

MAJOR PROJECT PHASE 1 REPORT - CS550

Project Title: Mental Health Analysis based on the Music choices of the individual

Project Author:

Kata Lakshmi Lasya, 12140880;

M. V. Kiran Sooraj, 12141000;

Pingili Sameeksha Reddy, 12141240,

1 Data Pre-processing : what data have you collected so far and what pre-processing have you done?

Model 1: Music Genre Prediction:

Data: GTZAN Audio Dataset - A collection of 10 genres with 100 audio files each, all having a length of 30 seconds (the famous GTZAN dataset, the MNIST of sounds)

Pre-processing done: Genre Vs Duration, Genre vs no. of tracks plot, Sampled signal plot for one of the audio tracks, Generating a spectrogram of the signal 'y' using the 'inferno' colourmap, Extracting audio features from music files of various genres: mean and variance, standardising the resulting data using StandardScaler.

Model 2: Mental Health Prediction:

Data: MXMH Survey Results Dataset

Pre-processing done: Replacing null values with mode of corresponding columns, distribution of primary streaming services, dropping unnecessary features, distribution of age, plotting of favourite genre vs Age, removing outliers in age, removing outliers in Hours per day, removing outliers in BPM, Mental health ranking distribution, Fav genre distribution, heat map.

2 Training with the basic model, validation, and completion of the data pipeline

2.1 Which models did you use, what training/validation accuracy have you achieved?

Model 1: Music Genre Prediction:

The following models have been trained using KNN,SVM and CNN on the data extracted from 30 second audio samples:

KNN with an accuracy of 64.50 percentage

SVM with an accuracy of 67 percentage

Ensemble of SVM with an accuracy of 64 percentage

CNN(2 hidden layers) with an accuracy of 74 percentage

CNN(3 hidden layers) with an accuracy of 61 percentage

CNN(5 hidden layers) with an accuracy of 69.5 percentage

The following models have been trained using KNN, and CNN on the features extracted from 3 sec audio samples:

KNN with an accuracy of 88.44 percentage

CNN with an accuracy of 91.08 percentage.

The best model out of all these is the CNN model trained on data extracted from 3 sec samples with an accuracy of 91.08 percentage.

Model 2: Mental Health Prediction:

Initially exploratory data analysis and data pre-processing has been done. Later, different models like svm, knn, linear regression and random forests have been used for training the data. However, the model's performance was disappointing. It was observed that r^2 error for the models predicting depression is tending negative. This might be due to some mistake in the data preprocessing while performing one-hot encoding.

2.2 Is your data pipeline completed?

No, pipelining both the models to yield mental health prediction from the questionnaire about daily life and music taste is yet to be done. The models, currently, are not streamlined with each other though.

3 Identification of the exact tasks you want to complete for the final submission

3.1 What challenges you are facing and how you plan to address them. What will be your final deliverables?

Challenges being faced and the action plan:

Even after persistent experiments with several models like SVM, KNN, random forests and linear regression, the model performance of Mental Health Prediction has been disappointing. Before the final submission, data processing and one hot encoding shall be revisited and other models types shall be explored.

Following are the identified tasks before final submission:

1. Revisiting Mental Health Prediction model to deliver better accuracy rate.
2. The individual models: Music Genre Prediction model, Mental Health Prediction model, will be streamlined to produce a single system of which these two models will be components.
3. A basic interface will be developed over web to ease the prediction system's usage for the users.

Final deliverables:

A web application which predicts the mental health of individuals based on the questions answered by a user about his/her basic lifestyle and music choices, with appreciable accuracy.

4 Github Repo

<https://github.com/ayasal04/Music-Choices-and-Mental-Health.git>

5 Individual Contributions

5.1 Kata Lakshmi Lasya, 12140880

In building models for music genre prediction, 30-second audio samples had been collected, extracted features like MFCCs, and split the dataset. The SVM and kNN models were trained on scaled features, while a CNN processed mel-spectrogram images. Evaluation revealed the effectiveness of the SVM and CNN models, showcasing diverse approaches in genre classification from audio data.

5.2 M. V. Kiran Sooraj, 12141000

Features from audio samples had been extracted for Model 1. Additionally, a comprehensive Exploratory Data Analysis was conducted on Model 2, shedding light on the characteristics and insights within the dataset to inform subsequent modeling decisions.

5.3 Pingili Sameeksha Reddy, 12141240

In constructing models for music genre prediction, kNN and CNN for training on features extracted from 3-second audio samples had been utilised. Furthermore, SVM, kNN, and decision trees had been explored in building models for mental health prediction on a second dataset, showcasing versatility in machine learning applications across different domains.