac98d0b64f37812a78ee31d8746
Dream On	Depeche Mode	Exciter	New Wave	d68a98bbf2eb70b1118a706de2a32960
I Feel You	Depeche Mode	Songs of Faith an...	New Wave	6f53ce05b702bb615fbc6a0ca79efeb4
Diamond Light Boogie	Cherry Poppin' Daddies	Sould Caddy	Swing	9a43165d2a0dce52f6ee53c1f23f4f5e
Forget the Swan	Dinosaur Jr.	Dinosaur	Alternative	e1dbc5c83aafc7182a8969d4d6725c70
Freak Scene	Dinosaur Jr.	Bug	Alternative	a6f9cf45b4cda1423e26587d78406d0
I Don't Think So	Dinosaur Jr.	I Don't Think So	Alternative	d9c95f3ef8d1f43aed19bf25f6aa6df3
Little Fury Things	Dinosaur Jr.	Fossils	Alternative	c147fa8766494aa765508c678f7a732e
Whatever's Cool Wit...	Dinosaur Jr.	Whatever's Cool W...	Alternative	d56497e19a237cf35211fc0980544a45
Dollars And Sense	Faded Grey	A Quiet Time Of D...	Punk	58e6137d65d5a1fab96f770e9a3cf4a0
Famous For Nothing	Dropkick Murphys	The Meanest Of Ti...	Punk	60b0492f3d5f9f05fa5b28c60821eda9
Drunk Daddy	Cherry Poppin' Daddies	Ferociously Stoned	Swing	20d4237495509b0df8575648855dde9
First Breath After ...	Explosions In The Sky	The Earth Is Not ...	Indie	8f24b7343abbe50809310d7d3554ec71
The Birth and the D...	Explosions In The Sky	All of a Sudden I...	Indie	9191b37e3570c46fc115986264781570



Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
You’ve Done Nothing	Face To Face	Don’t Turn Away	Punk	e826f849237e4cb4a5951c8e9ef7c02c
Family System	Chevelle	Wonder What’s Next	Metal	5508ecd353abffaccdc610dc97ccf686
From Finish to Star...	Counterfit	From Finish to St...	Indie	d68d290fb76df0c9408b51de63bcc655
From West Texas	Explosions In The Sky	Friday Night Lights	Indie	a5513cac22da1712d41942c067ba5572
The Moon Is Down	Further Seems Forever	Hope This Finds Y...	Indie	a62bfaf4df9bad9a4810ace9337311f
Good Bait	Dizzy Gillespie	Dizzy Atmosphere	Jazz	33c9a8ba09e3782835fae910ed127d3e
Greet Death	Explosions In The Sky	Those Who Tell Th...	Indie	b61b7b2fedc578b05bb823da36309d94
Groovin’ High	Charlie Parker	Yardbird Suite Di...	Jazz	b2a3c43ec25314fd6f7bf75e3bb19807
Hanginaround	Counting Crows	This Desert Life	Alternative	b1549e4dbb6f6f1a24b24f87a326ff7a
Hard Candy	Counting Crows	Hard Candy	Alternative	e5d812b346c9ac24a729075da9de9ceb
Heaven’s Not Overfl...	Corrosion Of Confor...	Deliverance	Stoner Metal	4b7b1152b53057d54fd0c255dad01cc1
Holding Someone’s H...	Circa Survive	Juturna	Indie	9b71f88886664f3faff882b83ac5c034
Home Is a Fire	Death Cab for Cutie	Codes and Keys	Indie	30f5f4da9a3c64bdab16db103e922f9b
How To Start A Fire	Further Seems Forever	How To Start A Fire	Indie	fa90934a29eb6c53424601339d14be49
I Feel Free	Cream	The Best Of Cream...	Rock	c06e02ef0ae9cb56a18e28f72d30c9c8
If They Move...Kill...	Fairweather	If They Move...Ki...	Punk	ef0379d31ed555a440c3522c42f9d572
Immure	Damiera	MUSIC	Indie	e1343d447d498cc53b2eb58aecbfacfa
In a Sentimental Mood	Duke Ellington	Best of Duke Elli...	Jazz	e7d1f3e241250ef4b35158e76a1c0b98
In Chains	Depeche Mode	Sounds Of The Uni...	New Wave	56e0cf883a20203f71c35cdcacf4b9c8
Invocation Of Apoca...	DragonForce	Valley Of The Damned	Metal	6d6a3d7315f7dd2b455c8ea53c96ef5b

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Thumb	J Mascis	Martin + Me	Alternative	2dd6c6456064d49e2db90cf5ced01d67
Keeping the Blade	Coheed and Cambria	Good Apollo, I'm ...	Punk	e5eac7e333e89c320902b92fba3a165
Kids On The Street	Cherry Poppin' Daddies	Kids on the Street	Swing	ae4a7bc4f4971360246dad3ae001fe1b
King of the Rotten	Corrosion Of Confor...	Wiseblood	Stoner Metal	522acf2e8dc0fc472bf694dac3e317bb
Kiss Of Death	Dokken	Back For The Attack	Metal	30ace34b6e51158a917ced2511195d9f7
Light Up Ahead	Further Seems Forever	Hide Nothing	Indie	d5f1b746e343b715f50989083c26681a
Living Dead Beat	Children of Bodom	Are You Dead Yet?	Metal	9bcb0762fdab349e31aff3213e7f049
My Spirit Will Go On	DragonForce	Sonic Firestorm	Metal	bd9399f4063278b2025e6f6b73ae7bc5
Needed 24,7	Children of Bodom	Hate Crew Deathroll	Metal	06b5ef31d23d148682c41b41d0e44d99
No Action	Elvis Costello	This Years Model	Rock	9a178e57651f8a1577f9f8d25a1ad95d
No One Really Wins	Copeland	In Motion	Indie	2eed6bd4a1643291d57086a8f4f7960a
One	Eyedea & Abilities	First Born	Hip-Hop	2287cd13f090bb53f99eb071bfac49e2
Open Up and Wail	Chuck Ragan	Los Feliz	Indie	01e1c728ff7a73a22e1635a38153ec2a
Oro, Incienso Y Mirra	Dizzy Gillespie	Afro-Cuban Jazz M...	Jazz	68e5ad778b4b5c122b36e69d4b825018
Our Delight	Dizzy Gillespie	Cool Breeze	Jazz	48d08463e4ffe2c71da7c5e547e2421
Perdido	Dizzy Gillespie	Salt Peanuts	Jazz	e906b38e136711261e7a475442b77bdf
Politik	Coldplay	A Rush Of Blood T...	Indie	5094d9afde5baef58b06574f5e8cae81
Prelude	Chiodos	All's Well That E...	Punk	46f776d66344ff26066b18f16573e283
Pull Me Under	Dream Theater	Images And Words	Prog. Metal	72a0d7f72d6c1f66a1b9e91f6aefcebd
Regression	Dream Theater	Metropolis Pt.2 S...	Prog. Metal	2e4813801bfec34cb944606be0c25ac3

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Romeo A Go-Go	Every Time I Die	Hot Damn!	Metal	b6413d577e8f7d241a0cc08bc096be29
Round Here	Counting Crows	August and Everyt...	Alternative	886898a1389b47bfb2bf740d7d557c7
Schoold Days	Dizzy Gillespie	Impromptu	Jazz	a7322be4e61c7a274558af95e53fcff7
Scrapple From the A...	Charlie Parker	Yardbird Suite Di...	Jazz	f7c0d450774e07d1228ce082f9f50b8e8
Signe	Eric Clapton	Unplugged	Blues	454836e132d51901f1858aab67caf2c8
Shunky (Original mix)	Eric Clapton	Eric Clapton Delu...	Blues	06cc086a1640b454de1adae7deb41508
Shunky	Eric Clapton	Eric Clapton Delu...	Blues	bd80cd726dbc07f6fdcb2e634a46c810
Some Nights Intro	Fun.	Some Nights	Indie	718067f3ef0fd5a51d565159bcadef9
Souvenir	Counterfit	Super Amusement M...	Indie	d34fb07ff47277e946160f53684cb141
Sowing Season (Yeah)	Brand New	The Devil And God...	Punk	f300251868f7837d5abb6ebffa947502
Steadier Footing	Death Cab for Cutie	The Photo Album	Indie	92f2f19f4014c8d929840b75ed9738e9
Stone Breaker	Corrosion Of Confor...	In The Arms Of God	Stoner Metal	6d4cdc6b183e3c954f363b186a1fe18c
Talking	Descendents	Cool To Be You	Punk	26ac6c18ee4b5e240a26e5228e3f7150
The Brilliant Dance	Dashboard Confessional	The Places You Ha...	Indie	5128881b9431f092e4ee4ed01be5828d
The Greys	Frightened Rabbit	Sing The Greys	Indie	1fba10ce024d0e2c5a074eb0754f2183
The Modern Leper	Frightened Rabbit	The Midnight Orga...	Indie	077369139c21a6af681b097b423efeed
The Moon Is Down	Further Seems Forever	The Moon Is Down	Indie	4a9280f6d8a01603b5c84e5d524e9a60
The New Year	Death Cab for Cutie	Transatlanticism	Indie	3a8fbf6436f968f035f0ee90e419ae4a
The Root Of All Evil	Dream Theater	Octavarium	Prog. Metal	df0a451a0084f4809c459d1107c4c15a
The Search	Cherry Poppin' Daddies	Rapid City Muscle...	Swing	b55b5635b09ae6439fc2b1c6b4c9ef3e

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
These Shrouded Temples	Corrosion Of Confor...	Blind	Stoner Metal	a7026c12eb3d0173a55db92fa858ca63
Things	Frightened Rabbit	The Winter of Mix...	Indie	37465ca905d7671c76d31451b63ba58d
Title Track	Death Cab for Cutie	We Have The Facts...	Indie	d160106865773e44574ddb16110d87b3
Unchain The Night	Dokken	Under Lock And Key	Metal	f23a32d902263866e2c65b38eb18ff2a
Women	Def Leppard	Hysteria	Metal	683ef59f4eca6c1fe5f51a7883c8fb12
Zoot Suit Riot	Cherry Poppin' Daddies	Zoot Suit Riot	Swing	d5733de00ca4e29f9ee229d1c3be3368
A Song For Our Fathers	Explosions In The Sky	How Strange, Inno...	Indie	8a137d90cadaaf2658a56ef956cc8a69d
Acts of Man	Frightened Rabbit	Pedestrian Verse	Indie	5e4667e860999cdab2f64aee789b69f3
Bad Boyfriend	Garbage	Bleed Like Me	Alternative	b82adfa29bc7a84a2719a00133ab48c1
Bixby Canyon Bridge	Death Cab for Cutie	Narrow Stairs	Indie	f724938a630a215093a40b3f8a5680b5
Little Bribes	Death Cab for Cutie	The Open Door EP	Indie	c25a153e2437dbb50fe3f8dd67c0168e
Never Let Me Down A...	Depeche Mode	Music For The Masses	New Wave	4e54c90370b5b5015b8267dc4223a10f
Reintroducing	Eyedea & Abilities	E&A	Hip-Hop	456abbf0b03bd2375766bc8e11792661
Hay Fever	Eyedea & Abilities	By The Throat	Hip-Hop	4fc3d7afebd9dbba8c248665524e9860
Hang 'Em High	Dropkick Murphys	Going Out In Style	Punk	b980c515ebfcbdb28cc37fa050df0bc1
Hellhounds On My Trail	Children of Bodom	Blooddrunk	Metal	593afdcc7a44821d16c57caa92a2224d
Last Known Surround...	Explosions In The Sky	Take Care, Take C...	Indie	72c0528f9238b82e5365e08254806627
Life In Technicolor	Coldplay	Viva La Vida	Indie	ae8a4ef251c8f84f39013038ee0144a1
Love, in Itself	Depeche Mode	Construction Time...	New Wave	65c679edel555a10aaaaed79034a9fd1
My Secret Garden	Depeche Mode	A Broken Frame	New Wave	66a436abe24e9d4ba785e5983a4f5df7

