**AI Music Composer**

Concluding research on variety of papers from GitHub/Google Scholar, it becomes apparent that the majority is using Mel-frequency cepstral coefficients (MFCC) as the feature vector for the sound sample, Specifically the librosa python package is used in Audio Analysis.

**MFCCs are derived as follows:**

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.

There are many existing projects on Music Genre Classification, there is a long-short-term memory one on [GitHub](https://github.com/ruohoruotsi/LSTM-Music-Genre-Classification) which we could work with, for example the code is already provided to categorise a song into a genre based on feature vectors. There is a genre list of 8 different ones provided in the code.

Our project will focus on using AI to create a new genre of music, it will then be processed into this existing model to predict if it is one of the existing or a new one.

The goal is to create a new genre that is not in one of the existing 8 and have the model recognise that.

Success will be measured according to human evaluation, composers or music enthusiasts.

* Survey (MS Forms/Survey Monkey)
* Qs to collect info on coherence,
* Consistency,
* Stylistic elements,
* Emotional response
* Rank songs (1-10)

Lookup and compare another approach, graphing comparison to see which performs better.

Comparing results with training time

Visualise the pre-processed dataset graphically before moving onto the network

Judging from results pick a network to implement

**Read papers which have done comparison**

**Automatic Music Genre Classification using Convolution Neural Network**

1. Database of music created, each song is pre-processed as follows:
2. Feature Vector Extraction (librosa python package) Package specifically used in Audio Analysis
3. Extracted feature is called a MFCC (Encode timbral properties of music signal by encoding rough shape of the low-power spectrum on the Melfrequency scale)
4. MFCC is calculated using these steps:

A diagram of a process

Description automatically generated

1. Music signal is applied with Fourier Transform converting signal to frequency spectrum.
2. Mel Scale Filtering to obtain the Mel Frequency Spectrum
3. At this stage, the log of the power is taken.
4. The following is passed on to a block taking cosine transforms of the following signal and feature vectors are obtained
5. Obtaining two types of vectors, Mel Spectrum (128 coefficients) & MFCC (13 coefficients) The comparison is than done.

A Convolutional Neural Network (CNN) consists of one or more convolutional layers, proceeded by one or more fully connected layers as in a standard multilayer neural network.

Each neuron receives inputs from the feature vectors, then they are dot product with the weights passed on to the next layers and optionally follows it with a non-linearity,

A diagram of a diagram

Description automatically generated

Three main types of layers to build ConvNet architectures:

Convolutional Layer, Pooling Layer and Fully Connected Layer.

A screenshot of a computer program

Description automatically generated

Creating a new music genre blending the styles of Juice WRLD, Mac Miller, Tame Impala, and Bob Marley would be an exciting endeavour, combining elements of hip-hop, psychedelic rock, reggae, and introspective lyricism. Here's a conceptualization of this unique genre:

Genre Name: Psychedelic Reggae Rap Fusion

Characteristics:

Lyrical Themes: The lyrical content draws inspiration from the introspective and emotionally raw style of Juice WRLD and Mac Miller, exploring themes of mental health, personal struggles, and self-reflection. Additionally, it incorporates the socially conscious messages and uplifting spirituality often found in Bob Marley's reggae music.

Musical Elements:

Melodic and Harmonic Layers: Taking cues from Tame Impala's psychedelic rock sound, the music features lush, layered instrumentation with dreamy synths, swirling guitars, and ethereal vocal harmonies.

Rhythmic Foundation: Infusing the laid-back grooves and offbeat rhythms characteristic of reggae music, the genre maintains a steady, infectious rhythm that encourages movement and relaxation.

Hip-Hop Influences: Drawing from Juice WRLD and Mac Miller's hip-hop sensibilities, the genre incorporates elements of rap, including tight beats, intricate flows, and introspective storytelling.

Production Techniques: The production style emphasizes experimentation and sonic exploration, incorporating psychedelic effects, trippy soundscapes, and innovative sampling techniques to create a surreal and immersive listening experience.

Sample Tracks:

Eternal Vibes - This track features introspective lyrics reflecting on the complexities of life and the search for inner peace, set against a backdrop of hypnotic reggae rhythms, psychedelic guitar melodies, and atmospheric synths.

Mind's Eye - Combining catchy hooks, intricate wordplay, and socially conscious themes, this song explores the struggles of navigating modern society while staying true to oneself. The music blends pulsating hip-hop beats with reggae-inspired grooves and swirling psychedelic textures.

Sunset Dreams - Inspired by the laid-back vibes of a beachside sunset, this track combines smooth reggae rhythms with hazy guitar lines and introspective lyrics about love, loss, and personal growth. The dreamy production transports listeners to a tranquil state of mind, evoking a sense of nostalgia and reflection.

Overall, the Psychedelic Reggae Rap Fusion genre offers a captivating blend of musical styles and thematic elements, inviting listeners on a journey of self-discovery, introspection, and sonic exploration.

https://github.com/mlachmish/MusicGenreClassification