William P Hannah. Automated Music Genre Classification Based on Analyses of Web-Based Documents and Listeners' Organizational Schemes. A Master's Paper for the M.S. in L.S degree. May, 2005. 95 pages. Advisor: Stephanie W. Haas

This paper describes a two-part study attempting to correlate music genre assignments performed by two primary, yet disparate groups: the music industry and consumers of popular music.

An online survey was conducted, aimed at evaluating the latter group's perception of music genre. The sample of the survey consisted of 15 UNC-CH students affiliated with the music department. Concurrently, a series of genre classification experiments were conducted on several corpora of music reviews harvested from authoritative, online review websites. Results of the survey were subsequently triangulated with a portion of the music review corpora in a final genre classification experiment.

The genre classification experiments were quite successful, yielding a maximum of 91% accuracy using web-based data alone. The effect of weighting schemes and procedural modifications on experimental accuracy rates are discussed, as are qualitative evaluations of participants' responses to the survey.

Headings:

Automation of Library Processes – Classification/Automation

Automation of Library Processes – Music Libraries and Collections/Automation

Music Information Retrieval – Music Genre Classification

Music Information Retrieval – User Needs Evaluation

Indexing – Automatic Indexing

AUTOMATED MUSIC GENRE CLASSIFICATION BASED ON ANALYSES OF
WEB-BASED DOCUMENTS AND LISTENERS' ORGANIZATIONAL SCHEMES

by
William P Hannah

A Master's paper submitted to the faculty
of the School of Information and Library Science
of the University of North Carolina at Chapel Hill
in partial fulfillment of the requirements
for the degree of Master of Science in
Library Science.

Chapel Hill, North Carolina

May 2005

Approved by

_____

Stephanie W. Haas

Table of Contents

1. Introduction

In the realm of popular music, classification of an artist into a particular genre is a task governed partially by the inherent musical style of the artist, but largely by general consensus of the media and an artist's fan base. With mp3 downloading services increasing in popularity, the proliferation of file sharing networks and an interest in ordering collections by genre, a need exists for the rapid organization of ever-expanding personal digital music collections. To prevent complete disconnect between various genre classification schemes, it is important to take into account both the listener's specific, and often highly subjective, organizational needs, while at the same time adhering to more general, industry-developed concepts of genre.

This study attempts to examine the correlation and disparity between different listeners' digital music organizational systems (e.g., personal collections organized into such groups as by loudness, language, instrumentation, artist, etc.) and more *official* genre classifications based both on analyses of web-based record reviews and generally accepted artists' genre designations. The information obtained has been evaluated to extract possible connections between industry standard definitions and listeners' organizational tendencies.

The primary goal of the research is to investigate correspondences between these two differing entities performing music classification and the products they each output;

being music genre classification schemes. Therefore proposed is the development of an automated system that can analyze a listener's current digital music collection, comparing the organizational system in place against a list of possible correspondences - such as those found through the experimental results of the present study - and dynamically organize the holdings of a digital music collection in the manner most befitting a listener's preferences, tendencies or general musical temperament.

1.1 Automated Genre Classification – A Brief History

In the past year alone, there have been several studies aimed at automatically classifying music into genre based on measures similar to those employed in this experiment. One such study attempted to categorize artists using documents retrieved from various search engines (Knees, Pampalk & Widmer, 2004). Another used official and "unofficial" record reviews (Whitman & Ellis 2004) in an attempt to predict musical trends. Numerous attempts have also been made to extract various feature sets from purely musical information in order to determine genre; using MIDI files or musicXML. In the past few years, research seems to have greatly increased into the analysis of digital sound recordings in order to find recurring patterns that might be useful in automatically assigning genre to unclassified music.

The accuracy rates for these projects typically seem to vary inversely with the size of the sample (i.e., the number of artists or pieces of music classified). Therefore, the question generally remains, "will the system be applicable to significantly larger collections?" For most, reliability and accuracy typically decreased significantly under increasingly larger-scale implementation. Accuracy further suffered due to a required

adherence to highly subjective, experimenter assigned genre classification of the testing data (Basili, Serafini, & Stellato, 2004).

Certain studies have concentrated on the organization of genre into hierarchical designs that can be more flexible and capable of growth. Currently existing genres have been used as either parent or child nodes with standard descriptors used to differentiate similar groups. The difficulty with implementation of this type of organizational system is that it is rooted in static, inherently inflexible concepts of genre.

One significant example of this inflexibility is the inability of a child genre to be related to more than one parent. This can be problematic in a case such as *R&B*, which could be easily argued to have descended partially from any of *soul*, *rap*, *blues*, etc. Further complications arise in assigning artists into emerging genres. That is, precise classification into a "terminal [genre] node" cannot be done until the emerging genre has become a more established form of music or until it and its children nodes have reached a terminal point (Pachet & Cazaly, 2000).

To account for this limitation, subsequent research has attempted to further categorize music using self-organizing maps capable of accounting for multiple connections between artists, genre and general musical feature sets. Though the results of these systems have been comparable with the accuracy, or perhaps with the inconsistency, of the classification by human subjects of the same music, several problems remain (Mitri, Uitdenbogerd, & Cieslielski, 2004). The most significant of these are scalability and evolution. That is, because these systems are trained on currently existing music, they will undoubtedly need to be retrained as new forms of music are developed – a continuous event.

While this continual emergence of new and unclassified genres, instruments and forms helps to clarify an appropriate classification of the music of the past, at the same time it continually blurs classification of music of the present. Take for example the so-called *grunge* movement of the early 1990s, which until it had been established for several years could easily have been classified simply as *rock*. Setting aside the enormity and all-encompassing nature of the *rock* genre, and specifically the difficulty in distinguishing pop and rock music, considering the present genres of AllMusic.com one would almost certainly have had similar trouble assigning formerly classified Rock & Pop artists to such emerging sub-genres / child nodes as *Twee Pop*, *Shoegaze*, *Glitter* or *C-86.*

In light of these limitations, by evaluating industry and listener defined genre classifications, can a set of correspondence rules be established between a listener's preferred organizational scheme and a digital music library's holdings?

1.2 Operational Definitions

For the purposes of this study, a *listener* is defined as any consumer of digital music not known to be affiliated with the RIAA, any music label or recording group, or to be employed as a reviewer of music in any capacity. More specifically, a listener will refer to one of the participants of the survey that has been conducted as part of this study. *Industry* is defined as any aspect of the recording industry, be that a member of one of the aforementioned groups excluded from "listener" or the music reviews themselves that were analyzed.

Regarding any mention of a connection between these two groups, the terms *similarities* and *correspondences* are hereafter defined as musical feature sets of any kind that are capable of indicating particular points where classification rules might be abstracted.

Organizational systems will hereafter be defined as one or more of the following: listener reported actual or desired digital music directory structure; directory structure, contents or other organization of internet music sites; and/or genre classification systems based upon the analysis of record reviews of any type.

Descriptive genre classes will hereafter be defined as a set of unique descriptors which together comprise a new concept of genre (e.g. Reggae might take the descriptive genre class "Jamaica, Rock, Soul, syncopate").

Meta-Genres will hereafter be defined as any one of the 21 top-level popular music genres as listed on AllMusic.com (e.g. *Rock*, *Electronica*, *R&B, etc).* Sub-Genre, contrarily, will therefore hereafter be defined as any genre listed on AllMusic.com that is not one of the 21 meta-genres.

2. Literature Review

An issue that continually arises in studies pertaining to assigning genre to music is that there is no consensus as to appropriate classification for certain artists (Pachet & Cazaly, 2000). These artists are classified in various ways by various groups, and the final result can be their placement into three, four or more genre classes. To complicate things further, genre names that have existed for years are often very vague, and can "concern a vast area of popular music" (p. 6).

The research examined in this section incorporates many of the methods central to the present study. These include: extracting descriptive information from web-based music reviews in order to establish a genre, adhering to a rigid hierarchical genre structure to maintain standardized taxonomy and prevent artists from being torn between multiple meta-genres, and examining users' organizational schemes for both their physical and digital music collections.

2.1 "Classification of Musical Genre – A Machine Learning Approach"

The work of Basili, Serafini, and Stellato (2004) serves as a good starting point to demonstrate the need to perhaps step away from the realm of *accepted* genre designations, as well as away to step away from analyses performed on MIDI data alone. Their study attempted to use various machine learning algorithms to classify music into "widely recognized genres" based on trained examples (Basili et al., 2004, p. 505)

Different sets of musical features were used to determine which would yield the most accurate results. Using a corpus of 300 MIDI versions of songs of various musical genres, the researchers attempted to extract general musical features (in this case including: instruments, instrument classes, meter & time changes, and note extension/range).

The experimental results indicated that the two instrument categories had a very strong effect on precision and recall, while the other categories had relatively low impact. Overall, none of the six chosen algorithms performed significantly better than any of the others, and all yielded approximately 65% accuracy for correct genre classification.

This experiment assumed a predefined, general set of genre classifications into which the researchers themselves had difficulty assigning music to somewhat generic categories such as *pop*, defined as "common music appreciated by the mass", and *rock* (Basili et al., p. 506). Further, because the instrument, by definition, was based on one of 128 general MIDI instrument patches, the high effect of the instrument on genre precision and recall will almost certainly degrade dramatically if the approach were applied to digital sound recordings where the instrument pitch and timbre could vary significantly more often than ±128.

2.2 "Artist Classification with Web-Based Data"

Classification was attempted in a separate study by Knees, Pampalk and Widmer (2004), in which the researchers followed up on a previous experiment which examined community metadata[1] as a means to extract meaningful terms that might be successfully

applied to a particular musician or musical group. An artist's name plus the keywords *music* and *review* were queried using Google and Yahoo search engines. The 50 top-ranked pages were retrieved and processed using basic natural language processing techniques (e.g. HTML and stop-word removal, part-of-speech tagging). A term was given a higher score based on the likelihood that it related to the artist in question multiplied by number of times the term occurred in total across the 50 pages.

Three experiments were carried out to test: 1) their approach against previously published results (Whitman & Smaragdis, 2002); 2) the impact of fluctuations over time (e.g. updates to websites, changes to the top 50 list); and 3) the successfulness of their system on a large and varied set of artists. For the first of the experiments, the researchers found that their results were significantly better than those of their predecessor. Their success, they believed, owed to the search constraint (i.e., artist name "+music +genre +style") that they imposed. For the second experiment they observed a large degree of fluctuation among the pages retrieved, but only minimal deviation in content.

For the final experiment, they divided 224 artists into 14 groups of 16 artists each, with each group belonging to one of 14 predefined genres. There were three runs per experimental execution, with two, four and eight of the 16 artists, respectively, being used as the training data and the remaining artists used as the testing data. The results of the third experiment yielded an average of 71-73% accuracy for Google searches and 60-69% accuracy for Yahoo searches. Despite the variance in the mean accuracy percentages for these trials, the researchers were able to achieve an 87% accuracy rate

using support vector machines, classifying based on the top 100 words from each genre (Knees et al., 2004, p. 522).

Upon examination of the parent study (Whitman & Smaragdis, 2002), the term frequency restrictions imposed by the system of Knees et al. (2004) seem to have been quite successful. For example, though the earlier study was able to very successfully classify many artists (e.g., Led Zeppelin at 72% likelihood to fit in *heavy metal*), some of the more controversial artists such as Lauryn Hill significantly confused the system between three or more of the five possible genre classifications. Whitman and Smaragdis (2002) account for this by citing Hill being "classified as a *rap* artist [not *R&B*] due to her *rap*like production" (p. 3). However, comparing this earlier experiment with the later study (Knees et al., 2004), the system's confusion may have stemmed from the limitations inherent in the term frequency formula that was used.

The primary difference between the Knees et al. (2004) study and its predecessor is that the latter study performed neither term collocation recognition nor part-of-speech tagging on the data which it harvested. This point, as mentioned in the conclusion, led to some degree of confusion in the system involving the recognition of a particular part of an artists name as belonging to a completely separate artist (e.g. Janet Jackson would also yield result pages discussing country singer Alan Jackson).

Similar to the study by Basili et al. (2004), the adherence to standard genre designations was perhaps the only other limitation in this otherwise quite successful experiment (Knees et al., 2004). It seems that a further step away from the highly subjective and limiting genre names used by Knees et al. (2004) might have improved their system and such a step will be central to the present research.

2.3 A Hierarchy of Musical Genre

Along similar lines, another significant portion of my research will be based in part upon the hierarchical genre classification structure study published by François Pachet and Daniel Cazaly in 2000. In their work, Pachet & Cazaly describe a system Sony labs has been creating for the widespread assignment of genre-specific metadata to digital audio.

The study begins by describing the limitations of the three current music genre authorities at the time[2], as well as the general lack of descriptive metadata of any kind accompanying digital music collections. The authors state that significant inconsistency permeates the various genre classes in each of these three main authorities, with organization being variously based on genealogical, geographical, chronological or one of several other schemes. An example of this continuously growing inconsistency can be seen in the five "meta genres"[3] found on All Music Guide in 2000 (p. 3), and the 21 popular (i.e. *non-classical*) meta-genres currently found on the site[4].

To organize possible correspondences between listener-specific organizational needs and industry standard definitions of genre, the present study will attempt to incorporate a hierarchical structure similar to that presented in Pachet & Cazaly's research. Instead of deriving these terms entirely from previously existing genre names, terms will take a more abstract form, being comprised of the various descriptive terminology found within online music reviews, using term frequencies and tf/idf weightings. The connection of these groups of descriptive genre classes to a more formal, yet subjective, genre name or mood will be left to the listener.

2.4 "Automatic Record Reviews"

Whitman and Ellis describe a classification experiment wherein they combined the reliability of term frequency counting (p. 472) with analysis of audio taken from the MIT minnowmatch testbed, which served as their population; along with reviews taken from All Music Guide[5], Pitchfork Media[6] and potentially several others. The sample size was obtained by limiting the 1000 albums in the original testbed to 600 which better represented "a larger variety of music" (Whitman & Ellis, p. 473). After applying standard natural language processing techniques to the textual material, they obtained term frequency counts and subsequently used them in conjunction with separate analysis of the digital music content which the reviews were discussing.

The 2004 Whitman and Ellis study is central to the present research as many of the same tasks with regard to the processing of online music reviews have been performed. Though neither evaluation of digital music itself nor any similar cross-comparisons between textual evaluation and audio evaluation has been done, many of the same procedures apply. One notable difference is that this study limits its noun-phrase accumulator to two terms, whereas Whitman and Ellis seem to have used four terms[7]. This smaller noun phrase size should help to maintain a list of only highly relevant descriptors. Also, instead of using a regularized least-squares classification algorithm, non-relevant terms will be removed simply through basic stop-word removal followed by tf/idf term weighting (Whitman & Ellis, p. 473).

