

Comparison of Use of Music Content (Tempo) and User Context (Mood) Features on Classification of Music Genre

Putu Rikky Mahendra Prasetya^{a1}, Gst. Ayu Vida Mastrika Giri^{a2}

^aInformatics Department, Udayana University
Bali, Indonesia

¹puturikky98@gmail.com

²vida.mastrika@cs.unud.ac.id

Abstract

The development of technology in the current era in the field of multimedia, music is not just entertainment or pleasure. Nowadays, online music growth is greatly increasing, namely, music can be classified by genre. The music genre is the grouping of music according to their resemblance to each other. In previous studies, the system was built with Naive Bayes Classifier which is useful for predicting songs based on the lyrics of the song. In our study, we used a dataset that was divided into several genera, namely Blues, Electronic, R & B, Christian, Hip Hop / Rap, Rock, Country, Jazz, Ska, Dance, Pop, and Soul which obtained the accuracy of Music Content of 45 % while for Context Users get an accuracy of 60%.

Keywords : *Genre, Naive Bayes, Music Content, User Context*

1. Introduction

The development of technology in the field of multimedia has made music and singing grow very rapidly. Music and Singing are now often used as entertainment media and even become a supporting media in the learning process.

According to Wikipedia "music is sound composed in such a way that it contains rhythm, song, and harmony, especially sound produced from tools that can produce rhythm", whereas according to the large Indonesian dictionary "music is science or art arrange tones or sounds in sequence, combination and temporal relationship to produce a composition (sound) that has unity and continuity".

In this era, music is not only used as entertainment or pleasure but has been used for various purposes due to its social and physiological effects. Nowadays the growth of online music information is greatly increased.

Automatic and accurate music processing will be an issue/topic that is very important to be of particular concern.

Music can be classified by genre. A music genre is a grouping of music according to their similarities with each other. Music can also be classified according to other criteria, such as geography. A genre can be defined by music technique, style, context, and theme of music.

The most popular topic at this time in the search for automatic music information is the problem of organizing and grouping music according to its genre. The following are some research related to the topic.

In this study, the system was built with the Naive Bayes classifier which is useful for predicting song sentiments based on the song's lyrics alone. The experimental results show that music that suits a happy mood can be detected with high precision based on text features obtained from song lyrics (Sebastian Raschka, 2014).

In addition to song lyrics, some features can be taken from music, the feature is divided into two parts, namely based on user or user context and features that already exist in the music itself or music content.

In this study, we compared the use of two features, namely tempo representing music content and mood representing user context.

Tempo is the speed of playing a piece of music. It is usually represented by beats per minute (BPM). In brief, we calculate it by counting the number of beats for playing the music per minute. (M. F. McKinney, 2004).

Mood is a relatively long-lasting emotional state. Moods differ from emotions in that they are less specific, less intense, and less likely to be triggered by a particular stimulus or event (Thayer, Robert E, 1998)

Researchers show that humans are not only able to recognize the emotional intentions used by musicians but also feel them. When we listen to various music we normally tend to experience a change in blood pressure, heartbeat rate, etc. (P. N. Juslin, 2003)

2. Research methods

In conducting this research, defining several needs is as follows:

2.1. Dataset

Here we use a dataset that we took from the Kaggle website, where the dataset we use is in the form of data from music content and music context which will later become a comparison feature in this paper.

We took 200 data, of which 10% were testing data and the rest were training data. The following is a diagram of all the datasets used:

