NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

School of Computer Science and Engineering
College of Engineering

Music Recommendation System Based on Emotions from Facial Expression

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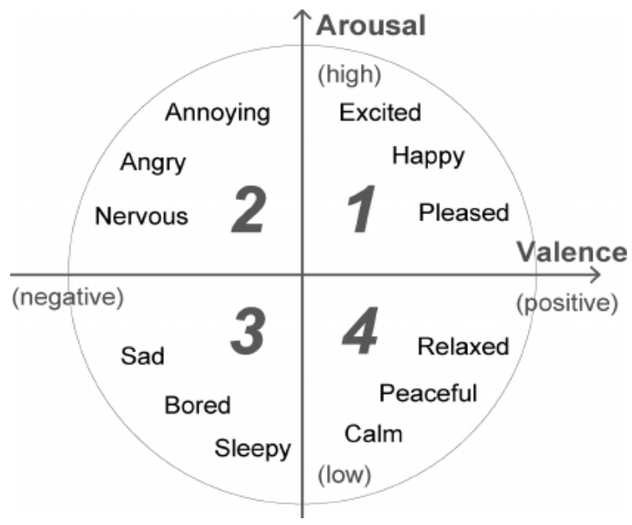
Project Objectives

This project explores the extent to which song lyrics can further improve the accuracy of music classification based on emotion. Deep learning techniques are used to demonstrate the complementary nature of song lyrics and audio features.

This project also develops a music recommendation system as a web application that integrates existing facial detection APIs and the enhanced music classification algorithm. Music playlists are recommended to users to better their existing mood whenever a certain facial emotion is detected.

Music Algorithm Design

The music multi-classification algorithm classifies music into 4 different moods – Angry, Calm, Happy and Sad – which represent the 4 quadrants of Russell's Arousal-Valence Model of Emotions.

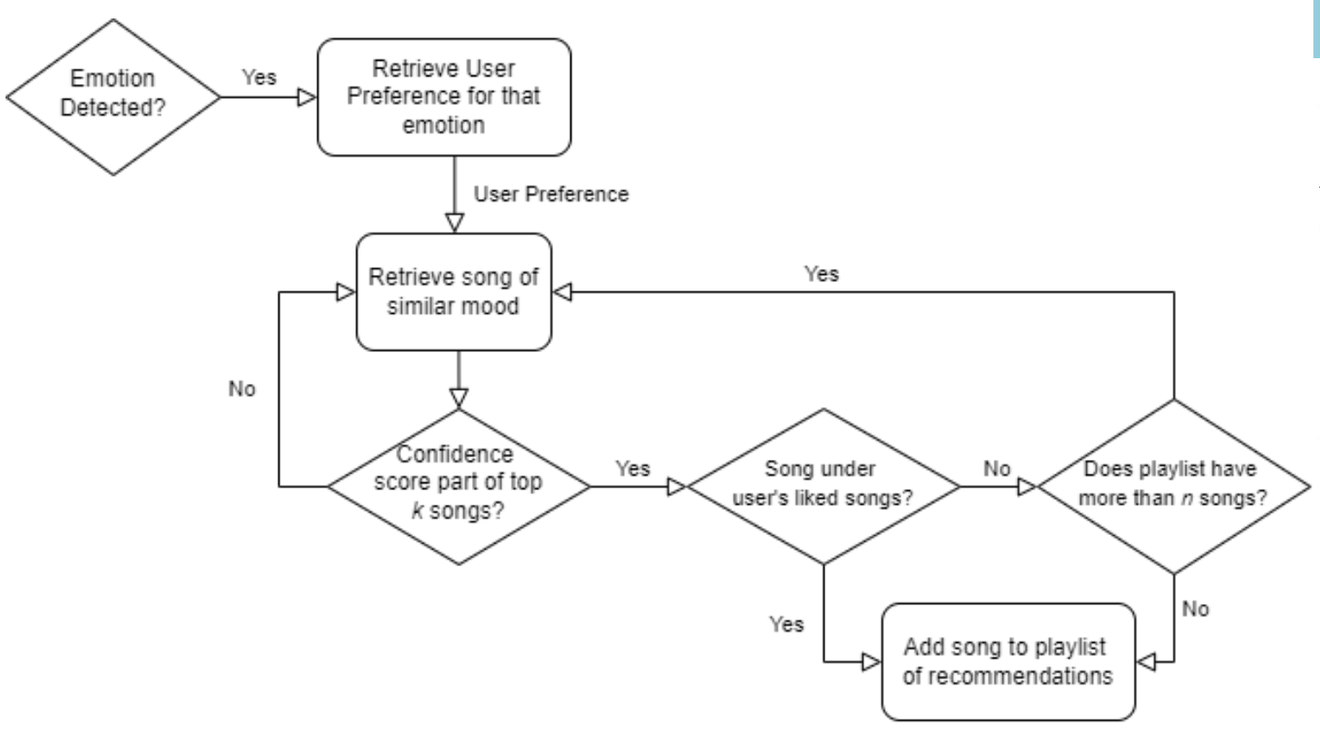


Song lyrics were extracted using Genius API and leveraged transfer learning by being trained on a pre-trained DistilBERT model. Audio features retrieved from Spotify API were trained using a Feedforward Neural Network.

The combined model was found to be most optimal at a weight distribution of 80% song lyrics and 20% audio features. Overall accuracies and F1 scores of the combined model surpassed that of the individual models.

	BERT	FNN	Combined
Accuracy	0.800	0.679	0.849
Average F1 Score	0.795	0.650	0.826

Recommendation Model



Application Development

The desktop application incorporates Amazon Rekognition API for real-time emotion detection, together with the enhanced music classification model for music recommendation. It also addresses differing user preferences by seeking user input and considering their like history.

The main features offered by the application are:

- Account Creation
- Spotify Authentication
- Set User Preferences
- Set Camera Permissions
- Playlist Recommendations