2.5 Tying it all together – Why is this Needed?

In 2004, Sally-Jo Cunningham, Matt Jones and Steve Jones published the results of a study in which they collected interviews and observations of approximately 34 listeners' organizational practices, along with the results of three additional focus group studies (p. 449). Although the study primarily concerns organization of physical media, and does not examine how the participants organized their digital collections, many of the organizational tendencies should perhaps logically be mirrored in an IR system's functionality or from the ground up with clustered file directories.

Grouping of CDs by genre is mentioned as a "notable" method of music categorization (Cunningham et al., p. 450). The authors describe a multi-tiered system of physical media organization, first by "broad genres such as Jazz and Pop" and next by artists belonging to one of the higher-level genres (p. 449). In a subsequent section, the authors expound on the idea of "broad [/loose] genres", describing collections that might creatively combine mood and genre to organize a collection. For example, one participant combines *techno/electronica* music into a pseudo-class of "programming music" as the intensity apparently helps to keep him or her typing (p. 450). With regard to the methods of the present study, implications of this phenomenon on future research might include dynamic reorganization of a music collection based on a temporal, verbally expressed mood compared against brief music reviews or descriptive genre classes stored in the metadata of a digital file.

Each of these articles, as well as several that were influential but not specifically cited, serve as integral pieces to the research described in the following section. Together, the studies helped to demonstrate a need to perhaps move away from "widely

recognized genres" towards a more abstract, descriptive term classification system

(Basili et al., p. 505).

3. Method

This is a concurrently executed, mixed-methods study with triangulated data integration (Creswell, 2003, p. 214). Neither the quantitative nor the qualitative method is intentionally given priority, and each occurred during the same time period. An advantage of the mixed-methods study is that it can yield more valid results than would be obtained in a study limited to only one of the two methods. The concurrent, triangulated mixed-methods study in particular has been used more often than other mixed methods and the results can therefore be seen as more substantiated (Creswell, p. 217).

Again, the primary goal of the study is the creation of rules for the categorization of music considering a listener's tastes in relation to the fixed genre structure of the music industry. A set of correspondence rules between general listeners' organizational systems and *accepted* or ground-truth genre classifications of artists were obtained by triangulating the results of the parts of the study: 1) An online survey was conducted, asking UNC-CH music students a series a questions attempting to gauge knowledgeable listeners' perceptions of genre, specifically how it relates to a variety of artists and reviews and 2) A series of text classification experiments were performed. The ultimate success of the study is arrived at through the triangulation procedure, described in section 3.5.

3.1 Online Survey

A survey was performed in March of 2005, using PHP surveyor software[8]. A reproduction of survey questions in the order in which they were presented is provided in Appendix 1. The population constituted all UNC-CH undergraduate and graduate students affiliated with the music department in the spring semester of 2005. Because the survey was performed on a volunteer basis, the sample was necessarily a convenience sample, comprised of volunteers from the population willing to participate (Creswell, p. 164).   The total number of participants in the survey was 15. Five participants were randomly selected to receive an iTunes gift certificate following the survey, and this served as the only monetary incentive to participate.

Questions were created to obtain artist classifications and descriptive genre terminology from listeners that could later be directly compared with experimental text classification results. The latter's results would provide *official* artist classifications and descriptive genre terminology for a highly similar – with respect to the listener-reported values – group of artists and albums reviews.

The survey itself was divided into four sections: general information about the participant including age, sex and typical amount of time downloading or listening to digital music; current and desired digital and physical music organizational schemes[9]; a set of 15-20 artists for which the participant assigned genres; a set of 3-5 reviews from which the participant extracted the most descriptive adjectives and noun phrases; and a final section where the participant was requested to explain what he or she believed were the primary differences between 5-6 groups of two similar or highly related genres.

It should be noted that nearly all of the artists and reviews selected for inclusion in the survey were purposely selected from a random sample of Billboard artists described below. This random sample was also used to populate the AllMusic.com samples used for the genre classification experiments described in the subsequent sections.

The artist classifications were used to determine classification accuracy percentages based upon the listener's collection compared against the *official* genre designations assigned by AllMusic.com and the BBC; evaluated in the Review Analysis described below. The descriptive terminology extracted by participants from the album reviews was compared with the experimental results of the review analysis section of the study. Finally, observed limitations in exclusivity among certain genre classes (e.g. Country-Rock vs. Folk-Rock), which can lead to genre assignment discrepancies and possible multiple assignments, were examined in relation to participants' responses to the final section of the survey, concerning perceived differences among highly similar genres.

3.2 Album Review Analysis

In order to evaluate the descriptiveness and exclusivity of *official* genre designations propagated by the music industry, two corpora of music reviews were harvested and processed from AllMusic.com and the BBC online music reviews collection. The former was based on a random sample of the BillBoard charts albums combined with corresponding album reviews taken from AllMusic.com, while the latter was simply a single-date collection retrieved en masse from the BBC. As mentioned above, since nearly all of the artists presented in the survey originated from the

AllMusic.com review collection, the text classification procedure described below could accurately mirror the results obtained in the survey, except from listener's standpoint as opposed to that of the music industry.

In order to determine which albums' reviews would be retrieved from AllMusic.com, a random sample of artists was taken comprising 25 albums from the Billboard top 100 albums chart for February 1, 2005 and 25 albums from the same charts one year, five years and ten years in the past[10]. These charts were all collected on the same day, resulting in a total sample size of 100 albums.

To seed the sample, four random numbers were generated between 1 and 100. The album at that chart position and every fourth album thereafter was selected from both the February 1, 2005 list and the lists from one year, five years and ten years in the past. Stratified sampling was considered, but the Billboard chart contained a sufficient degree of randomness in ordering among its four primarily represented meta-genres to make this step unnecessary.

The final step in the retrieval of this first sample involved manually collecting reviews and accepted genre designations from AllMusic.com for the 100 selected artists/albums. Primarily, these genre assignments separated the reviews into one of four categories: Rap, R&B, Rock and Country. Three categories (and thus three reviews) were eliminated from the collection because they each contained only 1 artist/album/review each[11]. Two more albums were too recently released for reviews to yet be available. Five further reviews classified by AllMusic.com as "soundtrack" were excluded because they were unrelated aside from the genre to which they were assigned (e.g. the *Elektra* soundtrack contains primarily popular music artists, whereas the *Lord of*

the Rings soundtrack contains only classical artists). In total, 90 reviews remained from the original collection, displayed in figure 3.a.
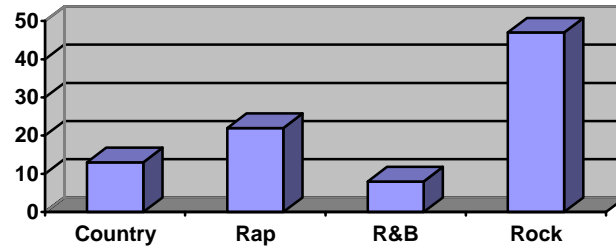
[Figure 3.a – Randomly Selected Billboard artists by genre – genre assignment from AllMusic.com]

Because some of the older, more obscure and very recently released artists/album reviews were not readily available on AllMusic.com, reviews were retrieved from other online sites whenever necessary[12]. Regardless of the source of the review, all genre decisions were made based on AllMusic.com assignments. The reviews were retrieved and stored as quickly as possible, over the span of several concurrent days so as to limit possible effects of content alterations over time.

The second sample set of reviews comprised seven of the twelve[13] top-level meta-genres from BBC online music review collection[14]; harvested on April 1, 2005. Five groups[15] were harvested as well, but later excluded due to both their wide-ranging scope and the relatively low number of reviews available compared with the other seven genres. After removal of a number of duplicates[16], the entire BBC test set consisted of 1282 reviews, and the breakdown among the meta-genres is displayed in figure 3.b.
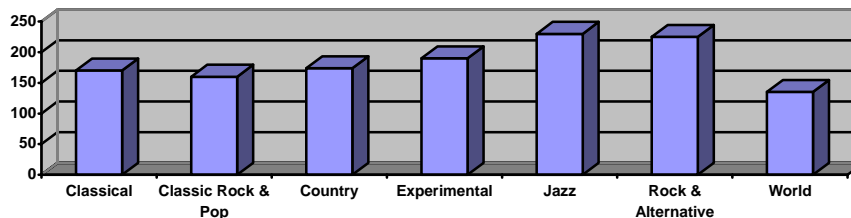
[Figure 3.b – BBC Review Sample, 1282 total reviews, divided by genre]

3.3 Final Alterations and Genre Classification Model Specifics

Because the random sampling clearly appeared to have resulted in an inordinately high number of *rock* albums represented and a minimal number of R*&B* albums, a third, normalized sample was created from the original AllMusic.com sample. To accomplish this, a sufficient number of reviews were selected randomly from the main *country*, *rap* and *R&B* genre pages on AllMusic.com to yield a total of 25 reviews in each group. Further, 24 *rock* reviews were randomly pruned from the original collection, in order to yield 25 total reviews for that genre. The normalized AllMusic.com collection therefore consisted of 100 total reviews.

It was necessary for each AllMusic.com review to be retrieved manually, while the BBC collection was able to be retrieved and parsed automatically. All reviews were then processed (removing irrelevant information such HTML tags and menu options) using Perl. The AllMusic.com reviews were ultimately manually edited to remove lingering content not pertaining directly to the artist or album in question (e.g., reviewer bylines and everything but the review text itself). All three collections were then divided into sub-directories according to the genres represented, in preparation for processing using the text categorization software, Rainbow[17].

In creating the classification model for each test set, stop-words were removed automatically using a standard stop-word list, slightly modified[18] to eliminate several very common music-specific terms that seemed to pervade all genre classes (e.g., *song*, *group*, *music*, etc.). This modified stop-word list is located in Appendix 2. The reviews were then passed through Rainbow's internal Porter stemming algorithm to unify terms. Possible inconsistencies or perhaps limitations of the stemming algorithm are noted in the findings. Following the creation of the three classification models (one for each review collection), the 10 terms with the highest log odds weighted score from within each class were extracted for later comparison. These terms serve as the first of two possible descriptive genre classes for each meta-genre. Resulting terms for each genre class, within each review corpus, are included in Appendix 3.

3.4 N-Gram Extraction as an Alternative

N-Gram/Term collocation extraction has been used sporadically and successfully in music information retrieval[19], but most studies seem to consider n-grams in relation to musical language (e.g., rhythms, notes, dynamics, etc.) and not the formal music-specific English terms that accompany sound recordings and the printed music itself. In this study, bi-grams were incorporated into the classification model used to determine the second set of descriptive genre classes. The top ten log odds ratio weighted terms, taking into account both single terms and bi-grams for each class, within each review corpus, are listed in Appendix 4. From this listing of terms, it appears that the effect of bi-gram processing is perhaps nominal, since bi-grams do not occur in the log-odds rankings until significantly further in the rankings.

3.5 Genre Classification Experiments

The three sample groups of reviews were run through a series of experiments using Rainbow, aimed at determining the accuracy rates of genre assignment based on varyingly sized training and testing subsets, as well as on different classification methods and preprocessing. These experiments were performed in order to more accurately determine whether a genre classification system should be built using: 1) a completely random sample of reviews, spanning only four meta-genres, 2) a normalized version of the random sample – in terms of reviews per genre class – spanning only four meta-genres or 3) a substantially larger collection of reviews, spanning a relatively larger number of meta-genres.

3.6 Triangulation and Overall Success Evaluation

To determine the accuracy of the hierarchical[20] and other genre designations, grounded in currently existing classification naming schemes, with regard to a listener's particular organizational scheme, the two sets of descriptive genre classes[21] derived from analyzed reviews were compared with the review-extracted terms given by the participants in the survey. This analysis is presented in section 4.6

To compare the *accepted* genre for each artist against participants' genre descriptors, a final genre classification model was created to triangulate the survey results with the genre classification results.

Survey responses to questions requesting the "most representative artists" and the "most representative terms" describing the participants' indicated genres of preference were separated by genre. These genre-specific term groupings were then used to train

the final classification model. To test the model, the corresponding genre-grouped album reviews from both the AllMusic.com and the BBC samples were fed into the system. The resulting accuracy rates, presented in section 6, shall serve as the ultimate evaluation of success of this study.

4. Survey Findings

4.1 General Participant Information

A total of 15 students participated in the online survey, aimed at gauging various facets of genre classification and organization. A large majority, 87%, of the participants were undergraduate music majors. Originally, music students were selected as the population due to an assumption that they would be the most widely reachable group, apt to provide highly pertinent genre information for a variety of different artists.

In general, survey responses seem to indicate that this assumption was a valid one. However, one third of the participants did report classical music to be their preferred genre; one which was purposely not covered to any large extent in the survey questions due to it not being represented on the sampled Billboard albums aside from indirectly in the form of movie and television soundtracks. Owing to this, the responses of several participants did seem to indicate that certain respondents were not entirely comfortable with or as knowledgeable of non-classical artists.

Regardless of this issue, significant knowledge of musical issues and trends – specifically related to country and rock artists – did pervade the majority of responses. Support for certain, previously ascertained classification desires was reaffirmed, and useful information as to the perceived differences between various, related genre groups was obtained. Charts illustrating participant information age, gender and grade level are included in Appendix 5. Others illustrating genre and time period preference are

included in Appendix 6. Physical and Digital music organization methods are located in Appendix 7, and a final chart illustrating participants' usage of music reviews prior to making music purchases is included in Appendix 8.

4.2 Prevalent Classification Schemes

To help gauge music organizational tendencies among the sample, participants were requested to describe their current methods of both digital and physical media organization. Given a set of seven possible classification methods, genre organization proved the most prevalent among this population. Just fewer than 47% of the participants reported organizing their digital music files by genre and 40% reported organizing their physical music collection (i.e., CDs, tapes and LPs) in this way.

It should be noted that multiple choices were permitted for this question, and a recurring response, both in current and desired organization methods, was for music to be first organized by genre or mood and then subsequently by artist and/or song title. Two participants noted that this would be their desired scheme if they had more time available to undertake the task. This should serve to emphasize the importance of implementing an automatic genre (or mood) categorizer, possibly using a method similar to that described in the previous section.

Organization by artist's name was the second most reported classification scheme, with 40% of the participants reporting at least partially organizing their collection using a default file and directory sorting procedures to alphabetize their collections. One participant specifically noted this default feature of most modern operating systems as a contributing factor to the organization system chosen. This participant further

mentioned that it was possible to abstract moods from a group of alphabetically arranged files, since the artists' names themselves were sufficient indicators for him.

