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BOLLYWOOD MOVIE SONGS MOOD CLASSIFICATION INVARIANCE OF MFCC VALUE

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Abstract*—*In this paper the approach goes towards of classifying bollywood songs by extracting out audio feature of MFCC- Mel Frequency Cepstral Co-efficient that is mainly representing the power value of any song. Based on retrieved value classifier is to be applied to check whether that song belong which one of all categories.Various mood like Calm,Happy,Sad,Excited kind of mood based songs are addressed from dataset.

Index Terms—MFCC, music information retrieval, music, mood classification

I. INTRODUCTION

nformation retrieval used to be an activity that only a few people engaged in: reference librarians, paralegals, and similar Iprofessional searchers. Now the world has changed, and hundreds of millions of people engage in information retrieval every day when they use a web search engine or search their email. Information retrieval is fast becoming the dominant form of information access, overtaking traditional database style searching[2]. Music information retrieval (MIR) is the interdisciplinary science of retrieving information from music. MIR is a small but growing field of research with many real-world applications.

Those involved in MIR may have a background in musicology, psychology, academic music study, signal processing, machine learning or some combination of these. Music Information Retrieval (MIR) has been defined by Stephen Downie as 'a multidisciplinary research endeavor that strives to develop innovative content-based searching schemes, novel interfaces, and evolving networked delivery mechanisms in an effort to make the world's vast store of music accessible to all'. And this MIR mainly deals with Music Content, Music Similarity and Music Psychology areas.[1]

II. HUMAN PSYCHOLOGY & MUSIC

The relation between mood and music, Music emotion detection and classification has been extensively studied and researched earlier. Mostly pattern recognition approach was preferred. The extensive work done in this field does specify a scope of improvement in the choice of audio features as well as classification for better accuracy. This is where we intend to contribute so that the mood can be automatically and efficiently be detected for a given audio file.
Most of the experimentation done in the field of music mood categorization has been observed with respect to non-Indian music [8]. Music being subjective to cultural backgrounds, it

is but natural that Indian Music might need a different treatment as compared to non-Indian music.

My goal is to develop a music emotion categorization system for Indian popular music by analysing the relation of timbre, spectral and temporal features of audio file with the emotion represented by the audio file. To name a few, these features include pitch, tempo beats and rhythm. Grouping of songs might be done by using clustering algorithms like support vector machine.

III.AUDIO FEATURES

JAudio was used for the feature extraction process.Each clip is divided into 0.5 overlapping 32ms-long frames. The extracted features fall into four categories: timbre, intensity, rhythm. The first three sets can express mood information to some degree and are very important for mood detection.

1) Timbre features

Happy songs usually sound bright and vibrant, while grief ones sound pensive and gloomy. Timbre features can be used to judge whether the emotion is negative or positive. The timbre features we used are listed as follows: Centroid, Rolloff Point, Flux, Zero Crossing, Strongest Frequency Via Zero Crossing, Strongest Frequency Via Spectral Centroid, Strongest Frequency Via FFT Maximum, Compactness, MFCC, LPC, Peak based Spectral Smoothness. We, Calculated the mean and standard deviation over all frames.

2) Intensity features

Intensity features can used to judge whether the emotion is very strong or not. For example, if songs express a positive emotion, then using intensity features we can get whether it is enthusiastic or lively. In this paper, the intensity features are RMS and Fraction of Low Energy Windows. By calculating the mean and standard, we got 4 intensity features.

3) Rhythm feature

Through rhythm features, we also can get some information about whether the music emotion is positive or negative. Fast songs tend to be happier than slow ones. We extracted rhythm features including Beat Sum, Strongest Beat and Strength of Strongest Beat. Also by calculating the mean and standard, led to 6 rhythm features. The features are extracted and consolidated for each music piece in a standard file format so as to make it easy for mining the relations between these features w.r.t. the corresponding mood of the audio files.

4) Feature Selection

There are certain features which give similar values for audio of any mood. Hence such features can hinder the accuracy of the system. After conducting survey and feature extraction process, Information Gain algorithm was used to select the defined features and remove the redundant ones. Information gain helps to determine which attribute in a given set of training feature vectors is most useful for discriminating between the classes to be learned [7]. When a particular classification model has multiple features, there is higher probability that many (if not most) of the features are low information.

These are the features that are common across all classes and therefore contribute meagre information to the classification process. Individually they are innocuous, but in aggregate, low information features can decrease performance.

Eliminating low information features gives your model clarity by removing noisy data. When the higher information features are used, performance is increased and the size of the model is decreased, which results in less memory usage along with faster training and classification.

IV. MFCC

The Mel-frequency cepstrum (MFC) is a representation of the short-term power spectrum of a sound, based on a linear cosine transform of a log power spectrum on a nonlinear Mel scale of frequency. The name Mel comes from the word melody to indicate that the scale is based on pitch comparisons.[6]
MFCCs is a normalized energy parameter of audio.A popular formula to convert f hertz into m Mel is:[4]

$$m = 2595 \log_{10}\left(1 + \frac{f}{700}\right)$$

MFCCs are commonly derived as follows:[3][4]

1. Take the Fourier transform of (a windowed excerpt of) a signal.
2. Map the powers of the spectrum obtained above onto the mel scale, using triangular overlapping windows.
3. Take the logs of the powers at each of the mel frequencies.
4. Take the discrete cosine transform of the list of mel log powers, as if it were a signal.
5. The MFCCs are the amplitudes of the resulting spectrum.

