



## Literature Review: Mood Detection in Music Using Lyrics

### 1. Problem Statement

- Objective: Automatically detect the mood of a song based on its lyrics.
- Mood Categories: Common categories include happy, sad, angry, relaxed, romantic, and energetic.

Applications:

- Playlist generation
- Personalized recommendations
- Music therapy

### 2. Dataset

Sources:

- Lyrics databases (e.g., Genius, LyricFind, Kaggle datasets)
- Some datasets are annotated with mood/emotion labels via crowdsourcing.
- Preprocessing Steps:
  - ❖ Removal of stopwords, punctuation, and special characters
  - ❖ Lemmatization and stemming
  - ❖ Tokenization (conversion of text into word tokens)

### 3. Methodology

- Key Methods
- Text Preprocessing
- Implement Bag of Words (BoW) and TF-IDF representations
- Utilize word embeddings (Word2Vec, GloVe, FastText)
- Classical Machine Learning Models Employ models such as Naive Bayes, Support Vector Machines (SVM), and Random Forest using TF-IDF features. These models are suitable for smaller datasets and offer interpretability.
- Deep Learning Approaches that Use Recurrent Neural Networks (RNNs), Long Short-Term Memory networks (LSTMs), and Gated Recurrent Units (GRUs) to capture the sequence and context of words.
- Apply Convolutional Neural Networks (CNNs) on word embeddings to detect emotional word patterns.

#### ☐ Transformer Models

- Implement state-of-the-art models such as BERT, RoBERTa, and DistilBERT for text classification
- Fine-tuning these models significantly enhances mood detection accuracy.

#### ☐ Hybrid Models

- Combine lyrics with audio features (e.g., tempo, pitch, energy)
- This approach improves accuracy, as mood is expressed in both lyrics and sound.

#### 4. Results

- Classical Machine Learning: Achieves approximately 60–70% accuracy.
- Deep Learning Models (LSTM, CNN): Reaches around 70–80% accuracy.
- Transformers: Exceeds 85% accuracy on well-annotated datasets.
- Hybrid Models (lyrics + audio): Yield the best overall results.

#### 5. Challenges & Limitations

- Lyrics may not always accurately capture mood (e.g., sarcasm or ambiguity).
- Multilingual lyrics pose challenges for Natural Language Processing (NLP).
- There is a lack of large, high-quality mood-labeled datasets.
- Mood perception is subjective; different listeners may interpret emotions differently.

#### 6. Relevance to My Project

- The project will incorporate lyrics-based mood detection as a key component.
- Planned Approach:
  - ❖ Preprocess lyrics through tokenization and lemmatization.
  - ❖ Train and fine-tune DistilBERT/RoBERTa for mood classification.
  - ❖ Later integrate with social sentiment analysis and playlist metadata to enhance mood-aware recommendations.