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
New Life	Depeche Mode	Speak & Spell	New Wave	95c4b3b2b6cb7506d2e35076d65b92cc
Saturday	Christie Front Drive	Christie Front Drive	Indie	046b623aeaf0def41455cebe7d3b1e5
Should Anything Go ...	Face To Face	Laugh Now...Laugh...	Punk	fa66ff2a07487bbcb8e91dd25e282f97
Shut Your Mouth	Garbage	beautifulgarbage	Alternative	c18486afef940563089490d287c29b0f
Untitled (Love Song)	Counting Crows	Underwater Sunshine	Alternative	f0067de21686b4511dc66826625ef3e4
Waydown	Catherine Wheel	Waydown [1]	Alternative	24cf7ceae0821c716e9291c5d07ff704
We Laugh Indoors (T...	Death Cab for Cutie	The John Byrd E.P.	Indie	6c23e0851dfc46a9d728d2befb72b298
Mylo Xyloto	Coldplay	Mylo Xyloto	Indie	e1110ce86c0a5f65d2d9dea2c2a60670
Should You Return	Copeland	You Are My Sunshine	Indie	de0afecd1deea07c43649e468366d76
Daahoud	Emily Remler	Retrospective Vol...	Jazz	035172bdca326db82c1abbcc152c6e2c5
Photobooth	Death Cab for Cutie	Forbidden Love E.P.	Indie	b69c29d6b9ba7f0ec803fae7992049c5
Electra Made Me Blind	Everclear	Sparkle and Fade	Alternative	fd0844d82c0da9db567282f795732129
Disappointed	Face To Face	Reactionary	Punk	2f49d6dbf02ace6873466cb8a47a241f
Overcome	Face To Face	Ignorance is Bliss	Punk	f845bbf29be5c1e321812b68825a7c17
Resignation	Face To Face	Face To Face	Punk	a2084b725a58fcd340af342b383e7c8
Struggle	Face To Face	Big Choice	Punk	b4fac71f31ddf696ad2aca43ed1789b7
Walk The Walk	Face To Face	Live	Punk	66d07f744c0d743b3b77fbc503a441ad
123 Drop	Face To Face	Three Chords And ...	Punk	511c2eab7e963a111b0e4287c264a3a0
Geography, Vonnegut...	Fireworks	All I Have To Off...	Punk	31b25864db5e1887c996957723ceb8ae
Helena Beat	Foster The People	Torches	Indie	f06452b3e29336a3964e224bf88a2f03

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
So Cold	Further Seems Forever	Penny Black	Indie	33da9e763f77edff5fd863099fa2621
I Got Plenty o' Nuttin	Ella Fitzgerald and...	Ella & Louis Sing...	Jazz	3c9919393ee96f4965650ad350b1d14d
Ingredients	Constellation of Cars	Constellation of ...	Indie	b9e59d7e1523fd83ae46a34487faa3de
Let's Call The Whol...	Ella Fitzgerald and...	The Best Of Ella ...	Jazz	f88299b27722e6c33961210d736f65cf
Limehouse Blues	Django Reinhardt	The Best of Djang...	Jazz	9feabb3df172ccf7fbca1507ab6fd02
Mocha Spice	Emily Remler	Retrospective Vol...	Jazz	c3b1dcd0798e7d4bbcaf14e24aa50d24
My Melancholy Baby	Dizzy Gillespie	Jazz Collector Ed...	Jazz	d6f4f32fb5fe236e0e527a8486d9ea58
Seven Come Eleven	Charlie Christian	The Original Guit...	Jazz	14d523ef6c3bf1328543d6525ed2da54
So Much for the Aft...	Everclear	So Much for the A...	Alternative	01b0d2564c55fe9d31e9a1eb551affb4
Song From an Americ...	Everclear	Songs From an Ame...	Alternative	47e07a7bfaf8478fb02bac82c5a0a3c2
Sparks Are Gonna Fly	Catherine Wheel	Wishville	Alternative	18d5eb152c62d67c2792c164386a0405
Supervixen	Garbage	Garbage	Alternative	fec9605433fa2f515e03a92fcdcb76668
The Reaping	Coheed and Cambria	Good Apollo I'm B...	Punk	7a3f9ebf5eb0ca4e574a32d6e0792d62
The Ring in Return	Coheed and Cambria	In Keeping Secret...	Punk	d1b9b40a8c2c61e00b9ffd3f09d1f04e
You Must Be Losing ...	Fats Waller	Portrait Vol.2 - ...	Jazz	ae1b4b92e09d3570043ee70285c7db86
Your Genius Hands	Everclear	World Of Noise	Alternative	5a8e89d901ed723e9bafb12d961f087f
Square One	Coldplay	X&Y	Indie	bca69d1e503a266be0dff0aad0ddd244
Not My Funeral	Children of Bodom	Relentless, Reckl...	Metal	abba7b0cc2804f75550ea343197fb752
Bed	Brand New	Daisy	Punk	29090efecac1ab3ab4ab39562fd7b836b
Best of Me	Bigwig	Un-Merry Melodies	Punk	11664ceded60fbfbf257bfa787155003d

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Dirt Road Blues	Bob Dylan	Time Out Of Mind	Folk	3fea99180d86004ae1b65264816f1bd6
Capricorn	Braid	Frankie Welfare B...	Indie	12e62dedaa1277fd6bc2c7678d54a3a4
Jimmy Go Swimmer	Braid	Movie Music vol. Two	Indie	94e6bf3e0148faf11e417b5d72100e8d
Country House	Blur	The Great Escape	Alternative	74316bf48a634751c8a48bb4bd3e7cb7
Daylight	Better Than Ezra	Before The Robots	Alternative	19d38bc9ce464e494d46f5190001f867
Deck The Halls	Bing Crosby Frank ...	Christmas	Jazz	08f93cd3dbfa7f4bab7023d9cbbf249d
Dent	Bigwig	Stay Asleep	Punk	cffb431dfed942ea47802d24ae2017da
Kracked	Dinosaur Jr.	You're Living All...	Alternative	f4b04a969cae0456ed613e749effb1fb
Don't Change Your P...	Ben Folds Five	The Unauthorized ...	Indie	0c277b6498f9129e8492e68168e461ae
Fair	Ben Folds Five	Whatever And Ever...	Indie	cba301821d15c1c68c8480554141ec8
Felicia	Blues Traveler	Straight on Till ...	Alternative	6e8a17042e48d3bae698343ea27137cc
Future Boy	Catherine Wheel	Adam And Eve - Me...	Alternative	ce377ca5bef874de53f408632ed5d10d
Good	Better Than Ezra	Deluxe	Alternative	7899edcf51b5ce7b003be4d13bf10532
Higher Power	Boston	Greatest Hits	Rock	4488cb3b572f94039a186d45c283cdee
I Confess	Catherine Wheel	Chrome	Alternative	e177893bb9a483f0565ba0852b1f51fe
I Want To Touch You	Catherine Wheel	Ferment	Alternative	bc5b7c0cafa596bb5b900ea2593e9dc2
Lonely Man	Bill Frisell	Disfarmer (Standard)	Jazz	18a880dfc2984d5d8047ce0d3c778af2
Love & Greed	Blues Traveler	Save His Soul	Alternative	5c8cbd014c3216f042e1d5e947ee5214
Monkey Wrench	Foo Fighters	Colour & The Shape	Alternative	9be9f017a186dd574a3b754ec86f7f67
Motion Light	Braid	Movie Music Vol. One	Indie	bff6090b6cf69155d609762dbd1539d6a

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Old Times	Bill Frisell and 85...	Sign Of Life	Jazz	f6369a74e73f79666dfc7887f3ab9705
Queen Of Sorrow	Black Label Society	Hangover Music Vo...	Metal	9bbf8c5e2dd0bccc4ee461d90e5d84a
Rewind	Better Than Ezra	Friction, Baby	Alternative	a4e7d2451493fc41262a01afb28b0e16
Song 2	Blur	Blur	Alternative	33ca9cc3b897611d5789e723b0f59725
Stand	Blues Traveler	Four	Alternative	9e19cf2fd3ad3e867a126c8837f3c809
Swim	Bush	Sixteen Stone	Alternative	faf033c9395a268348e1fb1ad3d54b3
take a chance on love	Brian Setzer	13	Rockabilly	29abdc9f2889c69fbf672d76cd5cb9c8
The New Style	Beastie Boys	Licensed To Ill	Hip-Hop	ba6f775ddcb0da7e67be1a4f01b6c08b
The Rose Petalled G...	Black Label Society	Sonic Brew	Metal	1875ff8c5c03601d7d2049b2a6a203f4
Tough Guy	Beastie Boys	Ill Communication	Hip-Hop	a4dc9f7b5219aa5e574d0e7f5c6b7ce1
Waydown	Catherine Wheel	Happy Days	Alternative	13ae26883ab12a4d2f537e6dd3363190
What's In You	Black Label Society	Mafia	Metal	b3e295d2178b695e89d15ee127fc20eb
Where My Fortune Lies	Cacophony	Speed Metal Symphony	Metal	774bf6669892c870e7ea0011c652bdcd
Crank (Live)	Catherine Wheel	Broken Nose [Disc 1]	Alternative	37bda82a2b808f690f8052c88d498c2f
Delicious	Catherine Wheel	Ma Solituda [Disc 1]	Alternative	c34da384e69fb0e74822231bf8c707cc
Flower To Hide (Liv...	Catherine Wheel	Broken Nose [Disc 2]	Alternative	e5ae72d82beb65504a9ed6670d0fbcd8
Girl From The North...	Bob Dylan	The Freewheelin' ...	Folk	d2c7a66a637809a192c9fa4b3046c388
God Inside My Head	Catherine Wheel	Judy Staring At T...	Alternative	b8441395999a057d561bf5332f454605
Killing A Camera	Braid	Frame & Canvas	Indie	7f7301bd8c5cc0ad720b561ad84c0057
Logan To Government...	Brand New	The Holiday EP	Punk	5da68c804775aa41c54d2e4a607e54e7



Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Nineteen 75	Braid	The Age of Octeen	Indie	33252b29264ad52ed752ba888f91790b
Pleasure	Catherine Wheel	Crank	Alternative	542a82676dc2ea0b3e7954cb3e786f92
The New Nathan Detr...	Braid	Lucky To Be Alive	Indie	1f3a9dc3a53974176ca167dba00db90a
Upside Down	Catherine Wheel	She's My Friend (Ep)	Alternative	0c5cd89d1f01f4050a6984f730c3753f
Ursa Major Space St...	Catherine Wheel	I Want To Touch You	Alternative	57c0bf963563addece43c3fe0f8634f2
Wish You Were Here	Catherine Wheel	Like Cats And Dogs	Alternative	15e7dc5b93faceefa498fa26ea53f4d3
A Foggy Day	Billie Holiday	Billie's Best	Jazz	3e2ca0d5a5e2b276412b0c3840301318
Ballad Of Hollis Brown	Bob Dylan	The Times They Ar...	Folk	125d437978169d38a91db3948266ed76
Calloway Boogie	Big Bad Voodoo Daddy	How Big Can You Get	Swing	b4a60e9f2dfaf1c9980f02c3ac28ea64
Black Crow Blues	Bob Dylan	Another Side of B...	Folk	d6d27d3441111c17903aff45b46eefdd
Tracy Jacks	Blur	Parklife	Alternative	02f0bff9e4ea3f9ff0e51bebf75c1347
Do Over	Braid	Closer To Closed	Indie	ddf40b64d1e1b80b33033a979f45ab81
I Wanna Be Like You	Big Bad Voodoo Daddy	This Beautiful Life	Swing	9704fce21dc958bd8ca24e83a3c34f03
Isis	Bob Dylan	Desire	Folk	6f52add5316a5600b166a7f50ab0b77f
Louisiana	Barney Kessel	To Swing or Not t...	Jazz	b0c85e23f7313fb8c752d5d3f2863115
Mr. Pinstripe Suit	Big Bad Voodoo Daddy	Big Bad Voodoo Daddy	Swing	ba6bb2dd5805918836b0e9e27ccd734
Nashville Skyline Rag	Bob Dylan	Nashville Skyline	Folk	576bd7d0e1adc88d8613fc4898279965
Pledging My Time	Bob Dylan	Blonde on Blonde	Folk	1fad92f9e3d4760a4d0aba138bb47c21
Satin Doll	Barney Kessel	The Poll Winners	Jazz	b579efaf86ff89c9f7624f8bb48da885
She belongs to me	Bob Dylan	Bringing It All B...	Folk	22b72427876fba473570e1079e2a5377