This comment brings up an interesting concept guiding *at least* a small number of listener's organizational schemes. That is, regardless of how elaborate any of the participants' desired organizational schemes were, some listeners were satisfied to let their collections be arranged using a basic alphabetization scheme. This is not to fault the listener's initiative, but perhaps the limited software organization options available to him or her. Such speculation is not entirely within the scope of this study, however, and is only mentioned in an attempt to explain certain organization methods.

4.3 Genre & Artist Descriptors

Participants were asked a preliminary question about their preferred genre of music. Subsequently, they were asked to list 3-5 of the most representative artists belonging to that genre. Although one third of the participants reported *classical* music and another third reported *rock* music, none of the *representative* artists listed in either group was duplicated by any two members of these groups. Interestingly, the only artist to be duplicated in the responses of any of the participants was the Beatles for both *rock* and *soundtrack* categories.

Responses were equally dissimilar to a question asking participants to provide three to five terms that they felt best described their preferred genre. One term that was used to describe a number of genres, for example, was *emotional*. Several concepts and genre-specific terms did pervade multiple responses, however. The idea of a *driving rhythm* and *energetic performances* seemed to be appreciated by several *rock*

enthusiasts. In contrast, the *laid back* and *soothing* nature of *classical* music was

emphasized by several others.

The small number of total participants could be seen as the ultimate reason for

these somewhat inconclusive results. Perhaps, too, the fact that *rock* and *classical* are

very wide-ranging genre classes, encompassing a large group of varied artists

contributed to the diverse responses. The dissimilarity among *representative* artists,

though, along with other comments made in this survey support the overarching theme of

this study – being a need to step away from often rather vague genre groupings, towards

the more extensible, proposed descriptive genre classes.

That is, there exists a seemingly high degree of dissimilarity among

representative artists within any particular genre. Combined with the reluctance of one

listener to assign an artist to a perceived, unfitting genre, the overall problem associated

with completely accurate artist/genre classification seems to hinge on the inherent

vagueness of the genre *meta-classes* themselves.

4.4 Artist Classifications

It must first be noted that due to the small number of total participants, many of

the findings presented below are somewhat inconclusive. Participants were asked to

classify artists into one of 19 *official* meta-genres outlined by AllMusic.com (*soundtrack*

was excluded due to its rather wide scope and *Cajun* was excluded since that genre was

not represented in the surveyed artists). Three quarters of the artists included, displayed

in the reproduction of the online survey in Appendix 1, were the same as those retrieved

from the random Billboard sample described in section 3.2 above. The remaining artists

were randomly selected from AllMusic.com's internal "browse by genre" pages, in order to represent as wide a variety of genres as possible.

The results are presented in order to substantiate the genre assignments chosen for the AllMusic.com sample of the qualitative section of this study. Only those artists that were classified by at least 33% of the population (30 total, distinct artists) are included in the statistical results.

Of these 30 artists, 10 were assigned to the same meta-genre by 100% of the responding participants. A further 5 artists were assigned to the same meta-genre by 85% or more of the responding participants. Comparing the meta-genre of these 15 artists against their *official* classifications of AllMusic.com, all 15 were all *correctly* classified by 85% or more of the responding participants.

This classification success is perhaps not surprising, considering that the majority of these 15 artists[22] (hereafter, group A), 93%, are established groups or artists having been in existence for at least the past 5 years and often closer to 10 years. Also, the majority, 75%, of those artists receiving less than 50% (hereafter, group B) participant consensus on genre classification are groups or artists that have been in existence for significantly longer (between 10 and 30+ years)[23].

This demarcation line is perhaps not surprising, though, given that 87% of the survey participants were not teenagers (or yet born) when most of the artists of group B began their careers. Within group B, it might be argued that artists would be easier to classify if he or she had recently been very active in self-promotion or in the entertainment news recently (e.g., Celine Dion's Las Vegas performances, Britney Spears' pregnancy, etc). However, the artists in both groups A and B were selected

based on their presence on the Billboard charts, a position of seemingly high visibility, not two months before the survey was conducted.

Given the participants' familiarity with a wide variety of artists, a more likely explanation for successful or unsuccessful classification is the crossover status of a particular artist. That is, for example, according to AllMusic.com Celine Dion is a *rock* artist. Despite any renown for her vocal abilities, adult contemporary style or the relaxed venue in which her music is often performed, AllMusic.com has assigned her official *genre* to be *rock* based upon the overarching nature of her music. 0% of the participants in this study, however, classified the singer into *rock*, with 45% assigning her to *easy listening* and another 45% to *vocal*.

A similar situation occurs with the artist (again from group B), Alison Krauss and Union Station. Despite the fact that Alison Krauss and Union Station are *officially* classified by AllMusic.com under *bluegrass*, Alison Krauss herself is classified under *country*. As an aside, there are also artifact entries (presumably from typographic errors) in AllMusic.com for Alison Krauss as a classical artist as well as the lesser known Alison *Drauss - country* artist.

Taking this crossover status into account, the low 45% accurate participant classification of the group into *bluegrass* is not entirely telling of the exact situation. This is evident upon noting that another 45% of the participants classified the group into country or *folk*, two arguably neighboring crossover meta-genre possibilities.

4.5 Review Term Extraction

Participants were next requested to browse a series of 3-5 reviews taken from

AllMusic.com, and extract the most descriptive terms that they believed best represented

the genre or artist in question (artist, album, song and all identifiable information was

removed from the reviews in an attempt to prevent biased responses). These three

reviews were assigned randomly based on previous participant responses. One review

was completed by only 13% of the participants and was thus excluded from the statistical

results. The terms collected for the remaining four artists were combined and analyzed

using statistical N-gram recognition software[24]. Results are based on the top ten bi-

grams occurring for each of the four artists[25]. Though these bi-grams could not be

implemented into a classification system in the genre classification section of the study

due to the low participant turnout and expected low accuracy rates, they are presented in

Table 4.a for potential use in future research.

Judging from the terms extracted by the participants in these widely varying

reviews and artist descriptions, it is clear that certain themes do pervade. It is expected

that with future work along similar lines, a reliable set of the most frequently occurring

terms and bi-grams for a number of highly genre-representative artists can be created.

These terms, along with corresponding artist classifications could potentially be used

similarly to the text classification experiments that were performed in this study.

Green Day	*Guerillas in Tha Mist*	*Merle Haggard*	*Kenny G*
Rock opera	Urban revolutionary	Bona fide	Jazz pop
Politically charged	Fatback bass	Eternal themes	Smooth jazz
Fluid masterpiece	Bass funky	Working man	Automatic pilot
Opera punk	Punched in	Ballad urban	Hard bob
Nervy urgency	The gut	Waltz time	Pop instrumentalist
Punk witty	Funky keyboard	Country legend	Hardcore jazz
Opera intense	Angry swing	Simple ballad	Uncreative boring
Opera grandiose	Rolling fatback	Hard working	Instrumentalist contrived
Political preaching	Blindly angry	Odd percussion	Jazz smooth
Preaching punk	Finger wagging	Country free	Jazz hardcore

[Table 4.a – Participant Extracted Review Terms, top 10 most frequently occurring bigrams]

4.6 Related Genre Differentiation

The final section of the online survey requested participants to explain the difference, if any, between two related genres. Meta-genres as well as sub-genres were used; all taken from internal "browse by genre" pages on AllMusic.com. The design of the question did not lend itself to N-gram recognition, as participants often did not separately address the characteristics of each genre, but rather compared and contrasted both together. Characteristics of related genres outside the two in question were also often commented on, which led to further blurred experimental term frequency and N-gram results. Although no statistical analysis of this data is thus included, the genre

differentiations were examined qualitatively and several interesting themes were discovered.

For each of the six questions in this section[26], there was a greater than 85% response rate. Although these responses were generally widely varied, some generalities did pervade. Many participants, for example, commented on the "social implications" of *bluegrass* music, along with its improvisatory nature and tendency of emphasizing instrumental, rather than vocal, virtuosity. Many participants noted that *country* and *bluegrass* both come from the same roots, but *bluegrass* continues to hold fast to them while *country* has devolved into a pseudo-pop hybrid, generally with less emotion and soul. Interestingly, despite claims by many participants that *bluegrass* is an "older" style than *country*, at least one participant stated that *bluegrass* should be thought of as a sub-genre of *country*.

Similar breakdown in sub-genre status was apparent in the participants' responses to the differences between *rock* and *punk* music. Participants varyingly assigned *punk* as either a sub-genre of *rock*, or a separate genre altogether. Those stating the latter seemed to focus on the idea that *punk* is not so much a music genre, but a "style" of social and political rebellion out of which a type of music was born. Despite their opinion on this contentious issue, most participants seemed to agree that the *punk* musicians are able to distinguish themselves from general mainstream *rockers* through their attire, politically-charged vocals and generally "sloppier" musicianship.

Such political and social explanations for the emergence of *rap* vs. *R&B* music were virtually non-existent. Participants almost entirely focused on the spoken word vs. highly melismatic nature of the two genres. One notable difference was two participants

commented on the fact that *R&B* music typically "focuses on love" or "romantic themes" while *rap* music generally objectifies women and praises materialism.

Returning somewhat to instrumentation issues, many participants noted that *Classic Jazz* differentiates itself from *Big Band / Swing* music in that it generally uses much smaller ensembles. To go along with this idea, participants often commented on the increasingly improvisatory nature throughout the evolution of *Classic Jazz*, while *Big Band / Swing* has remained mostly formulaic; in terms of being performed from precisely notated music.

4.7 Conclusions

Throughout the evolution of musical genre, it seems that certain genres (e.g. *rock*, *R&B*) have continually expanded to encompass very diverse, emerging *sub-genres*. As Pachet and Cazaly indicated in their 2000 study, these meta-genres are neither objective nor consistent in terms of the method of derivation of *sub-genres*. Their proposed solution was the creation of a hierarchy in which *non-terminal* nodes (i.e. meta-genres) exist, but do not themselves contain any musicians or musical titles. These artists and titles would then be assigned to a sub-genre based on the most specific area into which a small group of artists will belong.

An inherent problem with this organization scheme exists, however. As several of the participants in this survey reported, numerous sub-genres could be equally well assigned to numerous *non-terminal* genres. To eliminate this point of controversy under their proposed hierarchical schema, every listener would either need to decide upon or be told into which precise genre a given artist should be classified. To accommodate many

differing perceptions of musical genre would require numerous interconnections, thus eliminating the clarity and functional harmony of the hierarchical system. What's more, as new genres continually spring up, blurred lines of ancestry would continually lose any semblance of mutual exclusivity.

Furthermore, very often the terms *style* and *genre* seem to be used interchangeably. Implications of the term *venue* also seem to factor in. The description above concerning Celine Dion illustrates this confusion very well. The *venue* in which this artist's music is typically performed, along with the occasional *style* in which the artist performs a notable song both seem to have an all-encompassing effect on the artist's ultimate *genre* assignment. This is to fault neither the music industry nor listeners, but only to elucidate a need to somehow better separate the concept of *genre* from the other terms.

The results of this survey point to fact that current genre terminology simply isn't perceived uniformly among listeners. Because the current terminology is so seemingly subjective and because sub-genre differentiations are not commonly agreed upon, any proposed automated classification system must focus only on distinguishing among a small number of highly disparate genre classes. It would be presumptuous, for example, to expect an automated system could accurately differentiate *country-rock* from *folk-rock*, for example, when presumably knowledgeable human respondents often haven't even a single explanation as to their differences.

5. Genre Classification Findings

For each of the three review samples, two classification models were created using the Rainbow text classification software. Subsequently, for each of these two models, two genre classification experiments were performed – the first using tf/idf term weighting and the second using Naïve Bayes term weighting. A total of 12 experiments were thus performed for each sample, each consisting of 50 trial runs to limit potential biases. These 12 experiments were repeated three times using: 1) 50% training set, 50% testing set; 2) 80% training set, 20% testing set; and 3) 90% training set, 10% testing set. Sample confusion matrices for the most successful of these trials are included in Appendix 9.

5.1 Test Set 1 – AllMusic.com Random Sample

The artists represented in the random AllMusic.com sample were selected randomly from the Billboard top 100 albums charts for February 1, 2005, 2004, 2000 and 1995. Though often containing a preponderance of *rock* artists, preliminary observations of the Billboard top 100 albums chart indicated that a random sample might yield a relatively even distribution of artists representing four meta-genres*: rock, R&B, rap* and *country*. Though the random sample was indeed skewed toward the broad *rock meta-genre*, compared against the normalized sample described in section 5.3, experimental classification results were actually substantially better.

Training % / Testing %	single terms tf/idf	single terms Naïve Bayes	+bi-grams tf/idf	+bi-grams Naïve Bayes
50% / 50%	77.62%	77.72%	76.23%	75.17%
80% / 20%	79.00%	77.74%	78.32%	75.11%
90% / 10%	88.40%	86.00%	87.11%	78.67%

[Table 5.a – AllMusic.com Random Sample, 50 Trials, Experimental Classification Results]

The genre classification model built on AllMusic.com and Billboard randomly sampled reviews was able to achieve a maximum of 88.40% accuracy using tf/idf term weighting and single terms only. Though the results of this series of experiments tended to improve using tf/idf over Naïve Bayes term weighting, it should be noted that the tf/idf trials took slightly more than 2.5 times as long to process than the Naïve Bayes trials (for 50 trials, approximately 15.46 seconds and 6.1 seconds per trial, respectively). While this was not a major problem given the relatively small scope of this experiment, significantly decreased performance could occur in a system based on a collection of a greater number of seed documents.

In a strong majority of the 50 trials (94%), the genre class *R&B* was classified correctly less than 50% of the time. The extremely low number of *R&B* artists, compared with the other 3 meta-genres, represented in the random sample likely contributed to this failure. Interestingly, nearly all of the classifications for *R&B* artists were mistakenly assigned to *rock* and very few were mistakenly assigned to *rap*, arguably a more closely connected meta-genre. A sample confusion matrix with the results of the single term, tf/idf, 90% training, and 10% testing trials is included in Appendix 9.

5.2 Test Set 2 – AllMusic.com Normalized Sample

Training % / Testing %	single terms tf/idf	single terms Naïve Bayes	+bi-grams tf/idf	+bi-grams Naïve Bayes
50% / 50%	69.26%	70.62%	69.96%	69.06%
80% / 20%	72.60%	73.15%	72.90%	72.40%
90% / 10%	75.60%	76.10%	77.00%	77.90%

[Table 5.b – AllMusic.com Normalized Sample, 50 Trials, Experimental Classification Results]

Clearly from the experimental results presented in table 5.b, the normalizing process substantially affected the accuracy rates of the random AllMusic.com and Billboard sample. In several experiments, they fell by more than 10%. Genre-specific accuracy rates remained comparable in all but the *rock* and *R&B* meta-genres. Accuracy for *R&B* rose only slightly from its dismal performance in the random sample to between 50% and 58%; however for *rock*, likely owing to the large number of reviews that needed to be purged, the average accuracy rate fell 14.5%. A sample confusion matrix with the results of the bi-grams, Naïve Bayes, 90% training, 10% testing trials is included in Appendix 9.

