Team MoodSwing

Lyrical Mood Classification

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01 Goal & Motivation

What

Accurately classifying song lyrics into moods (happy, sad, angry, relaxed)

Why

Aid in understanding the emotional impact of songs on listeners and improve music recommendations

How

?

02 Data & Data Processing

MoodyLyricQ Dataset

- Curated **collection of song titles, associated artist names** spanning across various genres.
- Individually **labeled with emotional tags** for every song – Happy, Sad, Angry, and Relaxed. [Each song has a **single label**.]
- The following dataset **does not contain song lyrics** due to copyright issues.

Mood	Number of Song Lyrics Available
Happy	500
Relaxed	423
Sad	415
Angry	383
Total	**1721**

Obtaining Lyrics

- **Genius API Integration:**
  - Using the Genius API's search feature for fetching lyrics using a combination of artist's name and song name.
- **File Organization:**
  - Retrieved lyrics and metadata are stored in individual .txt, .json files, respectively.

Mood	Total Lyrics Scraped	Subset used for training
Happy	500	45
Relaxed	423	45
Sad	415	45
Angry	383	45
Total	**1721**	**180**

Preprocessing

- Remove extra lines and metadata
- Remove stop words
- Apply stemming and lemmatization
- Manually verify 180 samples
- Create a perfectly class-balanced dataset

Data Sample

	Index	Artist	Title	Mood	Filename	Lyrics
0	ML100	Bad Company	Can't Get Enough	happy	ML100_Cant Get Enough.txt	[Intro]\n\n[Verse 1]\nWell, I take whatever I ...
1	ML1003	Los Lobos	Come On Let's Go	happy	ML1003_Come On Lets Go.txt	[Verse 1]\nWell, come on let's go, let's go, l...
49	ML1000	The Police	So Lonely	sad	ML1000_So Lonely.txt	\n[Verse 1]\nWell, someone told me yesterday\n...
50	ML102	Billy Squier	In The Dark	sad	ML102_In The Dark.txt	\nLife isn't easy from the singular side\nDown...
79	ML1010	The Meters	Fire On The Bayou	angry	ML1010_Fire On The Bayou.txt	\nFire on the bayou\nFire on the bayou\n\nDown...
80	ML1025	Metric	On The Sly	angry	ML1025_On The Sly.txt	\n[Verse 1]\nWipe it up you're capable\nOf put...
127	ML1	Usher	There Goes My Baby	relaxed	ML1_There Goes My Baby.txt	\n[Intro]\nYeah... right...\nUsher baby... oka...
128	ML10	Beenie Man	Slam	relaxed	ML10_Slam.txt	\nWell, this is like\nA menace to the society\...

Data frame

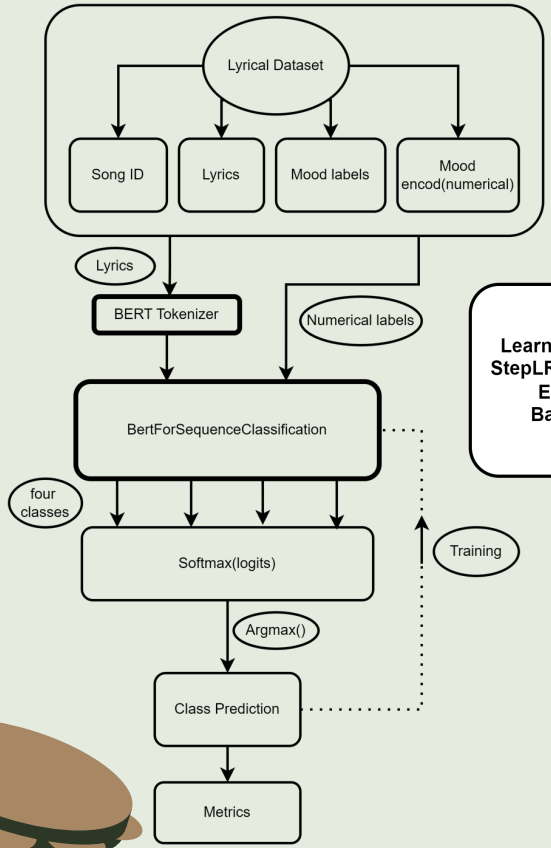
ML1032_Because Of You.txt

```
[Verse]
Because of you, there's a song in my heart
Because of you, my romance had its start
Because of you, the sun will shine
The moon and stars will say you're mine
Forever, and never to part

[Chorus]
I only live for your love and your kiss
It's paradise to be near you like this
Because of you, my life is now worthwhile
And I can smile
because of you

[Instrumental Break]

[Chorus]
I only live for your love and your kiss
It's paradise to be near you like this
Because of you, my life is now worthwhile
And I can smile
because of you
```