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Simple Twist Of Fate	Bob Dylan	Blood On The Tracks	Folk	d3266ca04492026531ddcc9fd5a5e216
These Foolish Things	Benny Goodman	Benny Goodman	Jazz	a2bfd0898943e0023d32492ae6be74eb
Time After Time	Brian Nova	Shadow Of Your Smile	Jazz	5c672114ef76e92aa990a7867fd0a76e
Tombstone Blues	Bob Dylan	Highway 61 Revisited	Folk	9ef29e8d38d4d54eee3cfall1ead12850
Twenty Years	Bill Frisell with D...	Bill Frisell with...	Jazz	18cc8bea220b8260e6f7bd27460eb537
Verona	Bill Frisell	Gone, Just Like a...	Jazz	4bc872c50cde31dd2f90b25f4a3e9bde
Volare	Barney Kessel	The Poll Winners ...	Jazz	91c4524c35dca0893b111fb0ab245764
What Are You Doing ...	Barney Kessel	Solo	Jazz	c6b3836562cde9619cd935f65e6ab794
You Know You Wrong	Big Bad Voodoo Daddy	Save My Soul	Swing	fbab963a2e2ad6c7bbc617bf53db801c
Sic Transit Gloria...	Brand New	Deja Entendu	Punk	c13b0d274dcd77d6ebc0421076c34a35
(Intermission)	Bane	It All Comes Down...	Punk	55ca42b4bf4125707e0307bd6e1ec3df
A Break, A Pause	As Tall As Lions	As Tall As Lions	Indie	4bae03972d8173b5ba2625a5c1865fc2
Aint Love Grand	Atreyu	Suicide Notes and...	Metal	340f19b946306d17b075fb64ccfcb746
And the Wick Burnt ...	As Tall As Lions	Blood And Aphorisms	Indie	8ad8bb13d54d39856e1128839e1b799b
Tears For The Sheep	Atmosphere	Lucy Ford, The At...	Hip-Hop	7463405b5842a4beefee0d8dfa92b435
The Skinny	Atmosphere	When Life Gives Y...	Hip-Hop	990988ac6f20306e99f5389678237000
August	Avail	Over The James	Punk	d32c3bcf8a1276f29b6f642fe6e88640
Laredo	Band Of Horses	Infinite Arms	Indie	99644d04520b20871d370b6039a5e636
Bewilder	Badly Drawn Boy	The Hour Of Bewil...	Indie	6732556976b41cc5bbbef5b251966408
Bird Sings Why The ...	Atmosphere	Seven's Travels	Hip-Hop	cadffc5f20ac073187d39c169ecc5c0d

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Both Guns Blazing	Bane	Holding This Moment	Punk	10273ad1f06602358d7da06f38d5e2af
Can't Stop It	Bad Religion	The Process Of Be...	Punk	0491823dd23c83042447f8eb0c55d258
Carry Me Home	Atmosphere	Sad Clown Bad Spr...	Hip-Hop	3b6f56b929f9e9be5ec37deb34d154a
Cricified	Automatic 7	Automatic 7	Punk	51b6efecd60f280887d08a49c03c9dc2
Current Status	Atmosphere	Overcast!	Hip-Hop	d3aee9aa01de99949c191cc97cb30281
Empire Grade	Audiocrush	So You Call These...	Indie	7e9f4a08a85b678c41574280d0b68399
Give Me	Atmosphere	God Loves Ugly	Hip-Hop	e299516fb2c53f19e3def88bd848921e
How Much Is Enough	Bad Religion	Suffer	Punk	3adec87758303140197edbb801c8cd87
N30	Avail	One Wrench	Punk	eef95f8cc3a72147b49204c4b0ce54ad
No Direction	Bad Religion	Generator	Punk	809704371972eef1c69e1fbcfd0ad7bc
No One's Gonna Love...	Band of Horses	Cease to Begin	Indie	69284508dd1a1907ca27fff1cfb11ba
One Armed Scissor	At The Drive-In	Relationship Of C...	Punk	f3216f4bc20fc23f4c18715739696c17
Our Swords	Band Of Horses	Everything All Th...	Indie	9c09108527cccec090b10efe85321b1
Single	Bad Astronaut	Houston: We Have ...	Punk	c568800d5b68f589c80874e796d14c08
Snakes Among Us	Bane	Give Blood	Punk	fe3883dffee1c26a8a9683487c0cac6d
Sore Losers	Bigwig	An Invitation To ...	Punk	d0d74ab7101c0ac1c70145b06e7bcb5
Sound Of A Gun	Audioslave	Revelations	Alternative	a0d63db1321c530fc620ea3c2023c5d9
Stranger Than Fiction	Bad Religion	Stranger Than Fic...	Punk	35b69385db8216401a5a1b0658eeaa86
They All Get Mad At...	Atmosphere	Sad Clown Bad Win...	Hip-Hop	e6d608e7d90f42580dedf769dae583f6
Tortures Of The Damned	Bayside	Bayside	Punk	e77bb5c5238d9487ff8f4535329a8831

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Tuesday	Avail	4 AM Friday	Punk	9ccafc04fd05923dff55f6a9200ccdf1
Tuning	Avail	Dixie	Punk	40a8ded9df15e338cacd70ef57e987d7
Ursa Minor	At The Drive-In	VAYA	Punk	c868faa105e3ea9ee68f3f9d592e8c0e
RFTC	Atmosphere	Sad Clown Bad Sum...	Hip-Hop	ef85a6bc3ce70aad15ad197b2c832aa
Watch Out	Atmosphere	You Can't Imagine...	Hip-Hop	40383eb3d691c455d385b322a8220775
Became	Atmosphere	The Family Sign	Hip-Hop	092dafafee7fb65843c21ba2b503e14b
Just In Time	Barney Kessel	Let's Cook!	Jazz	0983f0f4f8033ca8b4d27391bd2955a1
My Reverie	Barney Kessel	Music To Listen To	Jazz	a070a0f7661ea0d0702a37746f3a4289
On a Slow Boat to C...	Barney Kessel	Kessel Plays Stan...	Jazz	17b1a076f1ce9a42123fd265f3b39cc1
Poor Butterfly	Barney Kessel	Poor Butterfly	Jazz	bc76e2768ba5787614aaf52c8f9c3083
The Little Rhumba	Barney Kessel	Poll Winners Three	Jazz	1a332e94c76633496a902e028203e852
You Can't Take It W...	As Tall As Lions	You Can't Take It...	Indie	381c8d428e603451499be4b75368fca1
Scalp	Atmosphere	To All My Friends...	Hip-Hop	d26b8dada3489fe6611536cb42934444
Antisocial	Anthrax	State Of Euphoria	Metal	446634261b64a37f11db266637e0d798
Bleed The Freak	Alice In Chains	Facelift	Alternative	39185a4d0ca09b460cedbb4a5930d73f
Continental	Alkaline Trio	Good Mourning	Punk	8c919d22f65886e986edd1bcb08c443a
Dead On The Floor	Alkaline Trio	This Addiction	Punk	0bbd692514093e4271a2e357b37210e0
Down In A Hole	Alice In Chains	Dirt	Alternative	634a0e5eb7094f852ed0bc46916cab0a
Efilmikufesin (N.F.L.)	Anthrax	Among The Living	Metal	add816c0c4aa06075d69aabeefceec6c2
F*** You Aurora	Alkaline Trio	Maybe I'll Catch ...	Punk	975a6b89f562d7ff0e0bae78c88ceb98

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Funnels	Allan Holdsworth	All Night Wrong	Jazz	c5fd8bafac24522d6992ab13796acb6
Heaven Beside You	Alice In Chains	Alice In Chains	Alternative	3092cdfb02e0eafc081afe538febccdc
I Lied My Face Off	Alkaline Trio	Alkaline Trio	Punk	e78883f7cb4ee257419e86ebcafeba6d
Mercy Me	Alkaline Trio	Crimson	Punk	bd06f6ba5fbac6e8fa66c86f853c7483
No Excuses	Alice In Chains	Jar Of Flies	Alternative	596ecc48411f820a65b9dbb3ed7cea1b
Nose Over Tail	Alkaline Trio	Goddamnit	Punk	223f35478dc7674dc8b401af5e847c84
Sludge Factory	Alice In Chains	MTV Unplugged	Alternative	8ec0a73f3122c4a52eaf82cce7a0256b
Stamina	All Else Fails	The Chase Of Gain	Punk	01cb3a21ac4a211bdf5839d2e480a225
Stupid Kid	Alkaline Trio	From Here to Inf...	Punk	20d356a4a20f9d7713acc8dc61fd8536
The Carousel	As Tall As Lions	Lafcadio	Indie	2e8a24929fcd2647c04d976e17e7c15d
Tokyo Dream	Allan Holdsworth	Road Games	Jazz	f78ba49afb41d3ef5d6039e15f6a3fe1
Tuning	Avail	Live at the Botto...	Punk	48f029b7efdc34fa94fa25b4943a798a
Capacity To Change	Catherine Wheel	Judy Staring At t...	Alternative	667d70b9413beef787667898dc87ec0a
Every Thug Needs A ...	Alkaline Trio	Damnesia	Punk	680ede279047d4a5e407f9f3f0f89cb2
Over And Out	Alkaline Trio	Agony And Irony	Punk	31af053af909a5edb5d2f8f526a25b7e
Stop!	Against Me!	New Wave	Punk	17c3ebc0e889d205ca22aa94d35e5e03
Both Feet In	Alex Skolnick Trio	Transformation	Jazz	5c9adb4da2487d302fba11b3da4e5531
Chemical Party	Gavin DeGraw	Chariot	Pop Rock	577da2e958ac0f2f84990a0b18bc2a3a
Destroy What Destro...	Against All Authority	Destroy What Dest...	Punk	7d9f9549c6e6775643fd1329987420e35
Letter from India	Al Di Meola, Paco D...	The Guitar Trio	Jazz	12b3abece0f2c6f7e8a90ea349140596