5.3 Test Set 3 – bbc.co.uk/music/reviews Reviews Sample

Training % / Testing %	single terms tf/idf	single terms Naïve Bayes	+bi-grams tf/idf	+bi-grams Naïve Bayes
50% / 50%	89.89%	88.01%	89.94%	84.68%
80% / 20%	90.79%	89.55%	90.68%	86.66%
90% / 10%	90.78%	89.79%	90.81%	87.48%

[Table 5.c – BBC Sample, 50 Trials, Experimental Classification Results]

As displayed in table 5.c, the BBC review sample yielded a maximum accuracy rate of 90.81% using bi-grams and a tf/idf weighting scheme, with a minimum classification accuracy of 86.62% and a maximum of 94.20% over individual trials. The only categories holding this overall percentage back seem to be "rock and alt." and "classic pop" - which consistently score between 82% and 90% accuracy. As there exists a great deal of similarity between these two genres, it is not surprising that the majority of inaccurate genre assignments for *rock and alt* are made to *classic pop* and vice versa. Similar discrepancies exist between the *experimental* and *jazz* classes, likely owing to the high degree of crossover between these two groups. A sample confusion matrix illustrating the complete results is included in Appendix 9.

To investigate the effect of the confusion that *rock and alt* vs. *classic pop* caused on the system, a set of 50 trials were run on a genre classification model built excluding *classic pop* from the system. These 50 trials yielded a range of 92-96% accuracy, and a mean of 93.5%. With less randomized selection of reviews and perhaps more mutually-exclusive meta-genre groups, based on these results it would not at all be unlikely to see accuracy levels approach or exceed 95%.

5.4 Conclusions

Accuracy generally appears to fall with the inclusion of bi-grams and tri-grams into the genre classification models. Any increase in accuracy that they introduced was limited to a maximum of 1.4%, and very often much less. Such small increases, especially occurring most often in trials performed with only a fifty percent training set, is consistent with slight variations in genre-specific classification accuracy rates

depending on the particular random set of documents used to train the model in each trial. Therefore, an occasional small increase under the bi-gram model is statistically insignificant.

Although in these experiments by-lines were removed from the end of each review in the model, successful classification would definitely improve (if only slightly) if reviewer names were not removed. For instance, prior to removing by-lines in this experiment, the top ten log odds weighted terms for five of the seven genres contained at least one reviewer's surname, while three of the seven contained two or more surnames. Given a collection of reviews in which a unique group of reviewers focuses on only one or two related meta-genres, a surname could actually prove as representative of a genre class as any other term. In exchange for increased extensibility of the system over reviewer independent collections, the removal of these bylines did slightly reduce accuracy rates.

Support vector machines were also implemented as a third possible weighting method, however they did not perform nearly as well as either tf/idf or Naïve Bayes; scoring 10-20% lower accuracy on average. Moreover, the amount of time to execute a single trial using SVMs was found to be approximately seven orders of magnitude greater than the other two methods.

The basic stop-word list was found to be somewhat ineffective when applied to the various review samples that were collected. Terms of limited musically expressive information seemed to span nearly all of the meta-genres (e.g., song, music, album, band, track, and sound). Although the precise effect of the inclusion of these terms in a modified stop-word list could not be determined, trials performed on models built with

the modified list seemed to increase accuracy rates by one to two percent. Similar experimentation both with and without the use of Porter stemming yielded inconclusive results.

As anticipated, an increase of the training percentage had substantial effect on the overall accuracy of the system. Though not reported in the findings, tests were performed with both very high and very low training percentages. These tests resulted in maximum floor and ceiling accuracy rates of -5.5% and +1.2%, respectively for the BBC sample. For the Allmusic.com / Billboard samples, the floor and ceilings varied significantly more, presumably due to the far fewer number of documents in the sample.

Overall, the experimental results indicate that a varied, random sample of reviews is capable of producing the highest classification accuracy rates. With a mean accuracy as high as 90.81%, the system is comparable with and exceeds many of the findings presented in the influential studies described in section 2. Considering the length of time to model, train and run trials, compared against the amount of disk space required to store the models, the experimental results support the use of single terms and the Naïve Bayes weighting algorithm.

6. Data Triangulation

6.1 User-Defined Genre Classes vs. Experimental Genre Classes

As described in Section 5.3, question 12 of the survey requested the participants to provide 3-5 terms they felt best described their preferred genre of music. Additionally, question 13 asked participants to name 3-5 artists who they felt best represented their preferred genre. These two response groups were combined by genre, and were examined after both the survey and genre classification sections had been completed. Only those genres with two or more responses recorded were used, resulting in three genre classes: *classical*, *rock* and *country*. The Rainbow software was again used to create a classification model, this time using the three response groups as the training information.

To test this final classification model, the BBC and AllMusic.com samples were combined as follows. The three corresponding BBC review groups (*classical*, *rock* and *alternative*, and *country*) were extracted from the initial BBC sample. For the *rock* and *country* meta-genres, the 74 reviews obtained from the AllMusic.com sample were combined with the corresponding BBC groups. All of the reviews were thus ultimately separated into three large test groups corresponding to the three prevalent, participant-reported meta-genres.

Though, again, ultimately hindered by a low participant turn-out, the classification accuracy rates (necessarily static when testing a group of documents outside of the

model) were actually only 5-10% lower than those of the AllMusic.com normalized

sample experimentation describe in section 4.2. Presented in table 6.1 is a confusion

matrix illustrating the results.

Genre	Classical	Country	Rock	Total
Classical	107	31	30	63.69%
Country	13	128	55	65.31%
Rock	41	40	190	70.11%

[Table 6.1 – Confusion matrix illustrating accurate genre assignment of BBC & AllMusic.com album reviews using a model trained on participant responses]

Although the accuracy rates are significantly lower than those found using the

BBC review collection, a system trained on survey responses such as those retrieved in

this study could potentially yield highly accurate, listener-specific descriptive genre

classes. Had this study focused the reviews presented to participants around only one or

two distinct meta-genres, the participant-reported descriptors would likely be more

specified and thus ultimately more accurate. It is further expected that a music

classification trained on such participant-collected data could better tailor its decisions to

individual listener's tastes, and hopefully step a bit further away from music industry

defined genre classes.

7. **Future Work and Overall Conclusions**

A logical follow-up to this study, building on these experimental results, will be to establish a hierarchical genre classification model capable of using this upper level, meta-genre determination as a starting point for more precise, lower level classification. Based upon many of the survey participants' desired organizational scheme of a tiered system, first by genre or mood and next by artist name or song title, interesting future work might also include research into genre and its relation to mood and how the two might be combined in a similar classification system.

The results of the genre classification experiments in this study were promising, specifically when using the BBC review corpus. At a maximum mean accuracy rate of 90.5%, reaching as high as 94.20% in individual trials, the results of the text categorization procedure using web-based music reviews is comparable to the results of many previous studies. Specifically, the accuracy level is comparable to that of the 2004 Knees et al. study, despite the fact that only half the number of genre classes was used in the present study. In a more comparable study - in that it attempts classification into one of seven genre classes – from 2003, McKinney and Breebaart classified musical audio signals at a maximum accuracy rate of 74%.

The accuracy of the present qualitative study thus indicates that a classification system using either the Naïve Bayes or tf/idf weighting algorithms, built from widely

accessible album review text can categorize music at around 90-91% accuracy. Further research is needed to determine the feasibility of integrating such a model into an integrated, automated system capable of using minimal user provided information in order to dynamically organize and visualize relationships between artists and songs in their personal digital music collections.

1   "a vector space of descriptive textual terms crawled from the web" (Whitman & Smaragdis, 2002, pp. 2-3)
2   " allmusicguide.com, amazon.com and mp3.com" (Pachet, 2000, p.3)
3   "top nodes in the hierarchy" (Pachet, 2000, p. 2)
4   Currently located at http://www.allmusic.com
5   http://www.allmusic.com
6   http://www.pitchforkmedia.com
7   This point is not stated in the study itself; however, four terms are frequently displayed in the examples provided.
8   http://phpsurveyor.sourceforge.net
9   These schemes will be found both through specific multiple choice questions and analysis of the user's personal digital music library using the software tool described in this section.
10   This data is made available directly off of billboard's homepage: http://www.billboard.com/
11   Electronica, Gospel and Jazz
12   Three reviews were retrieved from Amazon.com and two were taken from www.countryreview.com
13   1) Classical, 2) Classic Rock/Pop, 3) Experimental, 4) Folk & Country, 5) Jazz, 6) Rock & Alternative, 7) World
14   http://www.bbc.co.uk/music/reviews/
15   1) Blues, Soul & Reggae, 2) Dance, 3) Easy & Soundtracks, 4) Pop, 5) Urban
16   Approximately 100 reviews were cross-listed under multiple meta-genres. Reviews that were found in multiple genres (typically jazz and experimental) were excluded from the sample altogether.
17   http://www-2.cs.cmu.edu/~mccallum/bow/rainbow/
18   http://www.lextek.com/manuals/onix/stopwords1.html
19   Downie, J.S. (1999). Evaluating a Simple Approach to Music Information Retrieval: Conceiving Melodic N-grams as Text.
       Doraisamy, S & Rueger, S. (2003). Robust Polyphonic Music Retrieval with N-Grams
20   Such as that described in Pachet's 2000 study
21   1) Based on single word log-odds weighting
       2) Based on combined single word and second level n-gram (bi-gram) log-odds weighting
22   Creed, Method Man, Clay Walker, Xzibit, Alan Jackson, George Strait, U2, Juvenile, Green Day, Destiny's Child, Snoop Dogg, No Doubt, Dixie Chicks, B.I.G., and Velvet Revolver
23   Celine Dion, Alison Krauss, Herb Alpert, Kraftwerk, Al Green, Jagged Edge, Mannheim Steamroller, and Lou Bega
24   Ted Pedersen's N-Gram Statistics Package - http://www.d.umn.edu/~tpederse/nsp.html
25   Green Day, Guerillas in Tha Mist, Merle Haggard and Kenny G
26   Bluegrass vs. Country, Rock vs. Punk, Rap vs. R&B, Country-Rock vs. Folk-Rock, Big Band/Swing vs. Classic Jazz,

Appendix 1 – Online Survey Reproduction

PHPSURVEYOR   **Music Classification Survey**

You are being asked to take part in a research study. To join the study is voluntary. You may refuse to join, or you may withdraw your consent to be in the study, for any reason, without penalty. Withdrawing from the study will not affect your class standing or grades at UNC-Chapel Hill.

The amount of time required should be approximately 15-25 minutes. Over the next 10-14 days, a total of approximately 30-45 respondants are anticipated to participate.

You are invited to participate in this survey because of your affiliation with the UNC-CH school of music. The primary goal of the research is to compare your methods of classification with those of the music industry and professional music critics. All information that you provide will be kept confidential.

Completion of this survey and its final submission constitutes your consent to the use of the information you provide for research purposes. You have the opportunity to "opt-out" of the survey at any time during the survey and for any reason. To do so, you must click "exit and clear survey" at the bottom left of any screen. Make sure to close all instances (all windows) of the internet browser which you are using.

Following successful completion of the survey, all participants will be entered to win 1 of 5 $10 iTunes gift certificates. Winners will be notified by email (see below) on April 16, 2005.

The survey is divided into 3 main sections (general information, artist classification, review classification). For each section in which you complete 75% or more of the questions, you will be given one (1) chance to win the compensation (e.g. completing one and three-fourths sections would give you two (2) chances to win, completing only two-thirds of the first section would give you zero (0) chances to win). Names of winners will be drawn at random, and you may only be

chosen once.

In the survey, the only piece of identifiable information you will be asked for will be your email address. Providing your email is completely optional. However, you will not be eligible for the iTunes drawing if you do not choose to provide it as there will be no way to contact you following the survey. All provided email addresses will be erased following the survey and the gift certificate distribution.

If you have any questions about any of questions or the study in general, please contact Stephanie Haas (stephani@ils.unc.edu)

If you have any questions about your rights as a participant, you may contact the Behavioral Institutional Review Board, which approved this study, at (919) 962-7761 or aa-irb@unc.edu."

k

Are you 18 years of age or older?

- ☐ Yes
- ☐ No

What is your age?

- ☐ 18 - 22 years
- ☐ 23 - 29 years
- ☐ 30 - 39 years
- ☐ 40 - 49 years
- ☐ 50 years or older
- ◉ No answer

This survey primarily concerns the realm of "popular" music, such as that typically found on the BillBoard top 200 chart. Responses will be most useful from those with a strong interest in this type of music. Whether or not this is true for you, please simply skip - click "next" without selecting or entering any responses - any questions (or parts of any question) concerning artists/genres with which you are not familiar.

What is your email address?

[   ]

[?] This is an optional question. However, you will not be eligible for the iTunes distribution if you do not provide this piece of contact information.

What is your gender?

○ Female

○ Male

◉ No answer

Please select your current grade level.
Choose only one of the following

○ Freshman

○ Sophomore

○ Junior

○ Senior

○ Graduate (first or second year)

○ Ph.D. candidate

○ Not currently a student

○ Other [   ]

◉ No answer

On average, about how many hours per week do you spend listening to music?

○ 0 - 2 hours

○ 3 - 5 hours

○ 6 - 8 hours

○ 9 - 11 hours

○ 12 or more hours

◉ No answer

On average, how many hours do you spend each week reading about music (e.g. album reviews, artist biographies, music-related news)?

◻ 0 - 2 hours

◻ 3 - 5 hours

◻ 6 - 8 hours

◻ 9 - 11 hours

◻ 12 or more horus

◻ No answer

? Please do not take into account any time spent studying classical music history, literature, & theory.

Prior to purchasing a new recording, do you typically read review(s) beforehand?

◻ Yes

◻ No

◉ No answer

What is your favorite genre of music?
Choose only one of the following

☐ Avant-Garde, "New" Music

☐ Bluegrass

☐ Blues

☐ Cajun

☐ Celtic

☐ Classical Music (any sub-genre)

☐ Comedic music

☐ Country

☐ Easy Listening

☐ Electronica & Techno

☐ Folk

☐ Gospel

☐ Jazz

☐ Latin

☐ New Age

☐ R&B (Rhythm & Blues)

☐ Rap

☐ Reggae

☐ Rock

☐ Soundtrack (television or movie music)

☐ Vocal

☐ World

☐ Other

☉ No answer

Considering the genre that you selected in the previous question, please provide 3-5 artists that you believe are most representative of this genre.