Figure 1. MFCC Calculation

V.PROPOSED SYSTEM

A. Basic Concept

The prime focus is to categorize the audio into different moods. Following are the moods that we have identified currently for our work so far. Adjacent to the mood category are the adjectives that the mood collectively represents[9]:-

Table I.Mood Model

Mood	Adjactive
Happy	cheerful, funny, romantic, playful
Sad	depressed, frustrated, angry
Silent	peaceful, calm
Exciting	dance, celebration, party

Songs with similar pattern or their similar audio feature range will be grouped together to yield a particular mood. Hence, a mood based playlist will be provided to the user.

B. Preprocessing

To begin with, we selected 200 songs for each mood based on the survey conducted among different people and based on the results of Vallabha Hampiholi[8].We wanted to assert the mood of a particular song based on the generalized perspective of human mind. The survey was conducted among 100 people and the result was tabularized so as to set the range of threshold for each mood.

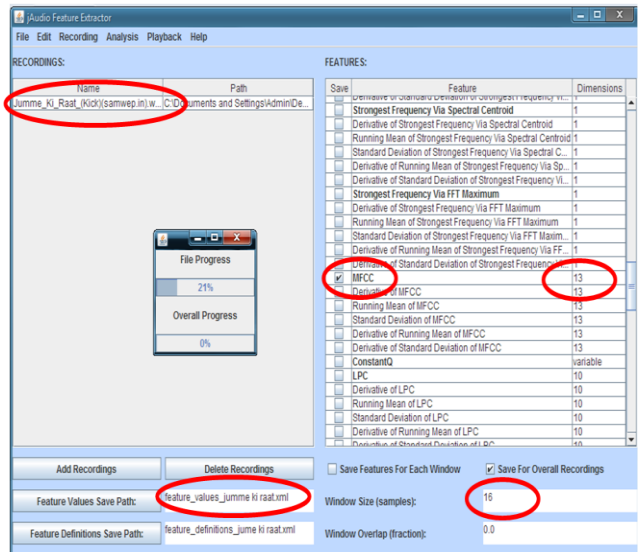

Figure 2.GUI Of jAudio

VI. DATASET & TOOLS

Dataset that is used for implementation of track classification is been created by me, because of as such its novel approach and reference paper. Dataset of 200 Hindi song dataset is created by me which contains, title of song, movie name, artist of song, mfcc value ,mood of song,and year of song.

jAudio is a software package for extracting features from audio files as well as for iteratively developing and sharing new features. [11]

VII. EVALUTION RESULTS

Based on trained dataset of 200 bollywood songs the range classifier is to applied using Weka Tool. With help of SVM classifier, the ranges of each mood with its particular boundary is to found and is enlisted in table. Analysis shows that the result of SVM classifier[10] is good rather than else classifier because of boundary overlapping is very well applied by support vector machine. And as such only two variables' regression is applied, linear regression worked out very well here. About of 68.9% accuracy is been achieved with good confusion matrix ranges where overall false negative,false positive ,true negative and true positive values are been calculated. And based on that values the accuracy found with its precision and recall value is enlisted in table.

Table II.Range Of MFCC & Mood

Mood	Start Range	End Range
Happy	45	65
Exciting	66	89
Sad	90	106
Silent	107	255

Table III.Dataset Of Song & Mood

Khoya Khoya Chand	Mohmad Rafi	Mohmad Rafi	46.9	Sad
Aisi Deewanagi Dekhi	Deewana	Vinod Rathod Alka Yagı	47.6	Happy
Maria Maria	Partner	Sonu Nigam Sajid Sunic	48.3	Happy
D Se Dance	Humpty Sharma Ki	Vishal Shamli Anushka	54.4	Exciting
Mera Joota Hai Japani	Shree 420	Mukesh	55.1	Happy
Ilahi	Yeh Jawaani Hai De	Mohit Chauhan	70.8	Happy
Jee Karda	Singh Is King	Labh Jan Jua	70.9	Exciting
Ashlam-e-Ishqum	Gunday	Neha Bhansin	72.6	Exciting
Raabta	Agent Vinod	Sherya Ghosal Ash King	106	Sad
Maahi	Highway	A R rahman Sultana Jyc	129	Sad
Diye Jalate Hai	Namak Haram	Kishor Kumar	176	Silent
Saans Me Teri	Jab Tak Hai Jaan	Shreya Ghosal	245	Silent

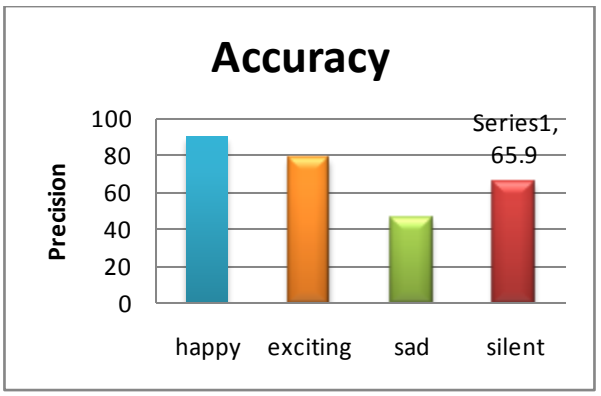

Chart I. Accuracy Of Mood

VI. CONCLUSION & FUTURE WORK

This music mood classification surely be unique one in the field of bollywood music and also for music information retrieval . It is also beneficiary as point of commercial application. Last but not the least, research target to normal human interface who are fond to be known as music lover, it is surely for them. Also in future if someone build an application that make user interaction then the research leads to normal human application.

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