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Moving Molecules	Against Tomorrow's Sky	The Lost Tapes	Indie	14337afefd7dfbab996f6d4bab3608d3
Perfection	All	Mass Nerder	Punk	5cc39c4f4afce0fdeled852457a2094213
Slurring the Rhythms	Against Me!	As The Eternal Co...	Punk	d769a05bc7a39725429ce164940f61ad
Taking Notes	Against Tomorrow's Sky	Jump The Hedges F...	Indie	07610b2e546c0fc622af433b772104c
From Her Lips To Go...	Against Me!	Searching for a F...	Punk	b9337595041c084c2feba7a8b7d04964
Scream It Until You...	Against Me!	Reinventing Axl Rose	Punk	67c4658eaec4fd1721a5569c8f8fd17a92
Girl's Not Grey	AFI	Sing The Sorrow	Punk	7dbc6f9f51f4b660795dc06b07fd71f7
Stand In Line	Against All Authority	All Fall Down	Punk	1def858db1301b15e9377a8a5d8e9a2b
The Checkered Demon	AFI	Answer That And S...	Punk	82eb7ae9f17bcbf14f3c2366a32e04c2
The Rip	A Wilhelm Scream	Mute Print	Punk	9864e41a64eea592a025a12cc5db9f21
Me Vs. Morrissey In...	A Wilhelm Scream	Ruiner	Punk	b3c059adc3fc5163a0e821c3bafdbc2a
My Little World	88 Fingers Louie	Behind Bars	Punk	0ec2c6fbd488058125a064564927f280
The Prayer Position	AFI	Black Sails In Th...	Punk	a08464d82d1c04bb86a430668b59e121
Theory Of Revolution	AFI	Very Proud Of Ya	Punk	3aa7dd13069847c3b312faea3606bc84
Sleeping Beauty	A Perfect Circle	Mer de Noms	Metal	a1ac9410542acfe936cce30a8797c70e
Get Mad, You Son of...	A Wilhelm Scream	Career Suicide	Punk	9d3991537c13d7456c088727dad9be88
The Crew	7 Seconds	The Crew	Punk	379e2be9c252608a31b083004b98600a
Relative Ways	...And You Will Kno...	Source Tags & Codes	Indie	be03b3d8f360fa3fae53a1137394658e
Your spirit's alive	Dropkick Murphys	The Warrior's Code	Punk	bdc7f9fe909c7419454e2f1cf6e9d195
Ice Machine	Depeche Mode	Speak & Spell	New Wave	91bb30ca028456cafa4e56aebc9494c4

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
If You Want (Live i...	Depeche Mode	Some Great Reward	New Wave	3a3625f614956af704f4a4c1fla8d7a5
My Secret Garden (L...	Depeche Mode	A Broken Frame	New Wave	0d27382498312ae85aad5778407e88b
Something to Do	Depeche Mode	Some Great Reward	New Wave	f84f7cb12e0768eea752b2f1250544c5
The Great Outdoors!	Depeche Mode	Construction Time...	New Wave	1595849c9364efb974765af4ed25d311
Walk Away	Dropkick Murphys	Blackout	Punk	a5ac7bfd44ccc7a0b8f560a7e15aa963
Scottish Winds	Frightened Rabbit	A Frightened Rabb...	Indie	b98c36369867abe3a05627ef55224f91
We're Breaking Up	Against Me!	White Crosses	Punk	3934def3e5fb05d35e4ae581358dec74
Lifeline (Live)	Catherine Wheel	Wishville (Bonus ...	Alternative	c28214a2cb48a33baf8ca1c1419816f6
Delicious (Live)	Catherine Wheel	Ma Solituda [Disc 2]	Alternative	ad65ccdd3affc7a5b8a6d27a96e5633e
20th Century Towers	Death Cab for Cutie	The Stability EP	Indie	886f0d39e75b3334200c2e3ed867ff3f
Makes the Sun Come Out	Atmosphere	Sad Clown Bad Fal...	Hip-Hop	d972cd8fc95a917d13ab0f85086c1e47
Full Moon	Atmosphere	Strictly Leakage	Hip-Hop	96ca9225f699c20bfbce53cba562fcee
The Ropes	Atmosphere	Leak At Will	Hip-Hop	b1b9bf2c3b10d228d4ee9b7d536496c3
Jude Law And A Seme...	Brand New	Your Favorite Wea...	Punk	85bb505acf410c47994d43c433bf0fab
By My Side	Copeland	Eat, Sleep, Repeat	Indie	ffb0157ab1af84bd09d346f1422ef3da
Marching Bands of M...	Death Cab for Cutie	Plans	Indie	9d05518bd5418826eb3e27de3f5b1b62
World In My Eyes	Depeche Mode	Violator	New Wave	2cc56cfceb0da75477eee1ebf7639d9a
I Don't Think	Dinosaur Jr	Hand It Over	Alternative	800e53e102c5dd1c5c5421b55047eaf9
Even You	Dinosaur Jr	Without a Sound	Alternative	9f2d333976dec167d6fld7ffbae43c68
Out There	Dinosaur Jr.	Where You Been	Alternative	cd648723346a4e08330b26bf1744ea81

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Day One	Explosions In The Sky	Travels In Consta...	Indie	dbe72d22ac53d00d587e76dd4b0487c6
Hidden Track	Brand New	The Devil And God...	Punk	eb2445491602c045a5a9688f945a5929
Beetlebum	Blur	Blur	Alternative	fac5ca2618f4c77609c927c07e6f434f
Love Sick	Bob Dylan	Time Out Of Mind	Folk	55e08bade8946059d8c2b9ef0a494060
Bored To Tears	Black Label Society	Sonic Brew	Metal	9c9a648843bf6b0eaa b4313548ba72c2
Angel Falls	Braid	Frankie Welfare B...	Indie	5ebd9e336b72db92f92813160a91d89e
Elephant	Braid	Movie Music vol. Two	Indie	9f236988233f044f601277bf342d4b45
Burned	Better Than Ezra	Before The Robots	Alternative	1c2c018a01b878736400b889d337ba9a
Carolina Blues	Blues Traveler	Straight on Till ...	Alternative	a42ffaeab9a4e8a1c7ff12a70caac5a1
Crazy Or High	Black Label Society	Hangover Music Vo...	Metal	904b00fbef6f2a1ebc9c8793b105ebf78
Disfarmer Theme	Bill Frisell	Disfarmer (Standard)	Jazz	d0851e198cf58a6e42f285feb55ebcf4
Doll	Foo Fighters	Colour & The Shape	Alternative	beafaa7cce81925c04583a09c2a0e057
drugs and alcohol (...)	Brian Setzer	13	Rockabilly	254eed1fa2e07e42dc840d4ad5d0aedb
Everything Zen	Bush	Sixteen Stone	Alternative	1db566692ab782878a6f8b436ba930fa
Fire It Up	Black Label Society	Mafia	Metal	3032f95b41bf245a3b62bfc66f828161
God Inside My Head	Catherine Wheel	Happy Days	Alternative	c78a496a20276e6cd01862fa3b4ffbd5
In The Blood	Better Than Ezra	Deluxe	Alternative	2e49c981220459333b6faac4b4ac32e7
Intro	Catherine Wheel	Adam And Eve - Me...	Alternative	90105b95c41e567d3cef29732b13f480
It's A Long Story	Bill Frisell and 85...	Sign Of Life	Jazz	6b497b483db4e8cbaf23fd52e3db96cf
Jingle Bells	Bing Crosby Frank ...	Christmas	Jazz	84d1122713ac248bdd440aefa8b027ac



Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Kill Rhythm	Catherine Wheel	Chrome	Alternative	01eb135a36b5bda25ea6443dd8c4847a
King Of New Orleans	Better Than Ezra	Friction, Baby	Alternative	2d85132134f10dc4a2efd7dbd88ea223
Narcolepsy	Ben Folds Five	The Unauthorized ...	Indie	fab8789e67f023e8fd71a696c2049d56
Old Lady	Bigwig	Un-Merry Melodies	Punk	c6cf7c70dc137c7094f6e73c92101fdd
One Angry Dwarf And...	Ben Folds Five	Whatever And Ever...	Indie	2b1da5185c7c7fe70d4c4be16e62e0f6
Rhymn & Stealin	Beastie Boys	Licensed To Ill	Hip-Hop	021216c96669c0cb818865f9a6108962
Run-Around	Blues Traveler	Four	Alternative	d267fd3e6a876a756bae3522ef2954f4
Savage	Cacophony	Speed Metal Symphony	Metal	91caa9608f21444378cd133222abd8692
Sounds Like Violence	Braid	Movie Music Vol. One	Indie	22a9095edb9986657f0029d4adc9bc9b
Stereotypes	Blur	The Great Escape	Alternative	3f0e1029f693d9601754afe19d978685
Still	Bigwig	Stay Asleep	Punk	888484c9cb973c587ebe69206f60a1d8
Sure Shot	Beastie Boys	Ill Communication	Hip-Hop	bc2760f6aa1a6a5e188453a011758524
Tell Me	Boston	Greatest Hits	Rock	26e16008421974c29d01ca263b86f1de
Texture	Catherine Wheel	Ferment	Alternative	6e0a8e58514c89edae9df415e7c2c79e
Trina Magna	Blues Traveler	Save His Soul	Alternative	55bd0f040b5ae4f079e68e8096e56462
Vices	Brand New	Daisy	Punk	2bdb917e89f4bc15d4b37e6d7b3c872a
Autobiography	Braid	Lucky To Be Alive	Indie	0a87bc5863a3964c56855c217cd674de
Blowin' In The Wind	Bob Dylan	The Freewheelin' ...	Folk	8bfa9fe28150e81883b1a7675d5a60f1
Broken Nose (Live Xfm)	Catherine Wheel	Broken Nose [Disc 2]	Alternative	9c9d5347a003e43c79c92be48171195a
Broken Nose (Single...	Catherine Wheel	Broken Nose [Disc 1]	Alternative	e8f6160bf992cc3ea2456a2c75dcfd69

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Crank	Catherine Wheel	Crank	Alternative	6d97a63e6a61cc9b8ee0bcc0e9871b0b
Heal 2	Catherine Wheel	Like Cats And Dogs	Alternative	a5101389f42d0b3e548db53d6e5bd840
I Want To Touch You	Catherine Wheel	I Want To Touch You	Alternative	c945ecdefa8dd72248c90792754dcab1
Judy Staring At The...	Catherine Wheel	Judy Staring At T...	Alternative	51e0e2af2ae399d043d2f5bc567ab157
Ma Solituda	Catherine Wheel	Ma Solituda [Disc 1]	Alternative	e869f9b2ed164758777eaa823c3826c1
My Baby Smokes	Braid	The Age of Octeen	Indie	981113f6bce1a0ee5fe706569f90e52e
The Boy Who Blocked...	Brand New	The Holiday EP	Punk	003f7b27ab972166f3164747d9faa9db
The New Nathan Detr...	Braid	Frame & Canvas	Indie	560a7dfac44589265261982d4d3e4ea7
All I Really Want t...	Bob Dylan	Another Side of B...	Folk	a5dc53a7df87ed122b1a49e82b37cee4
Be Deedle De Do	Barney Kessel	The Poll Winners ...	Jazz	b601c4f90d94262b978b87ae3c4f0c58
Begin the Blues	Barney Kessel	To Swing or Not t...	Jazz	f098eaf10ca0d6142d1cc9053cb29d0f
Big And Bad	Big Bad Voodoo Daddy	This Beautiful Life	Swing	2d1ceaa809d3969c4938550342e58e68
Come On With The "c...	Big Bad Voodoo Daddy	How Big Can You Get	Swing	4194ef67dab865407f6ad92cfc8a6784
Blues for Los Angeles	Bill Frisell	Gone, Just Like a...	Jazz	e7d8065f07bc6a4ef53e2c7465ec293d
Girls & Boys	Blur	Parklife	Alternative	3e4b2cceed1cf6ce2c16afeaa78c83cd
The Right Time	Braid	Closer To Closed	Indie	8e28ca263790b965428cd59362bf00eb
Brazil	Barney Kessel	Solo	Jazz	d36de4eb6e90b7c8245f85fc812e0238
Girl From The North...	Bob Dylan	Nashville Skyline	Folk	88a53710e1e8db6c9929817fb1c5e0b7
Hurricane	Bob Dylan	Desire	Folk	bbba56226bd4c7083126f5be0640aaff
Jordu	Barney Kessel	The Poll Winners	Jazz	550e8ea3c3ce4fa23e2930b0c5ecb4cb