Considering the same favorite genre that you previously selected, please list any terms that you might be likely to use to best describe music of that genre.

? Separate terms with a comma (e.g. Rock, beebop, goth, happy, loud, New York City, powerful, etc...)

During which time period was your favorite music written or first performed?

◻ Music from the 1960s or earlier (any genre)

◻ Music from the 1970s (any genre)

◻ Music from the 1980s (any genre)

◻ Music from the 1990s (any genre)

◻ Music from the 2000s (any genre)

◻ I enjoy music from multiple time periods

Considering your own digital music collection, how would you say you organize your files?
Check any that apply

- ☐ by Artist (Last Name, First Name or Group Name alphabetically)
- ☐ by Genre (e.g. Rock, Country, Rap, Classical, etc.)
- ☐ by Year (e.g. 1990s music, 1980s music, current music, etc.)
- ☐ by Mood (e.g. Party, Relaxation, Working, background, etc.)
- ☐ by Intrument (e.g. Vocal, Strings, Brass, Winds, etc.)
- ☐ by Favorites/Preference (e.g. must play everyday, once in a while, rarely, etc.)
- ☐ Multiple organization schemes (first by Artist, then by year/mood, etc.)
- ☐ Not Applicable (No digital music collection, no organization whatsoever, etc.)

Other: ☐

? If you do not have much or any digital music, how do you organize your physical music collection (CDs,LPs,cassettes)?

How do you organize your physical music collection (CDs,LPs,cassettes)?
Check any that apply

- ☐ by Artist (Last Name, First Name or Group Name alphabetically)
- ☐ by Genre (e.g. Rock, Country, Rap, Classical, etc.)
- ☐ by Year (e.g. 1990s music, 1980s music, current music, etc.)
- ☐ by Mood (e.g. Party, Relaxation, Working, background, etc.)
- ☐ by Intrument (e.g. Vocal, Strings, Brass, Winds, etc.)
- ☐ by Favorites/Preference (e.g. must play everyday, once in a while, rarely, etc.)
- ☐ Multiple organization schemes (first by Artist, then by year/mood, etc.)
- ☐ Not Applicable (No digital music collection, no organization whatsoever, etc.)

Other: ☐

Given the following list of artists, please assign the most appropriate genre to each

	U2	T.I.	George Strait	Big & Rich	Tarras	Celine Dion	Alison Kraus + Union Station	Modest Mouse	Morton Feldman	Velvet Revolver
Avant-Garde	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Bluegrass	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Blues	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Celtic	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Classical	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Country	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Easy Listening	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Electronica & Techno	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Folk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Gospel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Jazz	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
New Age	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Latin	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
R&B	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Rap	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Reggae	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Rock	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Vocal	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
World	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
N/A	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

? Although list may seem incomplete, please assign artists to the highest level genre to which you feel they belong.

Given the following list of artists, please assign the most appropriate genre to each

	Crossfade	Nas	Black Eyed Peas	Breaking Benjamin	Kenny G	Celine Dion	Alison Kraus + Union Station	Queen Latifah	Gavin DeGraw	Young Buck
Avant-Garde	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Bluegrass	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Blues	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Celtic	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Classical	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Country	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Easy Listening	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Electronica & Techno	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Folk	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Gospel	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Jazz	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
New Age	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Latin	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
R&B	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Rap	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Reggae	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Rock	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Vocal	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

World	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
N/A	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

? Although list may seem incomplete, please assign artists to the highest level genre to which you feel they belong.

Given the following list of artists, please assign the most appropriate genre to each

	Xzibit	Green Day	Harry Choates	Destiny's Child	Herb Alpert	Snoop Dogg
Avant-Garde	☐	☐	☐	☐	☐	☐
Bluegrass	☐	☐	☐	☐	☐	☐
Blues	☐	☐	☐	☐	☐	☐
Celtic	☐	☐	☐	☐	☐	☐
Classical	☐	☐	☐	☐	☐	☐
Country	☐	☐	☐	☐	☐	☐
Easy Listening	☐	☐	☐	☐	☐	☐
Electronica & Techno	☐	☐	☐	☐	☐	☐
Folk	☐	☐	☐	☐	☐	☐
Gospel	☐	☐	☐	☐	☐	☐
Jazz	☐	☐	☐	☐	☐	☐
New Age	☐	☐	☐	☐	☐	☐
Latin	☐	☐	☐	☐	☐	☐
R&B	☐	☐	☐	☐	☐	☐
Rap	☐	☐	☐	☐	☐	☐

Reggae	☐	☐	☐	☐	☐	☐
Rock	☐	☐	☐	☐	☐	☐
Vocal	☐	☐	☐	☐	☐	☐
World	☐	☐	☐	☐	☐	☐
N/A	☐	☐	☐	☐	☐	☐

[?] Although list may seem incomplete, please assign artists to the highest level genre to which you feel they belong.

Given the following list of artists, please assign the most appropriate genre to each

Korn Enirque Iglesias The Lord of the Rings: The Return of the The Offspring Fefe Dobson Daft Punk Hoobastank Bill Evans Jason Mraz The Crystal Method

King

Avant-Garde ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
Bluegrass ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
Blues ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
Celtic ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
Classical ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
Country ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
Easy Listening ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
Electronica & Techno ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
Folk ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
Gospel ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
Jazz ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
New Age ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
Latin ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
R&B ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
Rap ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
Reggae ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
Rock ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
Vocal ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐
World ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐

N/A ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

? Although list may seem incomplete, please assign artists to the highest level genre to which you feel they belong.

Given the following list of artists, please assign the most appropriate genre to each

	Evanescence	No Doubt	Chingy	Westside Connection	Kraftwerk	Alan Jackson	Juvenile	Coldplay	Arlo Guthrie	Nelly
Avant-Garde	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Bluegrass	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Blues	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Celtic	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Classical	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Country	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Easy Listening	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Electronica & Techno	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Folk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Gospel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Jazz	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
New Age	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Latin	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
R&B	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Rap	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Reggae	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Rock	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Vocal	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
World	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
N/A	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

? Although list may seem incomplete, please assign artists to the highest level genre to which you feel they belong.

Given the following list of artists, please assign the most appropriate genre to each

	Menudo	Black Eyed Peas	Keith Urban
Avant-Garde	○	○	○
Bluegrass	○	○	○
Blues	○	○	○
Celtic	○	○	○
Classical	○	○	○
Country	○	○	○
Easy Listening	○	○	○
Electronica & Techno	○	○	○
Folk	○	○	○
Gospel	○	○	○
Jazz	○	○	○
New Age	○	○	○
Latin	○	○	○
R&B	○	○	○
Rap	○	○	○
Reggae	○	○	○

Rock	☐	☐	☐
Vocal	☐	☐	☐
World	☐	☐	☐
N/A	☐	☐	☐

[?] Although list may seem incomplete, please assign artists to the highest level genre to which you feel they belong.

Given the following list of artists, please assign the most appropriate genre to each

	Al Green	Jagged Edge	Dixie Chicks	Mannheim Steamroller	Creed	Lou Bega	Juvenile	Macy Gray	The Notorious B.I.G.
Avant-Garde	☐	☐	☐	☐	☐	☐	☐	☐	☐
Bluegrass	☐	☐	☐	☐	☐	☐	☐	☐	☐
Blues	☐	☐	☐	☐	☐	☐	☐	☐	☐
Celtic	☐	☐	☐	☐	☐	☐	☐	☐	☐
Classical	☐	☐	☐	☐	☐	☐	☐	☐	☐
Country	☐	☐	☐	☐	☐	☐	☐	☐	☐
Easy Listening	☐	☐	☐	☐	☐	☐	☐	☐	☐
Electronica & Techno	☐	☐	☐	☐	☐	☐	☐	☐	☐
Folk	☐	☐	☐	☐	☐	☐	☐	☐	☐
Gospel	☐	☐	☐	☐	☐	☐	☐	☐	☐
Jazz	☐	☐	☐	☐	☐	☐	☐	☐	☐
New Age	☐	☐	☐	☐	☐	☐	☐	☐	☐
Latin	☐	☐	☐	☐	☐	☐	☐	☐	☐
R&B	☐	☐	☐	☐	☐	☐	☐	☐	☐
Rap	☐	☐	☐	☐	☐	☐	☐	☐	☐
Reggae	☐	☐	☐	☐	☐	☐	☐	☐	☐

Rock	▢	▢	▢	▢	▢	▢	▢	▢	▢
Vocal	▢	▢	▢	▢	▢	▢	▢	▢	▢
World	▢	▢	▢	▢	▢	▢	▢	▢	▢
N/A	▢	▢	▢	▢	▢	▢	▢	▢	▢

[?] Although list may seem incomplete, please assign artists to the highest level genre to which you feel they belong.

Given the following list of artists, please assign the most appropriate genre to each

	Lonestar	Mandy Moore	Kool & the Gang	Third Eye Blind	Filter	Beastie Boys	98 Degrees	Shabba Ranks
Avant-Garde	▢	▢	▢	▢	▢	▢	▢	▢
Bluegrass	▢	▢	▢	▢	▢	▢	▢	▢
Blues	▢	▢	▢	▢	▢	▢	▢	▢
Celtic	▢	▢	▢	▢	▢	▢	▢	▢

Classical	☐	☐	☐	☐	☐	☐	☐	☐
Country	☐	☐	☐	☐	☐	☐	☐	☐
Easy Listening	☐	☐	☐	☐	☐	☐	☐	☐
Electronica & Techno	☐	☐	☐	☐	☐	☐	☐	☐
Folk	☐	☐	☐	☐	☐	☐	☐	☐
Gospel	☐	☐	☐	☐	☐	☐	☐	☐
Jazz	☐	☐	☐	☐	☐	☐	☐	☐
New Age	☐	☐	☐	☐	☐	☐	☐	☐
Latin	☐	☐	☐	☐	☐	☐	☐	☐
R&B	☐	☐	☐	☐	☐	☐	☐	☐
Rap	☐	☐	☐	☐	☐	☐	☐	☐
Reggae	☐	☐	☐	☐	☐	☐	☐	☐
Rock	☐	☐	☐	☐	☐	☐	☐	☐
Vocal	☐	☐	☐	☐	☐	☐	☐	☐
World	☐	☐	☐	☐	☐	☐	☐	☐
N/A	☐	☐	☐	☐	☐	☐	☐	☐

? Although list may seem incomplete, please assign artists to the highest level genre to which you feel they belong.

Given the following list of artists, please assign the most appropriate genre to each

	Desmond Dekker	Funkmaster Flex	Montell Jordan	Vertical Horizon	Beck
Avant-Garde	☐	☐	☐	☐	☐
Bluegrass	☐	☐	☐	☐	☐
Blues	☐	☐	☐	☐	☐
Celtic	☐	☐	☐	☐	☐
Classical	☐	☐	☐	☐	☐
Country	☐	☐	☐	☐	☐
Easy Listening	☐	☐	☐	☐	☐
Electronica & Techno	☐	☐	☐	☐	☐
Folk	☐	☐	☐	☐	☐
Gospel	☐	☐	☐	☐	☐
Jazz	☐	☐	☐	☐	☐
New Age	☐	☐	☐	☐	☐
Latin	☐	☐	☐	☐	☐
R&B	☐	☐	☐	☐	☐
Rap	☐	☐	☐	☐	☐
Reggae	☐	☐	☐	☐	☐

	Rock	☐	☐	☐	☐	☐
	Vocal	☐	☐	☐	☐	☐
	World	☐	☐	☐	☐	☐
	N/A	☐	☐	☐	☐	☐

? Although list may seem incomplete, please assign artists to the highest level genre to which you feel they belong.

The following review describes a bluegrass artist's album. Skim the following review and try to extract 4-5 of the most descriptive terms:

[artist] has the voice of an angel. This phrase may sound so overblown that it becomes trite, but it is true. Her voice is beautiful and compelling and sounds as much like hope as it does the final moments before the giving up begins. I know punk rock boys smitten with [artist2] and [artist3] who swear by her, and this was before her transformation into a hip blonde. Those who became transfixed by bluegrass and American roots music a few years back, now own the [film] soundtrack and at least one [artist] CD in their collection.

The woman can sing, the band can play, and in an industry that pushes artifice (is there a contemporary country song out there that doesn't sound like it was made expressly for a commercial?), they are the real deal: genre-music that has crossed over because of their sincerity.

[album] is a musical travelogue. It is music made for and by the road. The metaphor isn't for searching, though. It is for the isolation found there and the clawed-at idea that self-imposed solitude can somehow protect one from being hurt. The road is refuge. The narrators in these songs are tough. They've accepted the bed they've made for themselves. They're telling their stories with determination. The songs never ask for pity, but sadness shows through on its own. Lonely is equal parts road as freedom and road as illusion. It is both something that never gets in your way, and a reason to ward off the dogs of security and the suspicion that stopping to settle down can only mean death while still living. The characters note their inability to commit ("[song_title") or if they have committed, their inability to remain faithful ("song_title2"). They're helpless in front of the road ("song_title3") and too scared to stop to see what else life could have to offer ("song_title4"). There's an acknowledgment that the lifestyle can leave one horribly lonely, but also the acceptance that this is all there is. Every life has its drawbacks, and this record chronicles honestly a born traveler's world.

[Artist] holds the reins here, with [artist4] and [artist5] piping in to add to the authentic bluegrass feel of the record. The band -- [Artist] (fiddle), [artist5] (guitar), [Artist6] (banjo, guitar), [Artist7] (bass), and [Artist8] (dobro) -- are professionals, but never dull. It is really the sequencing of the tracks that gives it its bluegrass feel. Ballads give way to hoedowns. The tracks that [artist] sings are the more subdued, veering away from the more extreme sounds of the genre. Still, fiddle and dobro come in at the right moments, never selling out completely. Everything is forgiven anyway, because of her voice. It is technically perfect. That should be boring. Instead, she takes this flawless instrument of hers and gives it soul. She doesn't need to let it crack or try to hit a lower note to add any texture. The texture is a living thing inside of her. It's indescribable, really. You don't know that you love [artist] until you sit down and really take in one song. Then, it's done; you're hooked.

I suspect that as sensitive, artistic young women seem to find [artist9] somewhere

between the ages of 17 and 23, in a generation or so they will find both [artist9] and [artist]. [Album] will no doubt be one that will stand out, the strongest and most consistent of her adult releases (her first album was recorded when she was 14). It is a defining moment for the band. It is a release that, almost at first listen, sounds like a standard in an already impressive career. And beyond all that, [artist] has the voice of an angel. With no hype around that phrase at all, what better reason to stop and buy this record today?

[   ]

? Please separate terms with commas (e.g. "Term1, Term2, Term3, Term4, etc.")