Lyrics

03 Models & Software

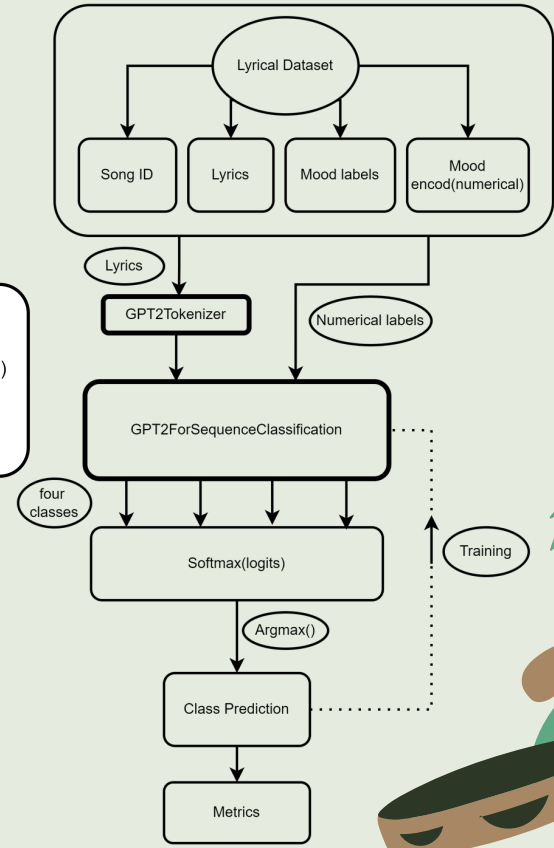
BERT vs GPT2



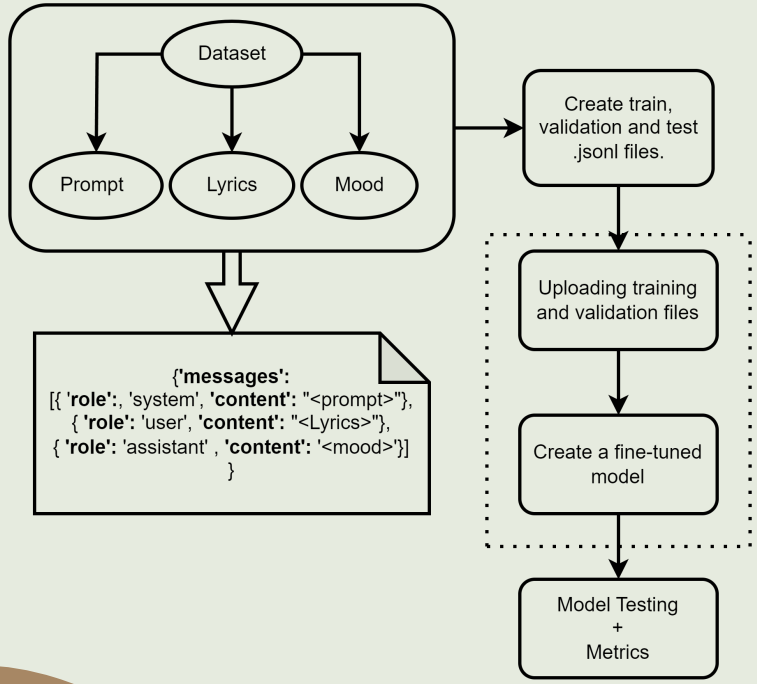
VS

Learning Rate: 1e-5
StepLR (gamma = 0.9)
Epochs: 20
Batch size: 8

Learning Rate: 1e-5
StepLR (gamma = 0.9)
Epochs: 20
Batch size: 4



GPT3.5 Model



PROMPT

1

"You are a chatbot that, when prompted with song lyrics, predicts one of the emotions ('Happy', 'Sad', 'Angry', or 'Relaxed') without providing any explanation. Reply with only the emotion name.

You do not retain any previous information regarding the lyrics given to you. You specialize in analyzing the given song lyrics and predicting the emotion of the song."

VS

2

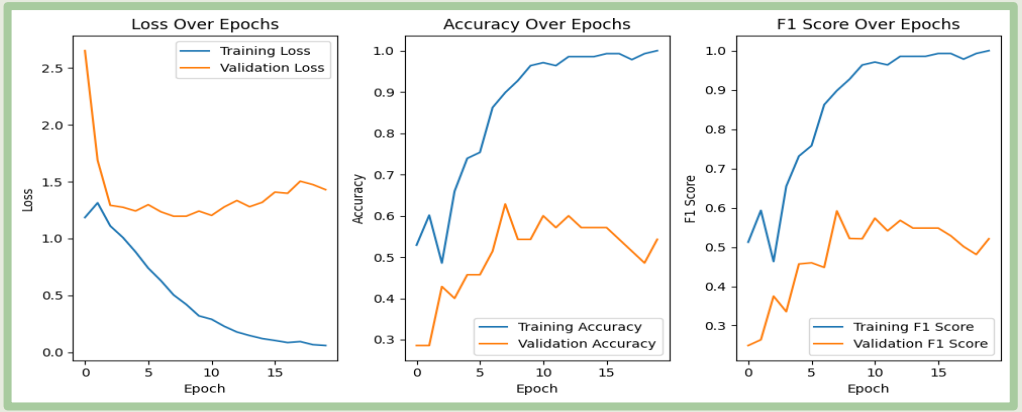
"You are a chatbot that, when prompted with song lyrics, predicts one of the emotions ('Happy', 'Sad', 'Angry', or 'Relaxed') without providing any explanation. Reply with only the emotion name. "