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Let's Dance	Benny Goodman	Benny Goodman	Jazz	cb48b927b58661b28192d2f3ffb00f0c
Like A Rolling Stone	Bob Dylan	Highway 61 Revisited	Folk	9b38e11212b5df8095691b22c52bc9a4
Outlaws	Bill Frisell with D...	Bill Frisell with...	Jazz	c07ef027168bd5fc42275de3c883851
Rainy Day Women 12 ...	Bob Dylan	Blonde on Blonde	Folk	bea2ad16e235904abd835afae6bbcdf1
Subterranean homesi...	Bob Dylan	Bringing It All B...	Folk	d9d9f71c93b23fb242b169279ce5b557
Tangled Up In Blue	Bob Dylan	Blood On The Tracks	Folk	1e9f981e033ca604705863e4eafc41f9
The Boogie Bumper	Big Bad Voodoo Daddy	Big Bad Voodoo Daddy	Swing	f381b78177016f7b01b49393422b bf45
The Shadow Of Your ...	Brian Nova	Shadow Of Your Smile	Jazz	9e0c2f96bd5d69f4fa7a581ac42f81b9
The Times They Are ...	Bob Dylan	The Times They Ar...	Folk	19bcl1a4aeb2d572b5924cd0efb8a6df3
What A Little Moonl...	Billie Holiday	Billie's Best	Jazz	553a5e6e98fb86e849b7ce7c3d61ebcc
Zig Zaggy Woop Wo...	Big Bad Voodoo Daddy	Save My Soul	Swing	52c3ac398adef617139b99a338a73eb9
Tautou	Brand New	Deja Entendu	Punk	441ec43b52888c526c2b037a5ce9db88
1000 More Fools	Bad Religion	Suffer	Punk	0bc21a4ee8d83af132b223be094d2170
66th Street	Atmosphere	Sad Clown Bad Win...	Hip-Hop	84e305c072b049690cd548048f8ca361
Like Today	Atmosphere	Lucy Ford, The At...	Hip-Hop	d436b127d433d9d37c6a3124a03f9345
Puppets	Atmosphere	When Life Gives Y...	Hip-Hop	1373cde6baae9c371f890c02a0551df0
Compliments	Band Of Horses	Infinite Arms	Indie	216dd2eb1636ff3924554e773b2ec9f4
Brief Description	Atmosphere	Overcast!	Hip-Hop	c3d9542b89a73f645204dd5061d6d3a0
Clear Cutting	Bad Astronaut	Houston: We Have ...	Punk	22bb4ed61de116d31c4f6544ed965728
Clone	Avail	Dixie	Punk	b9f28b357b5fdcf1816655ff2b6c89ad

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Count Me Out	Bane	Holding This Moment	Punk	b3f89de5482e0520a8df561f29182951
Dancing in the Rear...	As Tall As Lions	Blood And Aphorisms	Indie	bc294c9e12743fc03aa7aeb81c35855e
Devotion & Desire	Bayside	Bayside	Punk	f7e13b88acc62bc3c18227e2bc1e8501
Dilated	Atreyu	Suicide Notes and...	Metal	840b589669dec3869ebd79c7b8d65fdb
Everybody's Stalking	Badly Drawn Boy	The Hour Of Bewil...	Indie	78b090e3c95eca34022bed39b8544459
Good Daddy	Atmosphere	Sad Clown Bad Spr...	Hip-Hop	432e3df72da43853875a96cf35e8cef1
In Here	Audiocrush	So You Call These...	Indie	b6fb017d9500c9175ba9add98c83f476
Leave Mine To Me	Bad Religion	Stranger Than Fic...	Punk	446cac33288717ab43d4e78a99925c51
Lucky One	Automatic 7	Automatic 7	Punk	04f2b2a28d5f9466b911c811402a4ba5
New 2	Avail	Over The James	Punk	e94b6918cb41d5301dea151e74b8155c
Ode to LRC	Band of Horses	Cease to Begin	Indie	819aa4e0b6e17a2a89ede2f311facb37
One And The Same	Audioslave	Revelations	Alternative	ece47c16b22b11d2108728237a5a7cf7
Order	Avail	4 AM Friday	Punk	c331947c0a20c5360bbd2d52e7f68162
Pattern AgainstUSer	At The Drive-In	Relationship Of C...	Punk	c1fdaa984f42e937b3b4a797781d958
Prove It	Bad Religion	The Process Of Be...	Punk	1fldbfb85ecb964c3d3175521bbef40
Proxima Centauri	At The Drive-In	VAYA	Punk	b67fcf3d0e85a8df4a0b7506bc18bd79
Sink Or Swim	Bigwig	An Invitation To ...	Punk	507314ec50b048db7ac8396bdfbba684
Some Came Running	Bane	Give Blood	Punk	9d52079fedca997663b2d191d4b2ca4e
Song for Luna	As Tall As Lions	As Tall As Lions	Indie	2f96fee705d1e15f4c3247f07f54b9f4
Stride	Avail	Live at the Botto...	Punk	cd4368eb7afb54d54adf6222c0782002

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Struck Down By Me	Bane	It All Comes Down...	Punk	fb102897b71404b8ca8df29b6b7a7643
Taken	Avail	One Wrench	Punk	33c44924f4a199757dfc8f6795194a6d
The Bass And The Mo...	Atmosphere	God Loves Ugly	Hip-Hop	4ec82a8bed38c62ca59313a1d53fd005
Too Much To Ask	Bad Religion	Generator	Punk	9be103c5ac641557a5b8e185ecca788b
Trying To Find A Ba...	Atmosphere	Seven's Travels	Hip-Hop	380cda82743629dfdb72905665ef50b5
Wicked Gil	Band Of Horses	Everything All Th...	Indie	020b27809b4ab87ea22ee50759568a9f
Dead Girlfriend	Catherine Wheel	I Want to Touch Y...	Alternative	e4fa54b58c7a3238563b5b220e5f50b
Panic Attack	Atmosphere	You Can't Imagine...	Hip-Hop	0f5b379ba96993ef69adbfe592f14f29
The Number One	Atmosphere	Sad Clown Bad Sum...	Hip-Hop	5f9854426ec0c2399340a9ab74783f33
The Last To Say	Atmosphere	The Family Sign	Hip-Hop	7cefeca0e2f73d8e5a17df1d12fc3152
Crisis	Barney Kessel	Poll Winners Three	Jazz	865e80f2a4239fbb43f18cf392fb5ca4
Love is Here to Stay	Barney Kessel	Kessel Plays Stan...	Jazz	8b901eda9ada1dc6b7c7c9a8c36a4c18
Makin' Whoopee	Barney Kessel	Music To Listen To	Jazz	40e954e0bfdce9b51120a8e302daf00
Monsieur Armand	Barney Kessel	Poor Butterfly	Jazz	ec117afa8aff2963ee744484b039adf8
Sixes & Sevens	As Tall As Lions	You Can't Take It...	Indie	a363e431590fd873b859876a56fd8387
Time Remembered	Barney Kessel	Let's Cook!	Jazz	12be2ea42d93ac94f0565c4caa02f9b8
The Major Leagues	Atmosphere	To All My Friends...	Hip-Hop	2ff279a832be106af8ced5b712668276
Alphrazallan	Allan Holdsworth	All Night Wrong	Jazz	722eb5abb14d02c1842010d8219b36da
Bleeder	Alkaline Trio	Alkaline Trio	Punk	1d29b345b7ec14a82be0ebaddb1df58b
Burn	Alkaline Trio	Crimson	Punk	cfcfc4c96782c74ccbba01aba7ad19bc9

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
I Am The Law	Anthrax	Among The Living	Metal	fce2f471bb3123ffc214c08f5d20f17d
I Stay Away	Alice In Chains	Jar Of Flies	Alternative	ab266fe1c278e850707c755ecf2b3dff
Lead Poisoning	Alkaline Trio	This Addiction	Punk	719ac23ffb162b6fc111501cb85bcaaa
Make Me Laugh	Anthrax	State Of Euphoria	Metal	0afac457b2797c1609e6c50ee0d54510
No Excuses	Alice In Chains	MTV Unplugged	Alternative	20781943b6289b0f598ce2613d49c426
One Hundred Stories	Alkaline Trio	Good Mourning	Punk	5ba8d67666f6572613577d5a5582a997
Rain When I Die	Alice In Chains	Dirt	Alternative	94918f3b6434b2c9f17b9239c31b5f63
San Francisco	Alkaline Trio	Goddamnit	Punk	baaf731a8d4314eb28fb9c15e3ec44b9
Sea Of Sorrow	Alice In Chains	Facelift	Alternative	c3b64cc4e092e2d7292af903c3b67001
Silhouettes Silhoue...	As Tall As Lions	Lafecadio	Indie	305f96412d2fed1c8f4408cac145a9d6
Sludge Factory	Alice In Chains	Alice In Chains	Alternative	fe1603c1535edf112ecd470c4dc9df6f
Take Lots With Alcohol	Alkaline Trio	From Here to Inf...	Punk	827d6a24b7066ae8706f3fd032a9cff0
Water on the Brain,...	Allan Holdsworth	Road Games	Jazz	dd9c8fe67b65034b6bf2c882597c1536
Windfall	All Else Fails	The Chase Of Gain	Punk	dcfc2701ba5399f393d795f147e051a2
You've Got So Far T...	Alkaline Trio	Maybe I'll Catch ...	Punk	30a58a0ab3d9050504fa6c020352d2bb
Glitter	Catherine Wheel	Judy Staring At T...	Alternative	20812f95c5841d3b9db232bb8ed3d62
Rooftops	Alkaline Trio	Alkaline Trio, Ho...	Punk	79a0b3c1f1fba642c1ccdffb813a682d6
This Could Be Love	Alkaline Trio	Damnesia	Punk	c8a624559ccc447ccfd06310d6b6506
In Vein	Alkaline Trio	Agony And Irony	Punk	6968b5067f4bc6113125fc6892d16a9f
White People For Peace	Against Me!	New Wave	Punk	b23dc3dcdce5572f0561ccffa4814a734

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Candy In My Cavity	Against Tomorrow's Sky	The Lost Tapes	Indie	fae6e8dde7caal35865eaaccd429e603
Fairweather Friend	All	Mass Nerder	Punk	523ffad9536efa23c9eca173aa245427
Freedom	Against All Authority	Destroy What Dest...	Punk	377d5713c0607128379479de31bd6b1c
Manha De Carnaval	Al Di Meola, Paco D...	The Guitar Trio	Jazz	2fdb6d4a3b2f7a025fc48f01278a7632
Money	Alex Skolnick Trio	Transformation	Jazz	b4892fb835bc2c6483832b3d9eb78d4b
Pen	Against Tomorrow's Sky	Jump The Hedges F...	Indie	d5b3ef9065a0eb20363ce600dbc56073
Sink Florida Sink	Against Me!	As The Eternal Co...	Punk	5f99b415641b76b563165fa4b515db4d
I Still Love You Julie	Against Me!	Reinventing Axl Rose	Punk	1f9ed4cd9a32255049eecb93b71e0ca0
Unprotected Sex Wit...	Against Me!	Searching for a F...	Punk	100d3d56ad3017d041db85336dffbb3c
At Out Expense	Against All Authority	All Fall Down	Punk	677b428172cc1d257992b7d402f431a0
Brand New Me, Same ...	A Wilhelm Scream	Mute Print	Punk	12095affbbde72d74271dbe22a71c2153
Brownie Bottom Sundae	AFI	Answer That And S...	Punk	224243fb93cbe83328619a244a8306a3
Dancing Through Sunday	AFI	Sing The Sorrow	Punk	91a3ff935795894fc415139645914a83
Advances In Modern ...	AFI	Very Proud Of Ya	Punk	5d983603ab038b067dbeb4135e187c79
Clove Smoke Catharsis	AFI	Black Sails In Th...	Punk	5fed7b77d4ad7cf49cbdd1dde7cbbd55
Holding Back	88 Fingers Louie	Behind Bars	Punk	cda74f4b621c493db305636abc9be541
In Vino Veritas II	A Wilhelm Scream	Ruiner	Punk	3d1d1969ff084f7929a0f006b98d556b
3 Libras	A Perfect Circle	Mer de Noms	Metal	00fb93acb387c193f7412de88fdeada
Your Love	A Wilhelm Scream	A Wilhelm Scream	Punk	5a8flec97d36011897a664b79bf927be
These Dead Streets	A Wilhelm Scream	Career Suicide	Punk	451b630010a23d50ae6934fe341d8e8e