The following review describes a rap and/or r&b artist's album. Skim the following review and try to extract 4-5 of the most descriptive terms:

Nominally a rap group, in truth [artist] call on so many forms of songwriting and production that slotting them into hip-hop is like slotting [artist2] into R&B -- technically true, but very limiting. [Album], the group's third straight winning LP, doesn't have top-notch rapping, but as driven by frontman [artist2], it does possess some of the most boundary-pushing productions in contemporary, (mostly) uncommercial hip-hop -- right up at the level occupied by [artist3] and [artist4]. The smart, brassy opening club thump "[song_title]" hits another level with a sly bridge flaunting some heavy metallic slide guitar, while the highly pressurized love jam "[song_title2]" features great interplay between [artist4] and new member [artist5].

Space doesn't allow for description of each track, but suffice to say any [artist2] track is going to feature loads of ideas and fresh sounds, not to mention plenty of stylistic change-ups -- from the digital-step ragga of "[song_title3]" (featuring [artist6]) to the Latinized, loved-up "[song_title4]." Like a latter-day [artist7], [artist8] know how to get a party track moving, and add a crazy stupid rhyme or two ("[lyric]" from the suitably titled "[song_title4]").

[   ]

? Please separate terms with commas (e.g. "Term1, Term2, Term3, etc.")

The following review describes a jazz / easy listening artist's album. Skim the

following review and try to extract 4-5 of the most descriptive terms:

Throughout the 1990s, [artist] was the whipping boy of the jazz world the instrumentalist that hardcore jazz improvisers loved to bash when the subject of smooth jazz came up. [Artist]'s huge following responded that the attacks were silly and misguided because the saxman was the first to admit that he was primarily a pop instrumentalist and wasn't pretending to be anything else. True, it was silly for jazz artists to judge [artist] by hard bop standards when hard bop (or even soul-jazz or fusion) was a long way from what he was going for. And [album] isn't bad because it's a pop album or because it's commercial; it's bad because of its complete lack of soul, substance or creativity. There's nothing even remotely tasteful about interchangeable tunes like "[song_title]," "[song_title2]" and "[song_title3]," all of which are about as bloodless and schlocky as it gets. Always sounding like he's on automatic pilot, [artist] takes no risks whatsoever and sees to it that one song is as shamelessly contrived as the next. Even the presence of the great R&B crooner [artist2] on "[song_title4]" can't save this one-dimensional release. Whether you're into pop or jazz, [album] is unlistenable.

Please separate terms with commas (e.g. "Term1, Term2, Term3, etc.")

The following review describes a vocal artist's album. Skim the following review and try to extract 4-5 of the most descriptive terms:

The entry into the sorority of motherhood is a profound experience. The life-altering passage is celebrated magnificently in this audio/visual collaboration between [artist] and [artist2].

[artist] is a quintessential vocalist with countless recordings to her credit and is a newer mother with a willingness to share her passion for her son. There are several options for this treasure in a variety of price ranges so explore which one is better for you. This option is the cd version with a few smaller pictures by [artist2] and no dvd. The cd/dvd box set includes insight a dvd into the project and a cd booklet-size of photographs. [Artist2] has artistically interpreted the infatuating forms of infants in photography and the larger more costly coffee-table book version of "[album]" contains by far the greater collection of enlarged photographs and the cd.

[Artist] teamed up with [artist3] and [artist4] on the cd (an unbeatable combination of Grammy-Award-winning brilliance in sound) and a countless array of musicians to

generate unfeigned loving tracks of joy.

[Artist] capitalizes on her experience with ballads but the softer more emotive tracks like "[song_title]" and "[song_title2]" are my favorites with a gentle piano and orchestra that reminded me of the bonding of quiet midnight feedings. "[song_title3]," has lyrics that made me well-up; and her version of "[song_title4]" is equally lovely in English and French. "[Song_title5]" has long been a favorite song and this one is truly amazing sung with sincere passion. I love art born of life's experiences; when it's this authentic I swear I can "feel" the difference.

"[song_title6]" is more playful and uptempo but none of the tracks are jarring in volume or push the power [artist] can draw from her tiny frame. I believe great care was taken to ensure the songs were all just as suitable for rocking-chair moments between a mother (or father) and a newborn or recalling moments of parenthood at any age. These are all sensitively pulled together to create a masterpiece theme of a gift for any mom or parent.

Please separate terms with commas (e.g. "Term1, Term2, Term3, etc.")

The following review describes an alternative rock artist's album. Skim the following review and try to extract 4-5 of the most descriptive terms:

It's a bit tempting to peg [artist]'s sprawling, ambitious, brilliant seventh album, [album], as their version of a [artist2] album, the next logical step forward from the [artist3]-inspired popcraft of their underrated 2000 effort, [album2], but things aren't quite that simple. [Album] is an unapologetic, unabashed rock opera, a form that [artist4] pioneered with [album3], but [artist] doesn't use that for a blueprint as much as they use the [artist2]'s mini-opera "[song_title]," whose whirlwind succession of 90-second songs isn't only emulated on two song suites here, but provides the template for the larger 13-song cycle. But [artist2] are only one of many inspirations on this audacious, immensely entertaining album. The story of [artist5] has an arc similar to [artist6]'s landmark punk-opera [album3], while the music has grandiose flourishes straight out of both [album4] and [album5] (the '50s pastiche "[song_title2]" is punk rock [artist7]), all tied together with a nervy urgency and a political passion reminiscent of [artist8], or all the anti-Reagan American hardcore bands of the '80s. These are just the clearest touchstones for [album], but reducing the album to its influences gives the inaccurate impression that this is no more than a patchwork quilt

of familiar sounds, when it's an idiosyncratic, visionary work in its own right. First of all, part of [artist]'s appeal is how they have personalized the sounds of the past, making time-honored guitar rock traditions seem fresh, even vital. With their first albums, they styled themselves after first-generation punk they were too young to hear firsthand, and as their career progressed, the group not only synthesized these influences into something distinctive, but chief songwriter [artist8] turned into a muscular, versatile songwriter in his own right.

Warning illustrated their growing musical acumen quite impressively, but here, the music isn't only tougher, it's fluid and, better still, it fuels the anger, disillusionment, heartbreak, frustration, and scathing wit at the core of [album]. And one of the truly startling things about [album] is how the increased musicality of the band is matched by [artist8]'s incisive, cutting lyrics, which effectively convey the paranoia and fear of living in American in days after 9/11, but also veer into moving, intimate small-scale character sketches. There's a lot to absorb here, and cynics might dismiss it after one listen as a bit of a mess when it's really a rich, multi-faceted work, one that is bracing upon the first spin and grows in stature and becomes more addictive with each repeated play. Like all great concept albums, [album] works on several different levels. It can be taken as a collection of great songs -- songs that are as visceral or as poignant as [artist] at their best, songs that resonate outside of the larger canvas of the story, as the fiery anti-Dubya title anthem proves -- but these songs have a different, more lasting impact when taken as a whole. While its breakneck, freewheeling musicality has many inspirations, there really aren't many records like [album] (bizarrely enough, the [artist9]'s [album] is one of the closest, at least on a sonic level, largely because both groups draw deeply from the kaleidoscopic "[song_title4]"). In its musical muscle and sweeping, politically charged narrative, it's something of a masterpiece, and one of the few -- if not the only -- records of 2004 to convey what it feels like to live in the strange, bewildering America of the early 2000s.

Please separate terms with commas (e.g. "Term1, Term2, Term3, Term4, etc.")

Given the following list of artists, please assign the most appropriate genre to each

Madonna Live Candlebox Bjork Flatt & Scruggs Anita Baker Nine Inch Nails George Strait Kenny G

Avant-Garde	☐	☐	☐	☐	☐	☐	☐	☐	☐
Bluegrass	☐	☐	☐	☐	☐	☐	☐	☐	☐
Blues	☐	☐	☐	☐	☐	☐	☐	☐	☐
Celtic	☐	☐	☐	☐	☐	☐	☐	☐	☐
Classical	☐	☐	☐	☐	☐	☐	☐	☐	☐
Country	☐	☐	☐	☐	☐	☐	☐	☐	☐
Easy Listening	☐	☐	☐	☐	☐	☐	☐	☐	☐
Electronica & Techno	☐	☐	☐	☐	☐	☐	☐	☐	☐
Folk	☐	☐	☐	☐	☐	☐	☐	☐	☐
Gospel	☐	☐	☐	☐	☐	☐	☐	☐	☐
Jazz	☐	☐	☐	☐	☐	☐	☐	☐	☐
New Age	☐	☐	☐	☐	☐	☐	☐	☐	☐
Latin	☐	☐	☐	☐	☐	☐	☐	☐	☐
R&B	☐	☐	☐	☐	☐	☐	☐	☐	☐
Rap	☐	☐	☐	☐	☐	☐	☐	☐	☐
Reggae	☐	☐	☐	☐	☐	☐	☐	☐	☐
Rock	☐	☐	☐	☐	☐	☐	☐	☐	☐
Vocal	☐	☐	☐	☐	☐	☐	☐	☐	☐
World	☐	☐	☐	☐	☐	☐	☐	☐	☐
N/A	☐	☐	☐	☐	☐	☐	☐	☐	☐

[?] Although list may seem incomplete, please assign artists to the highest level genre to which you feel they belong.

Given the following list of artists, please assign the most appropriate genre to each

	Des Ree	Method Man	Warren G	Mahalia Jackson	Clay Walker

Avant-Garde	☐	☐	☐	☐	☐
Bluegrass	☐	☐	☐	☐	☐
Blues	☐	☐	☐	☐	☐
Celtic	☐	☐	☐	☐	☐
Classical	☐	☐	☐	☐	☐
Country	☐	☐	☐	☐	☐
Easy Listening	☐	☐	☐	☐	☐
Electronica & Techno	☐	☐	☐	☐	☐
Folk	☐	☐	☐	☐	☐
Gospel	☐	☐	☐	☐	☐
Jazz	☐	☐	☐	☐	☐
New Age	☐	☐	☐	☐	☐
Latin	☐	☐	☐	☐	☐
R&B	☐	☐	☐	☐	☐
Rap	☐	☐	☐	☐	☐
Reggae	☐	☐	☐	☐	☐
Rock	☐	☐	☐	☐	☐
Vocal	☐	☐	☐	☐	☐
World	☐	☐	☐	☐	☐
N/A	☐	☐	☐	☐	☐

[?] Although list may seem incomplete, please assign artists to the highest level genre to which you feel they belong.

The questions in this section will ask you to extract around 4-5 descriptive terms from album reviews that have been collected. Here is an example of what is expected of you:

Review:

Smooth jazz icon saxophonist [artist] delivers his first all-guest-star album with [album]. Featuring a coterie of big-name artists from the pop music world, including [artist2], [artist3], [artist4], and others, [album] essentially maximizes the vocal crossover aesthetic prominent on many of [artist]'s prior albums. The formula largely works, coming off as a breezy, laid-back concert with [artist] adding soft asides to his guest's vocal performances. To these ends, [artist5] reinvigorates "[song_title]" with a quiet storm intensity; [Artist6] actually betters [artist7]'s "[song_title2]," suffusing it with an infectious gospel/soul vibe; and [artist8] pull a "no brainer" on [artist9]'s "[song_title3]." Add to this a fairly organic production style that mixes in lush orchestral arrangements, funky organs, and real percussion as well as artists who seem to really enjoy themselves, and you've got one of [artist]'s most pleasing efforts...[album].

Possible Descriptors:

smooth jazz, crossover, laid-back, gospel/soul vibe, organic

Terms may be one, two or three words long (3 should be a maximum). Try to choose terms that you believe are the most descriptive of the artist being presented (given the context of the excerpt and not the artist herself). To limit potential biases, artist/album/song names have been removed. You will, however, be given the generally accepted genre into which each artist is classified. If you do recognize an artist, such as the "smooth jazz icon saxophonist" above, please try your best to objectively choose your terms.

The following review describes a bluegrass artist's album. Skim the following review and try to extract 4-5 of the most descriptive terms:

[artist] has the voice of an angel. This phrase may sound so overblown that it becomes trite, but it is true. Her voice is beautiful and compelling and sounds as much like hope as it does the final moments before the giving up begins. I know punk rock boys smitten with [artist2] and [artist3] who swear by her, and this was before her transformation into a hip blonde. Those who became transfixed by bluegrass and American roots music a few years back, now own the [film] soundtrack and at least one [artist] CD in their collection.

The woman can sing, the band can play, and in an industry that pushes artifice (is there a contemporary country song out there that doesn't sound like it was made expressly for a commercial?), they are the real deal: genre-music that has crossed over because

of their sincerity.

[album] is a musical travelogue. It is music made for and by the road. The metaphor isn't for searching, though. It is for the isolation found there and the clawed-at idea that self-imposed solitude can somehow protect one from being hurt. The road is refuge. The narrators in these songs are tough. They've accepted the bed they've made for themselves. They're telling their stories with determination. The songs never ask for pity, but sadness shows through on its own. Lonely is equal parts road as freedom and road as illusion. It is both something that never gets in your way, and a reason to ward off the dogs of security and the suspicion that stopping to settle down can only mean death while still living. The characters note their inability to commit ("[song_title") or if they have committed, their inability to remain faithful ("song_title2"). They're helpless in front of the road ("song_title3") and too scared to stop to see what else life could have to offer ("song_title4"). There's an acknowledgment that the lifestyle can leave one horribly lonely, but also the acceptance that this is all there is. Every life has its drawbacks, and this record chronicles honestly a born traveler's world.

[Artist] holds the reins here, with [artist4] and [artist5] piping in to add to the authentic bluegrass feel of the record. The band -- [Artist] (fiddle), [artist5] (guitar), [Artist6] (banjo, guitar), [Artist7] (bass), and [Artist8] (dobro) -- are professionals, but never dull. It is really the sequencing of the tracks that gives it its bluegrass feel. Ballads give way to hoedowns. The tracks that [artist] sings are the more subdued, veering away from the more extreme sounds of the genre. Still, fiddle and dobro come in at the right moments, never selling out completely. Everything is forgiven anyway, because of her voice. It is technically perfect. That should be boring. Instead, she takes this flawless instrument of hers and gives it soul. She doesn't need to let it crack or try to hit a lower note to add any texture. The texture is a living thing inside of her. It's indescribable, really. You don't know that you love [artist] until you sit down and really take in one song. Then, it's done; you're hooked.

I suspect that as sensitive, artistic young women seem to find [artist9] somewhere between the ages of 17 and 23, in a generation or so they will find both [artist9[and [artist]. [Album] will no doubt be one that will stand out, the strongest and most consistent of her adult releases (her first album was recorded when she was 14). It is a defining moment for the band. It is a release that, almost at first listen, sounds like a standard in an already impressive career. And beyond all that, [artist] has the voice of an angel. With no hype around that phrase at all, what better reason to stop and buy this record today?