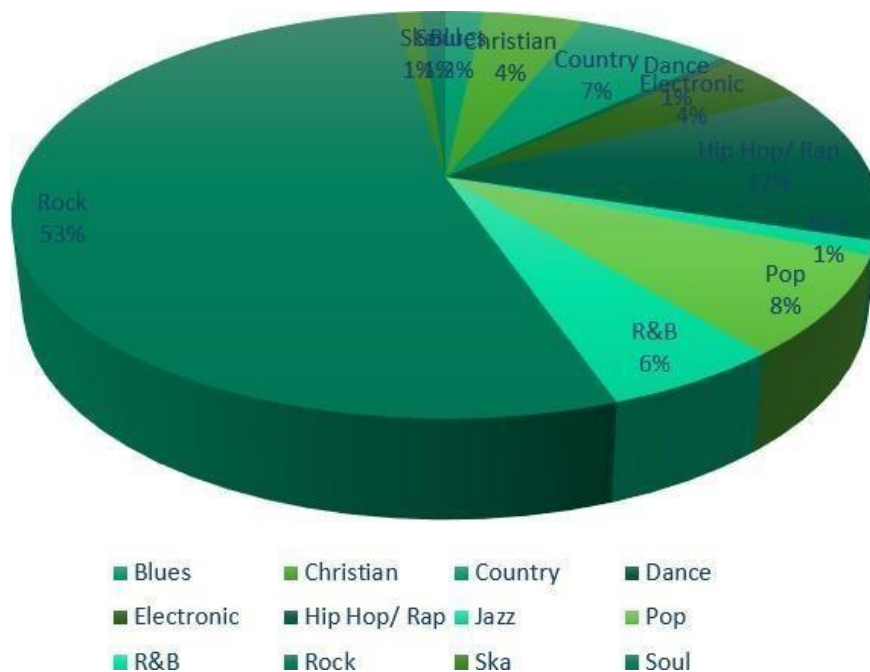


Figure 1. Dataset Diagram

All datasets used have several genres as shown in the picture above, with a different percentage.

2.2. Python

Python is a high-level programming language that is interpreted, interactive, object-oriented and can operate on almost all platforms, such as UNIX, Mac, Windows, and others. As a high-level language, Python is one of the easy programming languages to learn because of its clear and

elegant syntax, combined with the use of ready-made modules and high-level data structures that are efficient. (Dewi Rosmala, 2012).

2.3. Naïve Bayes

The Naive Bayes classification is a simple probabilistic classifier based on the application of the Bayes theorem with strong independent assumptions.

There are various Classifier text methods such as Decision Trees, Neural Networks, Naïve Bayes and Centroid Based, but Naïve Bayes perform better for different data collection and are easily done computationally. (Gurneet Kaur, 2014).

This technique is a probabilistic classification based on the Bayes theorem with the assumption of independence among the predictor variables. Simply put, the Naïve Bayes grouping assumes that there are certain features in a class that is not related to other features. Bayes's theorem provides a way to calculate the posterior probability $P(C | x)$ of $P(C)$, $P(x)$ and $P(x | C)$ with the following equation:

$$P(C | x) = \frac{P(C)p(x | C)}{p(x)}$$

$P(c | x)$ is the posterior probability of the class (c , target) given the predictor (x , (Choirul Anam, 2018) attribute).

$P(c)$ is the probability of the previous class.

$P(x | c)$ is a probability which is the probability of the class given the predictor. $P(x)$ is the probability of the previous predictor. (Choirul Anam, 2018).

