

Lyrical Analysis Using Machine Learning Algorithm

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Abstract–The sentiment prognostication of coeval music can have an enormous amount of applications in the current era, for entreaty, selecting the music for public gatherings such as procession or restaurants to improve the emotional status of an individual or group likely people and customers, respectively. Music recommendation system built upon Machine Learning Algorithms, trained to predict the emotion of songs based on lyrics.

Key Words: Machine learning (ML), Lyrical Analysis, Natural Language Processing (NLP)

I. INTRODUCTION

For the past some decades the songs have played a predominant role in human emotions and to change the mood accordingly. Hence there were enormous experiments have been conducted in the field of the music analysis based on its lyrics. Text mining was the concept for classification of songs based on the lyrics, in the current era researchers have shifted their direction in field of machine learning (ML). ML or Machine learning is a branch in computer science that researches the design of algorithms that learns itself by training some part of dataset (inputs). Vital functions involve concept learning, function learning or 'predictive modeling' clustering and finding predictive patterns.

Variety classification by lyrics grants itself as a natural language processing (NLP) problem. NLP is the application of computational approach to the analysis and synthesis of naturally available languages. In NLP the intent is to commit meaning and labels to text, this equates to a genre classification of the lyrical text. Machine learning approaches in text classification have utilized N-gram models and algorithms such as Random Forest, Support Vector Machines (SVMs), k-Nearest Neighbor (k-NN) and Naive Bayes (NB)[1].

II. LITERATURE SURVEY

Past researches have showed that lyrical data performs fragile in the genre classification compared to other forms of data [McKay et al., 2010]. This issue is not yet appropriately researched and preference has been given to other methods. Previous non-neural lyrical classifiers contended to achieve classification accuracy any higher than 50%. SVMs, k-NN, and NB have been heavily used in previous lyrical classification research. No research has looked into classifying more than between ten genres despite the prevalence. Fell and Sporleder [2014] classify

among eight varieties using N-grams along with other handpicked features to represent vocabulary, style, structure, and semantics. Ying et al. [2012] make use of Part-of-Speech (POS) tags and classify among ten genres using Support Vector Machines, k-NN, NB with a highest accuracy of 39.94%. McKay et al. [2010] utilize manually picked features in lyrics to produce classification accuracies of 69% amongst five genres and 43% amongst ten genres. Often the lyrical data is combined with other forms of data to produce superior classifiers[5]. Mayer et al. [2008] combine audio and lyrical data to produce a highest accuracy of 63.50% within ten genres via SVMs. Mayer and Rauber [2011] then use a Cartesian ensemble of lyric and audio features to gain a highest accuracy of 74.08% within ten genres. Li et al. [2010] use a CNN to understand features attaining an accuracy of 84% over ten genres. Costa et al. [2017] compare the performance of CNNs in genre classification through spectrograms with respect to results obtained through manually selected features and SVMs. The hierarchical nature of a song has also been previously exploited in genre classification tasks with Du et al. [2016] utilizing hierarchical analysis of spectrograms to help classify genre[2].

III. FEATURE SELECTION

The feature selection includes some of the terminologies and brief information regarding the same is given below:

i) Bag of Words

Lyrics are relatively short in length and can be built from a relatively limited vocabulary. Hence the selection of words in a song becomes one of the vital characteristics. There are two types of words that are bounded by this analysis-content and function.

ii) Word Endings

The endings can denote things such as verb tenses, meaningful suffixes, and slang use. All these combined and contribute to the semantic meaning of a song as well as the way of writing. For example, the appearance of the "-er" ending says the presence of verbs in a song, the suffix "-ive" can show the occurrence of adjectives.

iii) Line Length

The length of a line (lyrics) in the song can specify lot of things dealing with the rhythm and pattern of song auricular. For instances, numerous line breaks can denote a

song which flows in more choppy fashion than the crave lines with lot of words.

iv) Number of Lines

Alike to line length, the number of lines can also suggest the sound behind the song lyrics. Lot of lines may specify a fashion with frequent breaks, while some may denote longer lines.

v) Punctuation

The benefit of punctuation marks will reveal both rhetorical and auditory information. The use of periods, commas and delimiters indicate stops in the song. These can disclose the song's shape of rhythm[3].

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IV. ALGORITHMS USED IN ML

Here is the list of frequently used machine learning algorithms. The following algorithms can be applied to almost any data problem:

Linear Regression, Logistic Regression, Decision Tree, Support Vector Machine(SVM), Naive Bayes, k-Nearest Neighbors(k-NN), K-Means, Random Forest, Dimensionality Reduction Algorithms, Gradient Boosting algorithms, i) GBM ii) XG Boost iii) Light GBM iv) Cat Boost.

As almost all the algorithms performs well still the Random Forest remains special. In Random Forest, there is collection of decision trees (Hence known as "Forest")[4]. To classify a fresh object based on attributes, every tree provides a classification, say the tree 'votes' for that particular class. The forest selects the classification holding the maximum votes (overall the trees present the forest). Hence the Random Forest is simple and effective to use for the classification and regression and can become the primarily approachable algorithm.

V. CONCLUSION

Lyrical analysis has got a large amount of positive points, It will be a great achievement if the forthcoming algorithm provides the hundred percent accuracy in the field of prediction making by machine learning algorithm using lyrics, Lyrical analysis and prediction can lead to understand the individuals mood or sentiment and the technology can help them better to boost ones spirit. Further this field can be enhanced to understand the human behavior and individual's pattern of selection.

REFERENCES

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