Please separate terms with commas (e.g. "Term1, Term2, Term3, Term4, etc.")

The following review describes a country artist's album. Skim the following review and try to extract 4-5 of the most descriptive terms:

When [artist], along with [producer], entered a recording studio in July of 1981 to make his debut album for Epic — after leaving his long association with MCA — he had no idea that just 48 hours later he and the band would leave, having recorded enough material for two albums, [album] and its follow-up, [album2]. [Album] is a collection of songs focused on the themes of freedom from urban life. [Artist] wrote or co-wrote almost every song on the record — except "[title]," written by his then-wife, [artists_wife] — and the free abandon the band plays with here stands in sharp contrast to the material featured on the latter album. [Album], both the cut and the album, revisits the seemingly eternal themes in [artist]'s best work — the plight of the honest, decent working man amid the squalor, complication, and contradiction of urban life. Besides the title cut, there are bona fide [artist] classics here — and some that aren't but should be. The obvious ones were part of his shows in his fourth decade as a bona fide country legend: "[title]" (one of the most beautifully sung and arranged moments of his long career), "[title]," and "[title]" (an elegiac tome that reveals with resignation and disappointment — as well as some enlightenment — what was spouted off anthemically in "[title]" or "[title]" nearly 20 years earlier). For those who see [artist] as an unthinking, reactionary redneck, this song — with its waltz time and striking metaphors — is a prayer for a restoration not only to simplicity, but for those who make decisions to be held accountable for them: "I wish coke was still cola and a joint was a bad place to be/Back before Nixon lied to us all on TV," along with the complexities of his other side: "I wish a man could still work and still wood/I wish a girl could still cook and still would." And while most of the song is an elegy, it ends with [artist] pronouncing hope: "Stop rollin' downhill like a snowball that's headed for hell/Stand up for the flag and the Liberty Bell/Let's make a Ford and a Chevy last ten years like they should/The best of the free life is still yet to come/And the good times ain't over for good." The album closes with an [artist] stunner, one of his most beautiful and jazzy love songs, "[title]." The CD contains two bonus tracks, an unreleased duet version of "[title]," with [artist2] (a solo version appeared on [album2]), and the uncredited "[title]," a simple ballad with an odd percussion signature that was best left on the cutting-room floor. In all, [album] and its companion were staggering, auspicious beginnings for Epic, and stand among his finest — and most lasting — recordings.

> [!NOTE]
> ?Please separate terms with commas (e.g. "Term1, Term2, Term3, etc.")

The following review describes a rap and/or r&b artist's album. Skim the following review and try to extract 4-5 of the most descriptive terms:

Nominally a rap group, in truth [artist] call on so many forms of songwriting and production that slotting them into hip-hop is like slotting [artist2] into R&B -- technically true, but very limiting. [Album], the group's third straight winning LP, doesn't have top-notch rapping, but as driven by frontman [artist2], it does possess some of the most boundary-pushing productions in contemporary, (mostly) uncommercial hip-hop -- right up at the level occupied by [artist3] and [artist4]. The smart, brassy opening club thump "[song_title]" hits another level with a sly bridge flaunting some heavy metallic slide guitar, while the highly pressurized love jam "[song_title2]" features great interplay between [artist4] and new member [artist5].

Space doesn't allow for description of each track, but suffice to say any [artist2] track is going to feature loads of ideas and fresh sounds, not to mention plenty of stylistic change-ups -- from the digital-step ragga of "[song_title3]" (featuring [artist6]) to the Latinized, loved-up "[song_title4]." Like a latter-day [artist7], [artist8] know how to get a party track moving, and add a crazy stupid rhyme or two ("[lyric]" from the suitably titled "[song_title4]").

Please separate terms with commas (e.g. "Term1, Term2, Term3, etc.")

The following review describes a jazz / easy listening artist's album. Skim the following review and try to extract 4-5 of the most descriptive terms:

Throughout the 1990s, [artist] was the whipping boy of the jazz world the instrumentalist that hardcore jazz improvisers loved to bash when the subject of smooth jazz came up. [Artist]'s huge following responded that the attacks were silly and misguided because the saxman was the first to admit that he was primarily a pop instrumentalist and wasn't pretending to be anything else. True, it was silly for jazz artists to judge [artist] by hard bop standards when hard bop (or even soul-jazz or fusion) was a long way from what he was going for. And [album] isn't bad because it's a pop album or because it's commercial; it's bad because of its complete lack of soul, substance or creativity. There's nothing even remotely tasteful about interchangeable tunes like "[song_title]," "[song_title2]" and "[song_title3]," all of which are about as bloodless and schlocky as it gets. Always sounding like he's on automatic pilot, [artist] takes no risks whatsoever and sees to it that one song is as shamelessly contrived as the

next. Even the presence of the great R&B crooner [artist2] on "[song_title4]" can't save this one-dimensional release. Whether you're into pop or jazz, [album] is unlistenable.

[ ]

? Please separate terms with commas (e.g. "Term1, Term2, Term3, etc.")

The following review describes a vocal artist's album. Skim the following review and try to extract 4-5 of the most descriptive terms:

The entry into the sorority of motherhood is a profound experience. The life-altering passage is celebrated magnificently in this audio/visual collaboration between [artist] and [artist2].

[artist] is a quintessential vocalist with countless recordings to her credit and is a newer mother with a willingness to share her passion for her son. There are several options for this treasure in a variety of price ranges so explore which one is better for you. This option is the cd version with a few smaller pictures by [artist2] and no dvd. The cd/dvd box set includes insight a dvd into the project and a cd booklet-size of photographs. [Artist2] has artistically interpreted the infatuating forms of infants in photography and the larger more costly coffee-table book version of "[album]" contains by far the greater collection of enlarged photographs and the cd.

[Artist] teamed up with [artist3] and [artist4] on the cd (an unbeatable combination of Grammy-Award-winning brilliance in sound) and a countless array of musicians to generate unfeigned loving tracks of joy.

[Artist] capitalizes on her experience with ballads but the softer more emotive tracks like "[song_title]" and "[song_title2]" are my favorites with a gentle piano and orchestra that reminded me of the bonding of quiet midnight feedings. "[song_title3]," has lyrics that made me well-up; and her version of "[song_title4]" is equally lovely in English and French. "[Song_title5]" has long been a favorite song and this one is truly amazing sung with sincere passion. I love art born of life's experiences; when it's this authentic I swear I can "feel" the difference.

"[song_title6]" is more playful and uptempo but none of the tracks are jarring in volume or push the power [artist] can draw from her tiny frame. I believe great care was taken to ensure the songs were all just as suitable for rocking-chair moments between a mother (or father) and a newborn or recalling moments of parenthood at any

age. These are all sensitively pulled together to create a masterpiece theme of a gift for any mom or parent.

[ ]

? Please separate terms with commas (e.g. "Term1, Term2, Term3, etc.")

The following review describes an alternative rock artist's album. Skim the following review and try to extract 4-5 of the most descriptive terms:

It's a bit tempting to peg [artist]'s sprawling, ambitious, brilliant seventh album, [album], as their version of a [artist2] album, the next logical step forward from the [artist3]-inspired popcraft of their underrated 2000 effort, [album2], but things aren't quite that simple. [Album] is an unapologetic, unabashed rock opera, a form that [artist4] pioneered with [album3], but [artist] doesn't use that for a blueprint as much as they use the [artist2]'s mini-opera "[song_title]," whose whirlwind succession of 90-second songs isn't only emulated on two song suites here, but provides the template for the larger 13-song cycle. But [artist2] are only one of many inspirations on this audacious, immensely entertaining album. The story of [artist5] has an arc similar to [artist6]'s landmark punk-opera [album3], while the music has grandiose flourishes straight out of both [album4] and [album5] (the '50s pastiche "[song_title2]" is punk rock [artist7]), all tied together with a nervy urgency and a political passion reminiscent of [artist8], or all the anti-Reagan American hardcore bands of the '80s. These are just the clearest touchstones for [album], but reducing the album to its influences gives the inaccurate impression that this is no more than a patchwork quilt of familiar sounds, when it's an idiosyncratic, visionary work in its own right. First of all, part of [artist]'s appeal is how they have personalized the sounds of the past, making time-honored guitar rock traditions seem fresh, even vital. With their first albums, they styled themselves after first-generation punk they were too young to hear firsthand, and as their career progressed, the group not only synthesized these influences into something distinctive, but chief songwriter [artist8] turned into a muscular, versatile songwriter in his own right.

Warning illustrated their growing musical acumen quite impressively, but here, the music isn't only tougher, it's fluid and, better still, it fuels the anger, disillusionment, heartbreak, frustration, and scathing wit at the core of [album]. And one of the truly startling things about [album] is how the increased musicality of the band is matched by [artist8]'s incisive, cutting lyrics, which effectively convey the paranoia and fear of living in American in days after 9/11, but also veer into moving, intimate small-scale

character sketches. There's a lot to absorb here, and cynics might dismiss it after one listen as a bit of a mess when it's really a rich, multi-faceted work, one that is bracing upon the first spin and grows in stature and becomes more addictive with each repeated play. Like all great concept albums, [album] works on several different levels. It can be taken as a collection of great songs -- songs that are as visceral or as poignant as [artist] at their best, songs that resonate outside of the larger canvas of the story, as the fiery anti-Dubya title anthem proves -- but these songs have a different, more lasting impact when taken as a whole. While its breakneck, freewheeling musicality has many inspirations, there really aren't many records like [album] (bizarrely enough, the [artist9]'s [album] is one of the closest, at least on a sonic level, largely because both groups draw deeply from the kaleidoscopic "[song_title4]"). In its musical muscle and sweeping, politically charged narrative, it's something of a masterpiece, and one of the few -- if not the only -- records of 2004 to convey what it feels like to live in the strange, bewildering America of the early 2000s.

?Please separate terms with commas (e.g. "Term1, Term2, Term3, Term4, etc.")

Appendix 2 – Modified Stop-Word List

a about above across after again against all almost alone along already also although always among an and another any anybody anyone anything anywhere are area areas around as ask asked asking asks at away b back backed backing backs be became because become becomes been before began behind being beings best better between big both but by c came can cannot case cases certain certainly clear clearly come could d did differ different differently do does done down down downed downing downs during e each early either end ended ending ends enough even evenly ever every everybody everyone everything everywhere f face faces fact facts far felt few find finds first for four from full fully further furthered furthering furthers g gave general generally get gets give given gives go going good goods got great greater greatest group grouped grouping groups h had has have having he her here herself high high high higher highest him himself his how however i if important in interest interested interesting interests into is it its itself j just k keep keeps kind knew know known knows l large largely last later latest least less let lets like likely long longer longest m made make making man many may me member members men might more most mostly mr mrs much must my myself n necessary need needed needing needs never new new newer newest next no nobody non noone not nothing now nowhere number numbers o of off often old older oldest on once one only open opened opening opens or order ordered ordering orders other others our out over p part parted parting parts per perhaps place places point pointed pointing points possible present presented presenting presents problem problems put puts q quite r rather really right right room rooms s said same saw say says second seconds see seem seemed seeming seems sees several shall she should show showed showing shows side sides since small smaller smallest so some somebody someone something somewhere state states still still such sure t take taken than that the their them then there therefore these they thing things think thinks this those though thought thoughts three through thus to today together too took toward turn turned turning turns two u under until up upon us use used uses v very w want wanted wanting wants was way ways we well wells went were what when where whether which while who whole whose why will with within without work worked working works would x y year years yet you young younger youngest your yours z song music band album track sound piece ve re nt

Appendix 3 – Descriptive Genre Classes, *single term only,* **top ten log-odds weighted terms**

AllMusic.com *Random Sample***, Descriptive Genre Classes**

Country	*Rap*	*R&B*	*Rock*
country	rapper	jordan	rock
krauss	hop	destiny	pop
strait	rap	brownstone	debut
walker	hip	slow	metal
lonely	nas	jagged	grunge
alison	gangsta	vocal	creed
rich	snoop	fulfilled	time
kenny	beats	ree	power
bluegrass	jay	des	jojo
collection	xzibit	vocalists	self

AllMusic.com *Normalized Sample,* **Descriptive Genre Classes**

Country	*Rap*	*R&B*	*Rock*
country	rapper	love	rock
crowell	hop	brown	creed
krauss	hip	hayes	grunge
carter	nas	soul	metal
rich	rap	jordan	news
record	snoop	green	korn
walker	gangsta	mayfield	self
strait	beats	vocal	american

Country	*Rap*	*R&B*	*Rock*
lonely	jay	slow	hard
bluegrass	tha	funky	pop

BBC Sample, Descriptive Genre Classes

Classical	*Classic Rock & Pop*	*Country*	*Experimental*	*Jazz*	*Rock & Alternative*	*World*
bach	bowie	country	electronic	jazz	rock	african
concerto	rock	folk	sonic	coltrane	indie	cuban
recording	pop	irish	noise	tenor	debut	africa
symphony	rundgren	nashville	frith	miles	lyrics	tango
sonatas	live	fiddle	electronica	alto	single	mali
beethoven	waits	traditional	ambient	coleman	vocals	traditional
orchestra	clapton	cash	guitar	playing	pop	flamenco
performance	brian	carthy	drones	saxophonist	guitars	salsa
violin	version	fairport	digital	solo	record	afro
opera	hits	banjo	experimental	bassist	love	world

Appendix 4 – Descriptive Genre Classes, *single terms and bi-grams*, top ten log odds weighted terms

AllMusic.com *Random Sample*, Descriptive Genre Classes

Country	Rap	R&B	Rock
country	hip hop	jordan	rock
krauss	rapper	destiny	pop
strait	hop	brownstone	debut
walker	rap	jagged edge	metal
lonely	hip	jagged	grunge
alison krauss	nas	slow	creed
alison	gangsta	fulfilled	time
rich	snoop	destiny fulfilled	power
kenny	beats	ree	jojo
bluegrass	jay	des	self

AllMusic.com *Normalized Sample*, Descriptive Genre Classes

Country	Rap	R&B	Rock
country	hip hop	love	rock
crowell	rapper	brown	creed
krauss	hop	hayes	grune
carter	hip	soul	metal
record	nas	jordan	news
rich	rap	funky	korn
walker	snoop	green	self
strait	gangsta	mayfield	post grunge

Country	*Rap*	*R&B*	*Rock*
nashville	beats	vocal	weiland
lonely	jay	slow	american