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
What If There's a W...	7 Seconds	The Crew	Punk	b60151efecf14d68208747c64a994e93
Days Of Being Wild	...And You Will Kno...	Source Tags & Codes	Indie	2798d33a7a45d1aff423eda55d5ffe27
Black Metallic (Pee...	Catherine Wheel	Crank (12")	Alternative	655c16fe433ffc9e34c0de429fc8949d
Come Back Again	Catherine Wheel	Crank (Cassette)	Alternative	1cf37c8774a3256beef6bc7a18ef98c2
Suffocation	Against Me!	White Crosses	Punk	dcb490cc29c3cf0aef1d89fa8a787c9c8
What is This Thing ...	Charlie Parker	Yardbird Suite Di...	Jazz	aa30fc140f07da45997adb0d9c6fd0a4
Party Over Here	Atmosphere	Sad Clown Bad Fal...	Hip-Hop	75b2886fe2690433a9089ec651838399
Ma Solituda (Tim Fr...	Catherine Wheel	Ma Solituda [Disc 2]	Alternative	9001e0f8a0ed40fe95fbc478b768144d
Little Math You	Atmosphere	Strictly Leakage	Hip-Hop	29d51b8e104e8dddec58e61b31493f5b5
They Always Know	Atmosphere	Leak At Will	Hip-Hop	e08ccd9389a9bb63651e3182184a4585
The Shower Scene	Brand New	Your Favorite Wea...	Punk	014c3f25799fd3c462ecfa5f310d672b
Don't Want to Know ...	Catherine Wheel	30th Century Man ...	Alternative	532ce1aa28b5b81bb5405cc15c0b270e
1597	Atmosphere	Overcast!	Hip-Hop	dbd0789afa80b09c3ca95b9f925aa9d9
A Song For The Opti...	Atreyu	Suicide Notes and...	Metal	b61d01a0fe83393bee1b82e851afdbaa
Arcarsenal	At The Drive-In	Relationship Of C...	Punk	160392d90d6944e6d71ed362e3a733cd
Between The Lines	Atmosphere	Lucy Ford, The At...	Hip-Hop	60f04cd9171d8083b1988841dd02d46d
Like The Rest Of Us	Atmosphere	When Life Gives Y...	Hip-Hop	15f903b3b29bd729adef85ff14de70b9
Autumn Leaves	Audiocrush	So You Call These...	Indie	981197fcf544b0943f83e410c4207e34
Factory	Band Of Horses	Infinite Arms	Indie	47c1aa01bb6a5fd51ef4d7f3d2d1d56c
Break Blossom	As Tall As Lions	Blood And Aphorisms	Indie	46e311e9657898aa897fe82bad5474ad



Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Bury Me	Automatic 7	Automatic 7	Punk	9e8d2cc1071ee5939cb4b837ebf3603b
Deepwood	Avail	Over The James	Punk	17411b20cd5b7cc52ee7ba071ffc91b
Don't Stop	Atmosphere	Sad Clown Bad Win...	Hip-Hop	cfb2165523e45e8140e4676e0a3346ea
"Fast One"	Avail	One Wrench	Punk	4c4a4a913773d2919fff25ec05ab7546
F*** What You Heard	Bane	It All Comes Down...	Punk	a04a9494badf8d813c58be5d0f91f91b
Generator	Bad Religion	Generator	Punk	d7ce2f6dd3ebef38a40a32699fef0629
Hello S***ty	Bayside	Bayside	Punk	44b8e6a032277e20f403767b78e63d1f
History	Atmosphere	Seven's Travels	Hip-Hop	0678958fcadaaac35de7e37ad83bf2c96
In Pieces	Bane	Holding This Moment	Punk	a7d9cbc8b6f053faa812c450465058d6
Incomplete	Bad Religion	Stranger Than Fic...	Punk	fa4793b69da4c818d81647b62837e03f
Is There a Ghost	Band of Horses	Cease to Begin	Indie	10cc1a79c66783dca59e7edf8a1c6b53
Less One	Atmosphere	Sad Clown Bad Spr...	Hip-Hop	62e3bfca01075b684222c69184cde6c
On The Nod	Avail	Dixie	Punk	cda63ccbcf499288810a53c8741f3b16
Onemosphere	Atmosphere	God Loves Ugly	Hip-Hop	f1b201e6d4dd27943b42e3b9462b7d07
Rascuache	At The Drive-In	VAYA	Punk	a66d7d10b54f6efc995716b04ac960c
Revelations	Audioslave	Revelations	Alternative	d12eea2d15fc666033099d874b086326
Simple Song	Avail	4 AM Friday	Punk	3ca9e34877c2e16759e52a5aa1a5cb17
South Bound 95	Avail	Live at the Botto...	Punk	caf18aeb33a2b0b4e76acef97df9add4
Speechless	Bane	Give Blood	Punk	373d2509025db1ee3fafc007b1e2671b
Stab City	As Tall As Lions	As Tall As Lions	Indie	df17da444b6aab6cc7173704baf43872

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Supersonic	Bad Religion	The Process Of Be...	Punk	ef66827396da576f19f2d823e257f59f
The First Song	Band Of Horses	Everything All Th...	Indie	b88f02f59efdf312f0e7be6856bbe658
The Shining	Badly Drawn Boy	The Hour Of Bewil...	Indie	ed17ed7e9388680c83064126ecb47a43
These Days	Bad Astronaut	Houston: We Have ...	Punk	d4bb3b853b8145699571e456d0b51d7d
You Are (The Govern...	Bad Religion	Suffer	Punk	8d46566665324a1d7916044376fbbaa5
Sunshine	Atmosphere	Sad Clown Bad Sum...	Hip-Hop	99e08bd68fe8fc6571ba35f308fcc056
The Arrival	Atmosphere	You Can't Imagine...	Hip-Hop	deec69e23211e91e2d3a8a5234aa5a1e
My Key	Atmosphere	The Family Sign	Hip-Hop	4dd3c88f087b47338ccf750c327568e8
Cheerful Little Earful	Barney Kessel	Music To Listen To	Jazz	076f5d0ed0473834ac93bb912a2e5bc4
Circles	As Tall As Lions	You Can't Take It...	Indie	a42bd09b8a59074ffccd264fb334f76f
Dearly Beloved	Barney Kessel	Poor Butterfly	Jazz	eded0e6f16f57019b79c2a90cb18c853
Let's Cook!	Barney Kessel	Let's Cook!	Jazz	69b18e7102787eef6d8f56338008bb79
Soft Winds	Barney Kessel	Poll Winners Three	Jazz	cf6d6873b55fd409a80f7caa7850f6c57
Speak Low	Barney Kessel	Kessel Plays Stan...	Jazz	21d98bf643cf5ca91e27c808c939fef2
Until The Nipples Gone	Atmosphere	To All My Friends...	Hip-Hop	0d25724f531bbba15b4bc2c7587b4f5e
96 Heartbeats	As Tall As Lions	Lafcadio	Indie	2fc77b7ae2a81cf04c73140d8c2fb8af
Anthem	All Else Fails	The Chase Of Gain	Punk	dea6064e0c225e759a5f31cfdb78a2b7
Brother	Alice In Chains	MTV Unplugged	Alternative	a4c5c2081fc0fb48e6e669b16b289acf
Brush Away	Alice In Chains	Alice In Chains	Alternative	4636a3bd01b7fe8dfa0a9e421a981d6b
Caught In A Mosh	Anthrax	Among The Living	Metal	52ac3b75bea43dc92ebb4b61e3a2ca0d

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Cop	Alkaline Trio	Goddamnit	Punk	297c7a70182f76df112fcf54a3a46f28
Dam That River	Alice In Chains	Dirt	Alternative	d07bb2104bae9a0842793fe376475623
Dine, Dine My Darling	Alkaline Trio	This Addiction	Punk	9e625766ce14918a97bc968f0ea97c64
I'll Get There	All	Mass Nerder	Punk	58267e2f9bf2cbf5b395869eeaff4e63
Madam Me	Alkaline Trio	Maybe I'll Catch ...	Punk	d272554ef8aadb7f89d5d3065b6ca4c
Man In The Box	Alice In Chains	Facelift	Alternative	1be84cd21857fbeeccfb31ddae762b6
Mr. Chainsaw	Alkaline Trio	From Here to Infi...	Punk	fbdl1a7892a2624a56ed260ec6662c821
Nutshell	Alice In Chains	Jar Of Flies	Alternative	5156fc167c50301b2a72f4ff96014c53
Out Of Sight, Out O...	Anthrax	State Of Euphoria	Metal	520a24f829bd3ccd27a1afe144bce833
Road Games	Allan Holdsworth	Road Games	Jazz	6724cb8fb0a33b8e68ac1de0f9418ce2
The Poison	Alkaline Trio	Crimson	Punk	3b988c354ea505c863d6f1b3bd45b2df
The Things You see	Allan Holdsworth	All Night Wrong	Jazz	2ac2594a3429a065fda2b642acc5f380
This Is Getting Ove...	Alkaline Trio	Alkaline Trio	Punk	2700ba179b309fe1e2ba94cfbe44b45d
We've Had Enough	Alkaline Trio	Good Mourning	Punk	9dbf63c2d4d253b7b3f2fa86757c9b1bb
Nose Over Tail	Alkaline Trio	Damnesia	Punk	ea fb4e7d24f4ff1bdc b652fb0d859d44
While You're Waiting	Alkaline Trio	Alkaline Trio, Ho...	Punk	cc52e82a4631b58154e8858d9125e329
Help Me	Alkaline Trio	Agony And Irony	Punk	7edae048961160628051411ff905b8f3
Thrash Unreal	Against Me!	New Wave	Punk	6a7a523876a194fb27e42d9b7e6f6c90
Blind Folds and Pad...	Against Tomorrow's Sky	The Lost Tapes	Indie	8aecabb9e0faace1e60817557401d0d0
Conditioning	Against All Authority	Destroy What Dest...	Punk	29bc07ae80e3c1d6e2c6840efc879774

