

Colab links:

- oop Face\_Emotion\_Music\_Recommendation.ipynb
- oop ML-01.ipynb

Dataset: [kaggle-278k-songs](#)

Paper [link](#)

drive [link](#)

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## **ML project Proposal**

User uploads a face photo → our model reads the face emotion → the system suggests songs that match that emotion.

We used your numeric audio data for [278k songs](#). We scaled the features and ran K-Means to make 7 song groups. Then we named each group as one emotion → Sad, Happy, Angry, Neutral, Fear, Disgust, Surprised. When the face model

detects an emotion, we pick songs from that matching group and show them

## What data we have

- Around **28k songs**.
- Each song already has **numeric audio features** (not plain lyrics). Example features: **danceability, energy, loudness, speechiness, acousticness, instrumentalness, liveness, valence, tempo, spectral rates** etc.

Note: We are clustering songs based on these audio numbers (not on lyrics). Audio features tell us if a song is upbeat, slow, happy-sounding, acoustic, etc.

### 1. Pick the song features

We used the numeric columns like danceability, energy, valence, tempo, etc. Each song is a point with many numbers.

### 2. Make numbers comparable

Some features have big ranges (tempo = 70–200). Some are 0–1 (danceability).

We used:

```
from sklearn.preprocessing import StandardScaler
scaler = StandardScaler()
X_scaled = scaler.fit_transform(X)
```

This makes every feature have mean 0 and similar scale. It stops big numbers from dominating.

### 3. Use K-Means to group songs into 7 clusters

```
from sklearn.cluster import KMeans
```

```
kmeans = KMeans(n_clusters=7, random_state=42)
```

```
clusters = kmeans.fit_predict(X_scaled)
```

```
df['cluster'] = clusters
```

#### What K-Means did:

- It picked 7 center points.
- Each song went to the nearest center.
- It moved centers and repeated until stable.
- Result: each song has a cluster ID 0..6.

### 4. Give human names to clusters

K-Means returns numbers (0..6). We mapped them to emotion words:

```
emotion_map = {
```

```
    0: "Sad", 1: "Happy", 2: "Angry",
```

```
    3: "Neutral", 4: "Fear", 5: "Disgust",
```

**6: "Surprised"**

}

```
df['emotion'] = df['cluster'].map(emotion_map)
```

This is a manual step. We looked at cluster features (like low valence + low energy → “Sad”) and chose names.

## 5. Save the result

We saved all songs with their assigned emotion:

```
df.to_csv("clustered_songs.csv", index=False)
```

Now we have a big [file](#) with song id + cluster + emotion.

## How recommendation works

When the face model says `detected_emotion = "Happy"`, we pick songs from the "Happy" cluster:

```
def recommend_songs(detected_emotion, df, n=5):  
  
    songs = df[df['emotion'] ==  
              detected_emotion.capitalize()].sample(n)  
  
    return songs[['Unnamed: 0', 'emotion']]
```

This picks 5 random songs labeled as Happy and shows their IDs and emotion.

## Example output:

```
yaml

Detected Emotion: Happy
Unnamed: 0      emotion
277010          Happy
8477            Happy
182262          Happy
23988           Happy
259888          Happy
```