BBC Sample, Descriptive Genre Classes

Classical	*Classic Rock & Pop*	*Country*	*Experimental*	*Jazz*	*Rock & Alternative*	*World*
bach	bowie	country	electronic	jazz	rock	african
concerto	rock	folk	sonic	coltrane	indie	africa
recording	pop	irish	noise	tenor	debut	cuban
symphony	rundgren	nashville	frith	miles	lyrics	tango
sonatas	waits	fiddle	electronica	playing	single	mali
orchestra	clapton	traditional	ambient	alto	vocals	traditional
beethoven	live	cash	guitar	coleman	pop	salsa
performance	brian	carthy	drones	solo	guitars	flamenco
brahms	version	fairport	digital	saxophonist	record	afro
violin	townshend	june	cd	bassist	love	senegalese

<u>Appendix 5 – Participant Statistics: Age, Gender & Grade Level</u>

Participant Statistics - Number of Participants by Age
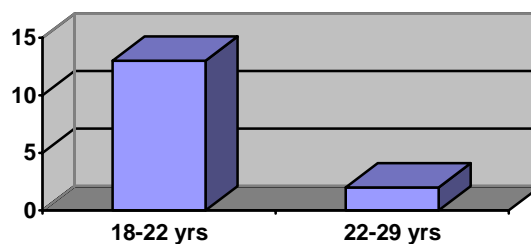
Participant Statistics - Number of Participants by Gender
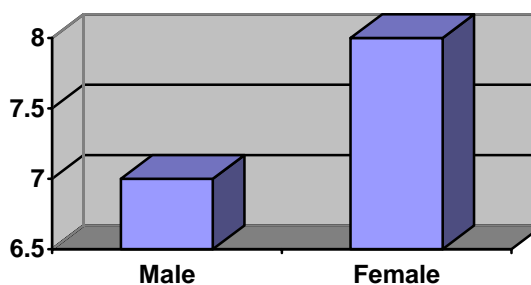
Participant Statistics - Number of Participants by Grade Level
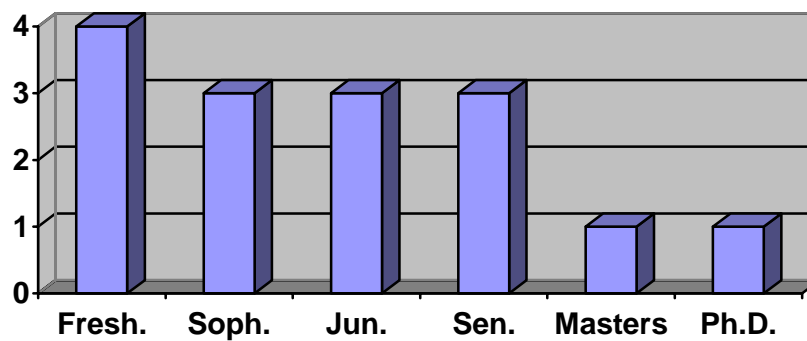
Appendix 6 – Participant Statistics: Preferred Genre

Participant Statistics - Number of Hours Listening to Popular Music Each Week
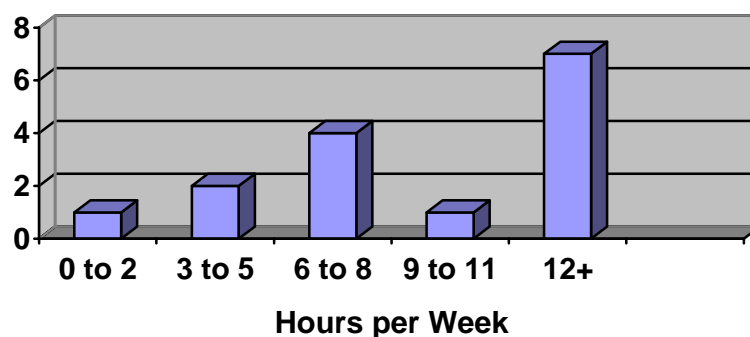
Participant Statistics - Number of Hours Reading about Popular Music Each Week
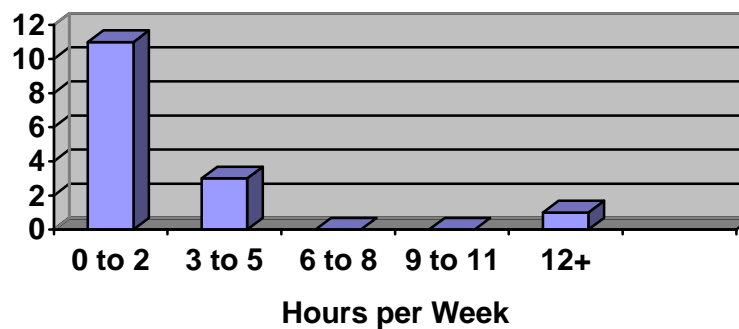
Participant Statistics - Preferred Genre of Music
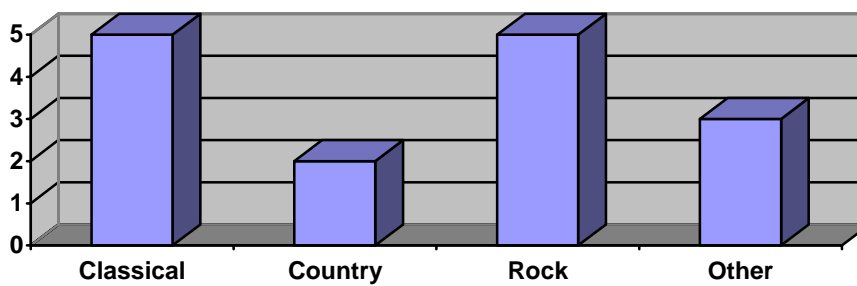
Appendix 7 – Participant Statistics: Organization Methods

Participant Statistics - Digital Collection, Organization Methods
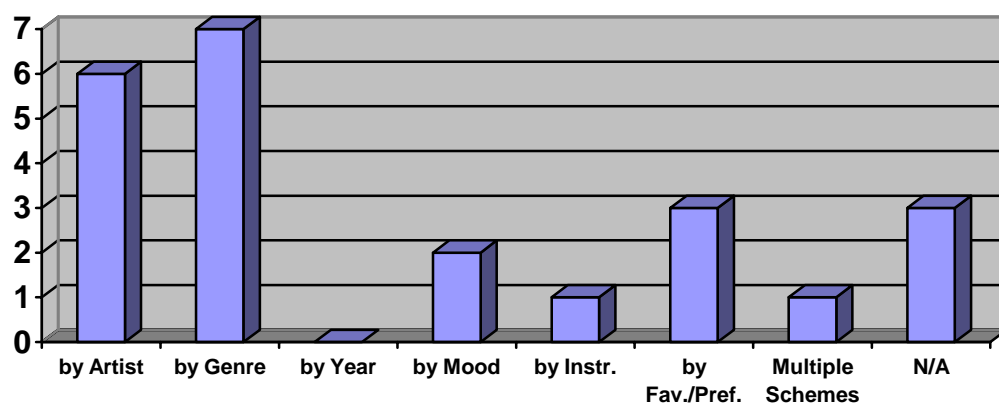
Participant Statistics - Physical Collection, Organization Methods
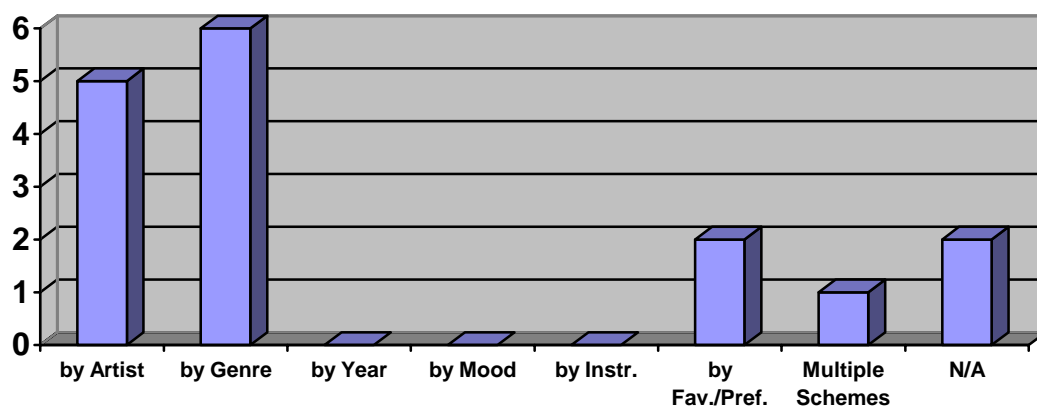
Appendix 8 – Participant Statistics: Usage of Music Reviews

Participant Statistics - Typically Read Reviews Prior to Purchasing New Recordings?

Participant Statistics - Location of *Best* or Most Easily Accessible Reviews
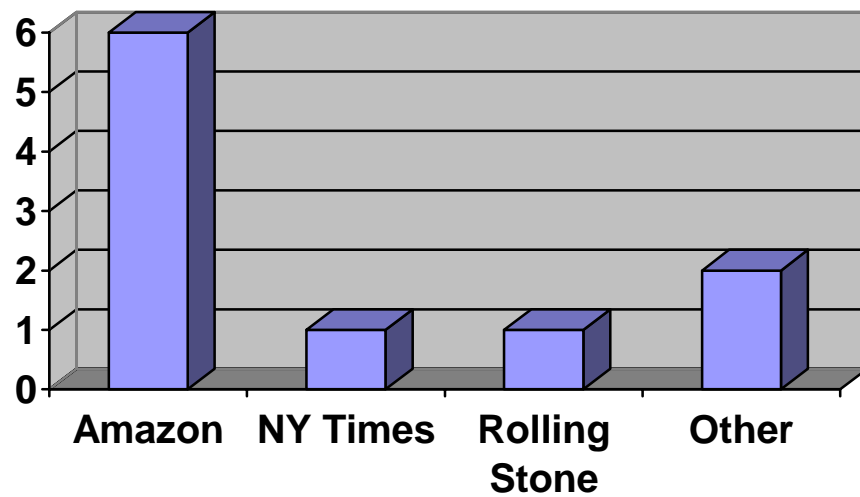
Appendix 9 – Confusion Matrices: All Samples

Random AllMusic.com Sample, Confusion Matrix

TF/IDF Classification Model – 10 trials, 90% training, 10% test

Correct: 80 out of 90 – (88.89% percent accuracy, stderr 2.11)

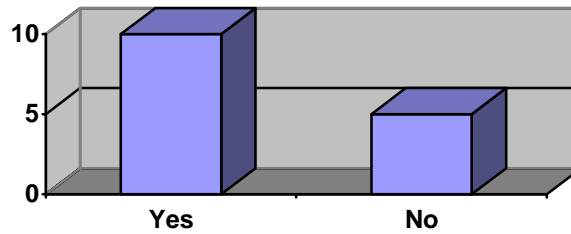| Genre Name	*Country*	*Rap*	*R&B*	*Rock*	total	% accuracy
Country	18	0	1	1	20	90.00%
Rap	2	27	0	1	30	90.00%
R&B	0	0	0	0	0	--
Rock	0	5	0	35	40	87.50%

Normalized AMG Sample, Confusion Matrix

Naïve Bayes Classification Model, w/bi-grams – 10 trials, 90% training, 10% test

Correct: 82 out of 100 – 82.00 percent accuracy, stderr 3.10)

Genre Name	Country	Rap	R&B	Rock	total	% accuracy
Country	24	1	3	2	30	80.00%
Rap	0	27	2	1	30	90.00%
R&B	1	0	15	4	20	75.00%
Rock	0	0	4	16	20	80.00%

BBC Sample Confusion Matrix

Naïve Bayes Classification Model – 10 trials, 90% training, 10% test

Correct: 2315 out of 2560 - (90.43 percent accuracy, stderr 0.49)

Genre Name	Classical	Cl. Pop	Country	Exp.	Jazz	R & A	World	total	%acc.
Classical	331	0	1	3	4	0	1	340	97.4
Classic pop	0	270	5	2	5	48	0	330	81.8
Country	0	8	310	0	4	12	6	340	90.3
Experimental	0	8	0	316	40	16	0	380	83.2
Jazz	0	1	1	6	447	2	3	460	97.2
Rock & Alternative	0	23	5	11	1	399	1	440	90.7
World	3	0	4	2	10	9	242	270	89.6

Bibliography

Basili, R., Serafini, A. & Stellato, A. (2004). Classification of Musical Genre: A Machine Learning Approach. *Proceedings of the 2004 International Symposium on Music Information Retrieval at Universitat Pompeu Fabra*, 5, 505-8.

Creswell, J.W. (2003). Research Design Qualitative, Quantitative and Mixed Methods Approaches. Thousand Oaks, CA: Sage.

Cunningham, S., Jones, M., & Jones, S. (2004). Organizing Digital Music for Use: An Examination of Personal Music Collections. *Proceedings of the 2004 International Symposium on Music Information Retrieval at Universitat Pompeu Fabra,* 447-54

Eoin, B., & Fernstrom, M. (2003). Where's That Sound? Exploring Arbitrary User Classifications of Sounds for Audio Collection Management. *Proceedings of the 2003 International Conference on Auditory Display, 9, 66-70.* http://richie.idc.ul.ie/eoin/research/16_Brazil1-classification.pdf

Knees, P., Pampalk, E., & Widmer, G. (2004). Artist Classification with Web-Based Data. *Proceedings of the 2004 International Symposium on Music Information Retrieval at Universitat Pompeu Fabra*, 5, 517-24.

McKinney, M.F., & Breebaart, J. (2003). Features for audio and music classification. *Proceedings of the 2003 International Conference on Music Information Retrieval.* Retrieved on March 23, 2005, from http://ismir2003.ismir.net/papers/McKinney.PDF

Pachet, F. & Cazaly, D. (2000) A taxonomy of musical genres. *Proceedings of RIAO Content-Based Multimedia Information Access.* Retrieved on November 11, 2004 from http://www.csl.sony.fr/downloads/papers/2000/pachet-riao2000.pdf

Perrot, D. & Gjerdigen, R.O. (1999). Scanning the dial: An exploration of factors in the identification of musical style. *Presented at Society for Music Perception and Cognition.*

Whitman, B. & Smaragdis, P. (2002). Combining musical and cultural features for intelligent style detection. *Proceedings of the 2004 International Conference on Music Information Retrieval*. Retrieved on October 27, 2004, from

http://ismir2002.ismir.net/proceedings/02-FP02-1.pdf

Whitman, B. and Ellis, D. (2004). Automatic Record Reviews. *Proceedings of the 2004 International Symposium on Music Information Retrieval at Universitat Pompeu Fabra*, 5, 470-7.

Yang, Y. & Liu, X. (1999). A Re-Examination of Text Categorization Methods. *Proceedings of the 22nd Annual International ACM SIGIR*, Retrieved on March 21, 2005, from http://www.cs.rit.edu/~dmrg/dm_winter/reading/re_examTCMethods.pdf