3. Experiments and results

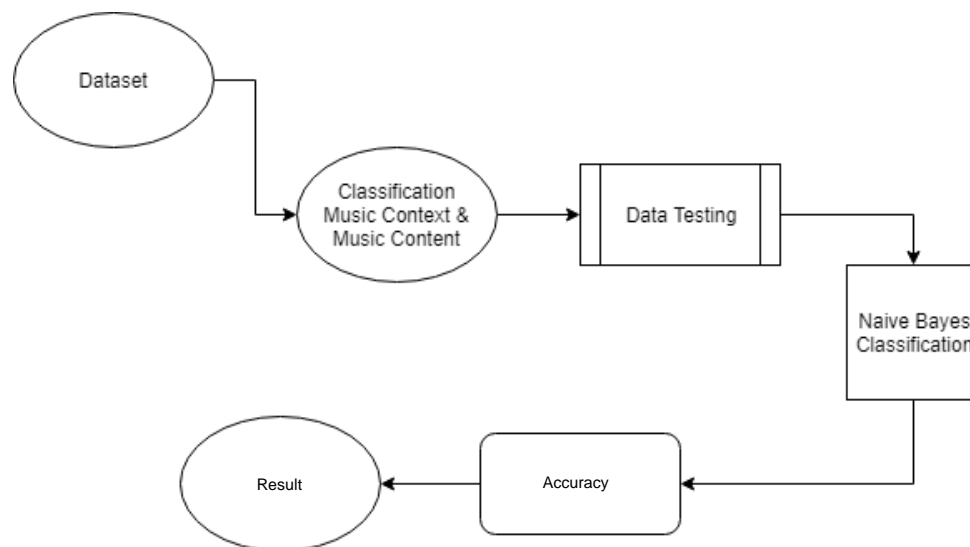


Figure 2. System Architecture

In conducting this research, we conducted several experiments to be able to compare the accuracy of the use of these features.

3.1. Experiment

In this section, the testing data for each feature is processed using the naïve Bayes classifier. The following is the data testing table:

3.2. Result

Table 3. Data Testing User Context Result

Artist	Mood	Genre	Status
4Him	happy	Christian	1
Vitamin C	happy	Pop	1

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K's Choice	sad	Rock	1
Rickie Lee Jones	sad	Jazz	0

Ronnie Milsap	sad	Country	1
Goldfinger	sad	Rock	1
Utopia	happy	Electronic	1
Korn	sad	Rock	1
Sister Hazel	happy	Rock	0
Backstreet Boys	happy	Pop	1
Kool Moe Dee	happy	Hip Hop/Rap	0
The Tragically Hip	sad	Rock	1
Cave & The Bad Seeds	happy	Rock	0
Usher	happy	Hip Hop/Rap	0
Michael McDonald	sad	Pop	0
Red Hot Chili Peppers	sad	Rock	1
Scar Symmetry	sad	Rock	1
The Rolling Stones	happy	Rock	0
Ronnie Milsap	sad	Country	1
Tesla	happy	Rock	0

Table 4. Data Testing Music Content Result

Artist	Tempo	Genre	Status
4Him	150.062	Christian	1
Vitamin C	85.023	Pop	1
K's Choice	130.007	Rock	0
Rickie Lee Jones	125.011	Jazz	1
Ronnie Milsap	130.031	Country	1
Goldfinger	139.922	Rock	0
Utopia	129.004	Electronic	1
Korn	119.999	Rock	0
Sister Hazel	125.011	Rock	0
Backstreet Boys	125.008	Pop	0
Kool Moe Dee	120.06	Hip Hop/Rap	1
The Tragically Hip	125.004	Rock	0
Nick Cave & The Bad Seeds	108.009	Rock	0
Usher	129.948	Hip Hop/Rap	1
Michael McDonald	125.008	Pop	1

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Red Hot Chili Peppers	131.952	Rock	0
Scar Symmetry	92.002	Rock	0

The Rolling Stones	99.977	Rock	0
Ronnie Milsap	153.547	Country	1
Tesla	132.002	Rock	0

From the data above, we do the classification using the naïve Bayes method which gets results, namely User Context gets an accuracy of 60% (status : 1) and Music Content gets an accuracy of 40% (status : 0). The most error data is Genre Rock data, it is caused by the high frequency of the amount of data with the genre of rock which results in similarities to almost all existing genres. The calculation of accuracy uses the precision method which has the following formula:

$$precision = \frac{TP}{TP + FP}$$

TP is True Positive (true result or true result) FP is Positive Positive (lost result or incorrect result) Or in other words, the true amount, divided by the total number of test data.

4. Conclusion

From the foregoing, we can conclude that in classifying the music genre using this naïve Bayes method, the mood feature in the User Context gets higher accuracy results when compared to the tempo feature in Music Content.

In the future, we can develop this research by finding data with the same amount of data frequency in each genre or at least not having a very significant amount of frequency difference.

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