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Fear Of Flying	Alex Skolnick Trio	Transformation	Jazz	5e11e9d4c1acd6e7b8aec596c7cd13d6
Midsummer Night	Al Di Meola, Paco D...	The Guitar Trio	Jazz	2f5ff4a0f4f060ae979b50f8044cf8e3
Mutiny on the Elecr...	Against Me!	As The Eternal Co...	Punk	cebb9d7165b70fa9d2b4c6a3bd21ed82
Poison Tester	Against Tomorrow's Sky	Jump The Hedges F...	Indie	3529f229c4a62f8ee11e66dc9c116301
Justin	Against Me!	Searching for a F...	Punk	363ac423efe72af8c2737233eaf36883
We Laugh at Danger ...	Against Me!	Reinventing Axl Rose	Punk	56ef99a3be326b78e0ab82a96d49c133
I Wanna Get A Mohaw...	AFI	Answer That And S...	Punk	cc19d2979f6ecbbe02b0d923a38a6e7b
Keep Trying	Against All Authority	All Fall Down	Punk	c8c706401e6847fd41c51a5c08f6b5cf
Malleus Maleficarum	AFI	Black Sails In Th...	Punk	8a24a1314ec8a4de11c2268a602ac34e
Silver And Cold	AFI	Sing The Sorrow	Punk	11ef0a529533f529bc32f5381e988bb7
Totalimmortal	AFI	All Hallow's E.P.	Punk	06579371f36fa504ea85b8992a7c7442
Williams Blake Over...	A Wilhelm Scream	Mute Print	Punk	5169725bbc9abb506fcd5c599a6f5d4
God Loves a Liar	A Wilhelm Scream	Ruiner	Punk	6f2a4f0e65ba70169588971e1ae39fdf
Jaws 3, People 0	A Wilhelm Scream	Career Suicide	Punk	0939170876214ab753e1a7c3108a71a9
Perfect Fit	AFI	Very Proud Of Ya	Punk	76dde3e86e0811231cebbe49492242e8
Smart Enough To Run	88 Fingers Louie	Behind Bars	Punk	1e482cd4504e4526c9b34893dc771446
Orestes	A Perfect Circle	Mer de Noms	Metal	5bbd795f41da562d69625a19ec94f33b
Skid Rock	A Wilhelm Scream	A Wilhelm Scream	Punk	c5a604536c56141a51ea3d65922d46c6
Girls	Beastie Boys	Licensed To Ill	Hip-Hop	9d01d2a75ac6ac9ad5c22fe4f6739d4c
You Lose	7 Seconds	The Crew	Punk	189728103ba8837fc950ad668f28c333

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Monsoon	...And You Will Kno...	Source Tags & Codes	Indie	54567a6cf5829154674f91a6e96714bb
Peyote	Atmosphere	Sad Clown Bad Fal...	Hip-Hop	956af71450300daf043c76587b079850
Because Of The Shame	Against Me!	White Crosses	Punk	3a73b23f3f6d073724cd54eb13b4285c
C'mon	Atmosphere	Leak At Will	Hip-Hop	e4783543f063640691d728db47108571
Ygm	Atmosphere	Strictly Leakage	Hip-Hop	687f5b59b0fc0ed0d879be292f431ac4
Among The Living	Anthrax	Among The Living	Metal	ce7bf99b1d0a96951b91b8bf7135d45b
Be All, End All	Anthrax	State Of Euphoria	Metal	e63e52584945a19984f21828e6e1dfd0
Cringe	Alkaline Trio	Goddamnit	Punk	9faf97d49f5f144eedf24b42ebc16fdc
Division	All Else Fails	The Chase Of Gain	Punk	edde840b88e19eacabeda9c76e77fe66
Goodbye Forever	Alkaline Trio	Alkaline Trio	Punk	1974d5407debb0a1bd78f7b0589ec28d
Grind	Alice In Chains	Alice In Chains	Alternative	761fd5388cdbf4b221a4c60ed40db0c9
Keep 'Em Coming	Alkaline Trio	Maybe I'll Catch ...	Punk	a0ebd3df9e083d33acf95e265b089db
Lanyard Loop	Allan Holdsworth	All Night Wrong	Jazz	0ac00cba14e3cba0aad3df1db47188ca
Nutshell	Alice In Chains	MTV Unplugged	Alternative	444b5384a3e525a51cca0b791ec04756
Private Eye	Alkaline Trio	From Here to Inf...	Punk	8bcb0c28f0a0f333b846bb44028643f1
Rotten Apple	Alice In Chains	Jar Of Flies	Alternative	1e565fb418975ea391ba022374a6e59b
Them Bones	Alice In Chains	Dirt	Alternative	13e01175265149b58317ecb4c153f5ec
This Addiction	Alkaline Trio	This Addiction	Punk	18857886c18df863b2b5df049b54cf3e
This Could Be Love	Alkaline Trio	Good Mourning	Punk	d92f2c30ef6dc2e482f002273aa3fe44
Three Sheets to the...	Allan Holdsworth	Road Games	Jazz	92904a3dab52ae4af0541546efbeed95

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Time To Waste	Alkaline Trio	Crimson	Punk	549ce3c8365a908443478f0e8bba1293
Waste	Bigwig	An Invitation To ...	Punk	bb58d847e7efc162fee8cc7f42ceb8fc
We Die Young	Alice In Chains	Facelift	Alternative	d1d332e8675375e97e6c38f06601185c
World's On Heroin	All	Mass Nerder	Punk	4c1ee1d96d416e70e6d2e7266199b5a4
Calling All Skeletons	Alkaline Trio	Damnesia	Punk	765e4557a749e6aedae56c5a38845035
Queen of Pain	Alkaline Trio	Alkaline Trio, Ho...	Punk	e4a82e577dbab3a679845a689e1e0f81
Calling All Skeletons	Alkaline Trio	Agony And Irony	Punk	97f191fb9736ebddece8c69081c1b6ff
Up The Cuts	Against Me!	New Wave	Punk	f9d701888e6e49eea336b062de8b67f7
Beyond the Mirage	Al Di Meola, Paco D...	The Guitar Trio	Jazz	640b35c9afefc85db6aa47301ddd1f27
Cliche Guevara	Against Me!	As The Eternal Co...	Punk	0765d6939bed976c34c62a979c1af410
Electric Eye	Alex Skolnick Trio	Transformation	Jazz	415d59ffd07d75781342463798d65ba0
No Reason	Against All Authority	Destroy What Dest...	Punk	a04c4669d055edb2e68d27d83f6b217e
Sans Plan Z	Against Tomorrow's Sky	The Lost Tapes	Indie	f015cb9cf50682c5d517187df6e6eef4
Throwing Broken Shapes	Against Tomorrow's Sky	Jump The Hedges F...	Indie	1f8d9ed3db93ac414d5a9ae11b9ebe3a
Mediocrity Gets You...	Against Me!	Searching for a F...	Punk	2eb66316212d41561642fa66933a0ef5
The Politics of Sta...	Against Me!	Reinventing Axl Rose	Punk	768b7abb853be6f83277e159707bc934
Anchor End	A Wilhelm Scream	Mute Print	Punk	cef50cb8ae000bf79bf4e72da357f1e9
Bleed Black	AFI	Sing The Sorrow	Punk	8373a879f37daba3ced662a1aae8744f
Exsanguination	AFI	Black Sails In Th...	Punk	7a66fcb247d64f466b694d6dca4d454a
Justification	Against All Authority	All Fall Down	Punk	90de01ed01733cdb9c171597d0c15439

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
The Boy Who Destroy...	AFI	All Hallow's E.P.	Punk	03c3560b0a45c07f48cc247ec44fec8
Yurf Rendenmein	AFI	Answer That And S...	Punk	87e541a0608a46ee05aa7f13fe81e623
Cult Status	AFI	Very Proud Of Ya	Punk	96dbaac4a869cc43d1d48df5912c4006
Die While We re Young	A Wilhelm Scream	Career Suicide	Punk	863e648b77474c9fad80d59376169ba0
Had My Chance	88 Fingers Louie	Behind Bars	Punk	1fe7c3c289574dd76605b8357d44d0e4
The Soft Sell	A Wilhelm Scream	Ruiner	Punk	350297477c924a7f8a738568742b8248
Judith	A Perfect Circle	Mer de Noms	Metal	55e374e47f4a7fb2ca5c64a41e43c9fb
Bulletproof Tiger	A Wilhelm Scream	A Wilhelm Scream	Punk	6e6f81608261b9c8ef1d4f46552910de
Straight On	7 Seconds	The Crew	Punk	7c6fd7b6e188354c57514fade3e9108d
Heart In The Hand O...	...And You Will Kno...	Source Tags & Codes	Indie	6de6b235b809abcd1efe4ec44e43d822
I Was A Teenage Ana...	Against Me!	White Crosses	Punk	dfe06b3f124f893d83dd82a0715001ef
New Wave	Against Me!	New Wave	Punk	7b21e4bfff344b62d602bf2c9d5dccc4
Eager	Against Tomorrow's Sky	Jump The Hedges F...	Indie	601fab833fc588f3f4544e3143dcab14
La Estiba	Al Di Meola, Paco D...	The Guitar Trio	Jazz	48d0fd5fecbb3f1adfb8ee86f845795
Lifestyle of Rebellion	Against All Authority	Destroy What Dest...	Punk	38857d4bed8d552e286744f02a4f5eea
Lullabye League	Against Tomorrow's Sky	The Lost Tapes	Indie	f098bb40ae6fcfac99233005b3b1adc6
T.S.R.	Against Me!	As The Eternal Co...	Punk	a7f4c5325c066d8103328a076f4f8636
Transformation	Alex Skolnick Trio	Transformation	Jazz	c2756fe99aacb1546799aaff4f001ed6
Miami	Against Me!	Searching for a F...	Punk	9c8c9f8cc03c68ceeda29991f33ae877
Pints of Guinness M...	Against Me!	Reinventing Axl Rose	Punk	728c8b8b21f09130bb39d7d6e3483356

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
12:00 AM	Against All Authority	All Fall Down	Punk	b7a9ae6922de955952f33312be840e7c
Famous Friends And ...	A Wilhelm Scream	Mute Print	Punk	f77658c6edd12adbfcbed92ae2fddfb6
Half-empty Bottle	AFI	Answer That And S...	Punk	16f54d678c8e4f2e7973f13b70c0c2e1
Halloween	AFI	All Hallow's E.P.	Punk	20490af29384a6d21988e0356504fbe5
Killing It	A Wilhelm Scream	Ruiner	Punk	134422285ebd2dcc8a9f026fb886f8cf
Porphyria	AFI	Black Sails In Th...	Punk	4fc656e57cb8589db03a4b77880a442
The Leaving Song Pt. 2	AFI	Sing The Sorrow	Punk	ca0996b052e9f669a13f97b929f94321
Order	Avail	Live at the Botto...	Punk	a2b5a9f08f00c05f121a7400b797e889
Outright Lies	88 Fingers Louie	Behind Bars	Punk	f24799443bb1ecd9e28b9944fb15662
The Horse	A Wilhelm Scream	Career Suicide	Punk	e3738417a76321a8900a5f33f759b958
Wake-up Call	AFI	Very Proud Of Ya	Punk	80cdf471b83cf199be5009d85dc88f2e
Rose	A Perfect Circle	Mer de Noms	Metal	fa66a9fba293f36992e78ed7cf3b45d6
Fun Time	A Wilhelm Scream	A Wilhelm Scream	Punk	674d19d33b5a84cac07c629b4634b167
This Is the Angry, ...	7 Seconds	The Crew	Punk	d24f27c3e8b8b337dbfe7151b723366a
How Near, How Far	...And You Will Kno...	Source Tags & Codes	Indie	0193ae3ced25974b99708ee19599785c
Iron Man	Alice In Chains	Dirt	Alternative	c1a51d5f933ee609f6fc9082c2b1acb
White Crosses	Against Me!	White Crosses	Punk	9dbe6d1ff570b8d3c58057175e0e5273
All Fall Down	Against All Authority	All Fall Down	Punk	2a823a3b7a0f19d4845cda728c65016f
Fall Children	AFI	All Hallow's E.P.	Punk	6cc151e6b2d8967e98a6a29b66b256ca
He Who Laughs Last	AFI	Very Proud Of Ya	Punk	44e5bcbd65a89026a9d160300b386b5a



Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Miseria Cantare–Th...	AFI	Sing The Sorrow	Punk	755446b4d499523d9ee41e8ef6090ac4
Mute Print	A Wilhelm Scream	Mute Print	Punk	76baf87bc8ebc4ee29af74da28f5a019
Strength Through Wo...	AFI	Black Sails In Th...	Punk	98c08b644b2259dad8ad3afc74b99663
The King is Dead	A Wilhelm Scream	Ruiner	Punk	4a0b5df76f9865d8dc435ba86150a69d
Two Of A Kind	AFI	Answer That And S...	Punk	911cdbc34949de445a1172016e358fb4
5 To 9	A Wilhelm Scream	Career Suicide	Punk	c3f2d10933e6873ea80dd5ef54089237
Explanation	88 Fingers Louie	Behind Bars	Punk	79bac17176f35c60b30a687cd9512f0e
Magdalena	A Perfect Circle	Mer de Noms	Metal	08061f7d017dac9a95786f5760a49a79
Every Great Story H...	A Wilhelm Scream	A Wilhelm Scream	Punk	0296c2052c0bf9784d933d61abc68f0e
Baudelaire	...And You Will Kno...	Source Tags & Codes	Indie	a3735c44f9edb69993d7921961a93a70
Life On The Road	All	Mass Nerder	Punk	0ef1b0174daa8ad3e5a6c1078f720ad5
Not Just Boys Fun	7 Seconds	The Crew	Punk	77ef59da82a5fcd49191a469ab1874d3
Reparation	88 Fingers Louie	88 Fingers Louie ...	Punk	920ba30f32fe71e86fa86b2375f0cb65
Hark! the Herald An...	Bing Crosby Frank ...	Christmas	Jazz	96e14345b837229bf9e48f221ebdd439
30 Sec. Song	Against All Authority	Destroy What Dest...	Punk	d932fc589448e411096cc94b9843b3a5
Pent Up	88 Fingers Louie	Behind Bars	Punk	f956b4e3144b241d20603e9a8c2f6574
The Hollow	A Perfect Circle	Mer de Noms	Metal	139ac4259aafc07c6d8a6a435d9167e8
Australias	A Wilhelm Scream	A Wilhelm Scream	Punk	2f8787c1efae95f6675dcbc77178b324
Another Morning Stoner	...And You Will Kno...	Source Tags & Codes	Indie	b32aa6f384dceb181d2ee851acdffa86d
Definite Choice	7 Seconds	The Crew	Punk	b4e123a85dd40f1d2056b51a5921b496

Table B.1 – Full Evaluation Dataset Continued

Song	Artist	Album	Genre	MD5
Slow Chorus Overlap	88 Fingers Louie	88 Fingers Louie ...	Punk	f2cbc4bf2936c731075f7a9cf8b7f318
Career Suicide	A Wilhelm Scream	Career Suicide	Punk	f3a3e09897dfb159073df1d5d4ba9e24
Zero Frisco	Braid	Frankie Welfare B...	Indie	690a79dfcef0372f943dc4b013009868
Here's Your Warning	7 Seconds	The Crew	Punk	24f9c12dfb84f8b94718f471120d730c
I Wipe My A** With ...	A Wilhelm Scream	Career Suicide	Punk	51ee4f0043069e3f41c3cb52bc6b1200
It Was There That I...	...And You Will Kno...	Source Tags & Codes	Indie	27707e7d00bd2036e8548c2698f511b7
Out There	88 Fingers Louie	88 Fingers Louie ...	Punk	505626e50b828fc415e7a809846c3a88
File 13	AFI	Very Proud Of Ya	Punk	3262bf7036fea610cab9dc2aed5af81b
Homage	...And You Will Kno...	Source Tags & Codes	Indie	4ba200e93b3ed7b2a690aa81b8fee497
Clenched Fists, Bla...	7 Seconds	The Crew	Punk	91e514b8af459fd7e1e05f051f837a6a
Narrative Of Soul A...	AFI	Black Sails In Th...	Punk	a7b0790c1e05012daa21c6fecab12142
The Pool	A Wilhelm Scream	Ruiner	Punk	86eff07e2414963c4356d826500b772c

# References

- [1] Gul Abdalnabi Agha. *Actors: a model of concurrent computation in distributed systems*. MIT Press, Cambridge, MA, 1985.
- [2] Akka. <http://akka.io/>. Last visited 11/18/2013.
- [3] Krste Asanovic, Ras Bodik, Bryan Christopher Catanzaro, Joseph James Gebis, Parry Husbands, Kurt Keutzer, David A. Patterson, William Lester Plishker, John Shalf, Samuel Webb Williams, and Katherine A. Yelick. The landscape of parallel computing research: A view from berkeley. Technical Report UCB/EECS-2006-183, EECS Department, University of California, Berkeley, Dec 2006.
- [4] Sebastian Böck, Florian Krebs, and Markus Schedl. Evaluating the online capabilities of onset detection methods. In *ISMIR*, pages 49–54, 2012.
- [5] Stuart Bray and George Tzanetakis. Distributed audio feature extraction for music. In *ISMIR*, pages 434–437, 2005.
- [6] Judith C Brown and Miller S Puckette. An efficient algorithm for the calculation of a constant q transform. *The Journal of the Acoustical Society of America*, 92:2698, 1992.
- [7] Jamie Bullock and UCEB Conservatoire. Libxtract: A lightweight library for audio feature extraction. In *Proceedings of the International Computer Music Conference*, volume 43, 2007.
- [8] Chris Cannam, Michael O. Jewell, Christophe Rhodes, Mark Sandler, and Mark d’Inverno. Linked data and you: Bringing music research software into the semantic web. *Journal of New Music Research*, 39(4):313–325, 2010.
- [9] Akka Clustering. <http://doc.akka.io/docs/akka/2.2.1/common/cluster.html>. Last visited 02/10/2014.
- [10] John Cocke. Global common subexpression elimination. *ACM Sigplan Notices*, 5(7):20–24, 1970.
- [11] BBC Vamp Plugin Collection. <http://github.com/bbcrd/bbc-vamp-plugins>. Last visited 02/29/2014.

- [12] Steven Davis and Paul Mermelstein. Comparison of parametric representations for monosyllabic word recognition in continuously spoken sentences. *Acoustics, Speech and Signal Processing, IEEE Transactions on*, 28(4):357–366, 1980.
- [13] Jeffrey Dean and Sanjay Ghemawat. Mapreduce: simplified data processing on large clusters. *Communications of the ACM*, 51(1):107–113, 2008.
- [14] Giuseppe DeCandia, Deniz Hastorun, Madan Jampani, Gunavardhan Kakulapati, Avinash Lakshman, Alex Pilchin, Swaminathan Sivasubramanian, Peter Vosshall, and Werner Vogels. Dynamo: amazon’s highly available key-value store. In *SOSP*, volume 7, pages 205–220, 2007.
- [15] François Deliège, Bee Yong Chua, and Torben Bach Pedersen. High-level audio features: Distributed extraction and similarity search. In *ISMIR*, pages 565–570, 2008.
- [16] Simon Dixon. Onset detection revisited. In *Proceedings of the 9th International Conference on Digital Audio Effects*, volume 120, pages 133–137, 2006.
- [17] Florian Eyben, Martin Wöllmer, and Björn Schuller. Opensmile: the munich versatile and fast open-source audio feature extractor. In *Proceedings of the international conference on Multimedia*, pages 1459–1462. ACM, 2010.
- [18] Roy T Fielding and Richard N Taylor. Principled design of the modern web architecture. *ACM Transactions on Internet Technology (TOIT)*, 2(2):115–150, 2002.
- [19] Vamp Plugin Framework. <http://www.vamp-plugins.org/>. Last visited 03/21/2014.
- [20] Matteo Frigo and Steven G. Johnson. The design and implementation of FFTW3. *Proceedings of the IEEE*, 93(2):216–231, 2005. Special issue on “Program Generation, Optimization, and Platform Adaptation”.
- [21] Olivier Gillet and Gaël Richard. Automatic transcription of drum loops. In *Acoustics, Speech, and Signal Processing, 2004. Proceedings. (ICASSP’04). IEEE International Conference on*, volume 4, pages iv–269. IEEE, 2004.
- [22] Neil J. Gunther. *Guerrilla Capacity Planning*. Springer Berlin Heidelberg, 2007.
- [23] Naohiro Hayashibara, Xavier Defago, Rami Yared, and Takuya Katayama. The  $\varphi$  accrual failure detector. In *Reliable Distributed Systems, 2004. Proceedings of the 23rd IEEE International Symposium on*, pages 66–78. IEEE, 2004.
- [24] Gregor Hohpe and Bobby Woolf. *Enterprise integration patterns: Designing, building, and deploying messaging solutions*. Addison-Wesley Professional, 2004.
- [25] Scala Programming Language. <http://www.scala-lang.org/>. Last visited 11/18/2013.

- [26] Olivier Lartillot, Petri Toivainen, and Tuomas Eerola. A matlab toolbox for music information retrieval. In *Data analysis, machine learning and applications*, pages 261–268. Springer, 2008.
- [27] Benoit Mathieu, Slim ESSID, Thomas Fillon, Jacques Prado, and Gaël Richard. Yaafe, an easy to use and efficient audio feature extraction software. In *ISMIR*, pages 441–446, 2010.
- [28] Daniel McEnnis, Cory McKay, and Ichiro Fujinaga. Overview of omen. In *ISMIR*, pages 7–12, 2006.
- [29] Daniel McEnnis, Cory McKay, Ichiro Fujinaga, and P Depalle. jaudio: Additions and improvements. In *ISMIR*, pages 385–386, 2006.
- [30] Cory McKay, Ichiro Fujinaga, and Philippe Depalle. jaudio: A feature extraction library. In *Proceedings of the International Conference on Music Information Retrieval*, pages 600–3, 2005.
- [31] University of Colorado Colorado Springs. EAS Cloud. [http://www.uccs.edu/eas/eas\\_cloud.html](http://www.uccs.edu/eas/eas_cloud.html). Last visited 03/15/2014.
- [32] QM Vamp Plugins. <http://isophonics.net/QMVampPlugins>. Last visited 02/29/2014.
- [33] Apple Press. <http://www.apple.com/pr/library/2013/02/06iTunes-Store-Sets-New-Record-with-25-Billion-Songs-Sold.html>. Last visited 03/29/2014.
- [34] Apache Software Foundation. HDFS Short-Circuit Local Reads. <http://hadoop.apache.org/docs/r2.2.0/hadoop-project-dist/hadoop-hdfs/ShortCircuitLocalReads.html>. Last visited 03/05/2014.
- [35] Devon Bryant. Scalable Audio Feature Extraction. Source Repository. <http://github.com/devonbryant/safe>. Last visited 04/10/2014.
- [36] Devon Bryant. Numerical Computing With Scala. <http://devonbryant.github.io/blog/2013/03/03/numerical-computing-with-scala/>. Last visited 03/25/2014.
- [37] Devon Bryant. MIR Tool Evaluation Scripts. <http://github.com/devonbryant/mir-eval-scripts>. Last visited 04/10/2014.
- [38] Konstantin Shvachko, Hairong Kuang, Sanjay Radia, and Robert Chansler. The hadoop distributed file system. In *Mass Storage Systems and Technologies (MSST), 2010 IEEE 26th Symposium on*, pages 1–10. IEEE, 2010.
- [39] Spotify. <http://press.spotify.com/us/information/>. Last visited 03/29/2014.

- [40] Herb Sutter and James Larus. Software and the concurrency revolution. *Queue*, 3(7):54–62, September 2005.
- [41] George Tzanetakis and Perry Cook. Marsyas: A framework for audio analysis. *Organised sound*, 4(3):169–175, 2000.
- [42] Robbert Van Renesse, Yaron Minsky, and Mark Hayden. A gossip-style failure detection service. In *Middleware'98*, pages 55–70. Springer, 1998.
- [43] Eclipse Public License version 1.0. <http://www.eclipse.org/org/documents/epl-v10.html>. Last visited 04/10/2014.