04 Results

Quantitative Results

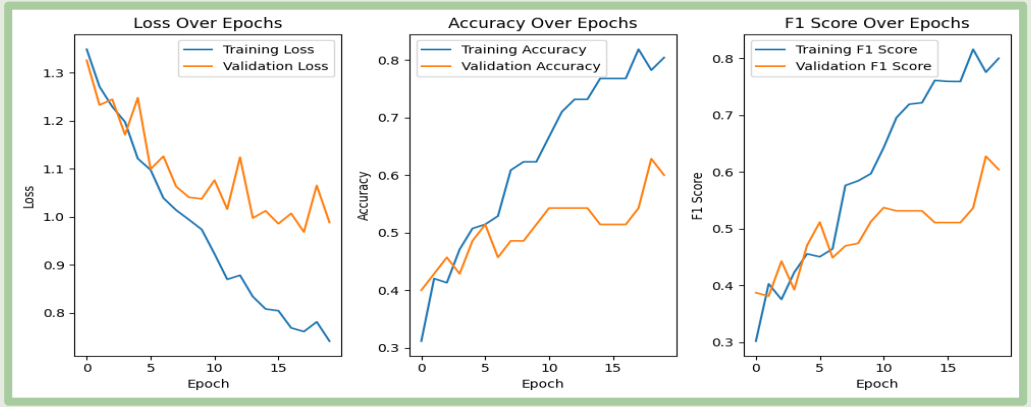
Training & Validation Curves

GPT2



VS

BERT



Baseline Model Performance

Classification Report – Validation:

	precision	recall	f1-score	support
happy	0.71	0.71	0.71	14
sad	0.50	0.60	0.55	5
angry	0.71	0.56	0.63	9
relaxed	0.38	0.43	0.40	7
accuracy			0.60	35
macro avg	0.58	0.57	0.57	35
weighted avg	0.62	0.60	0.60	35

BERT

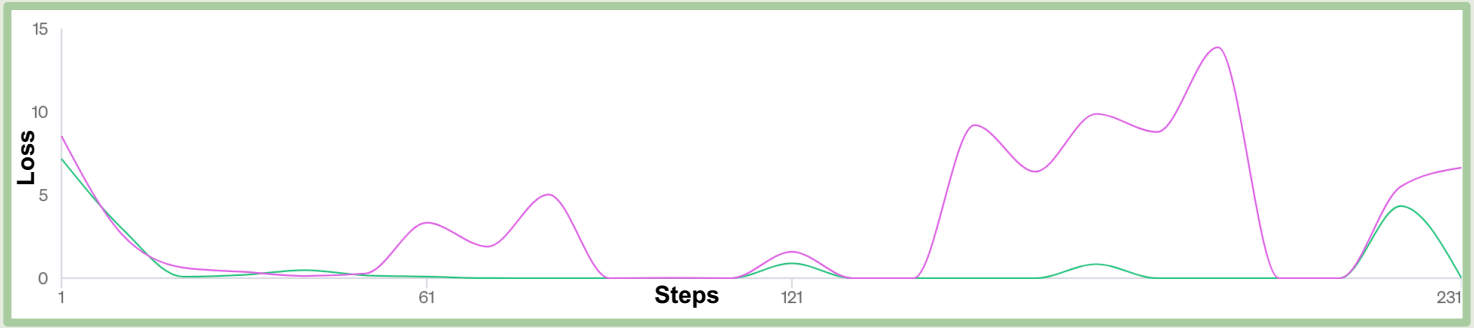
VS

GPT2

Classification Report - Validation:

	precision	recall	f1-score	support
happy	0.67	0.86	0.75	14
sad	0.25	0.40	0.31	5
angry	0.67	0.44	0.53	9
relaxed	0.33	0.14	0.20	7
accuracy			0.54	35
macro avg	0.48	0.46	0.45	35
weighted avg	0.54	0.54	0.52	35

OpenAI GPT3.5 Model Performance



Testing Sample of 80 Lyrics: Classification Report

	precision	recall	f1-score	support
happy	0.78	0.58	0.67	24
sad	0.54	0.58	0.56	12
angry	0.74	0.74	0.74	19
relaxed	0.52	0.67	0.59	18
accuracy			0.64	73
macro avg	0.64	0.64	0.64	73
weighted avg	0.66	0.64	0.65	73

- Strong performance in identifying ‘Angry’, ‘Happy’ emotions.
- ‘Relaxed' show decent precision but lower recall, with occasional misses.
- 'Sad' faces challenges with lower precision, F1-score, indicating difficulty in classification.

Qualitative Analysis

Correct & Misclassified Examples

```
[Verse]
Because of you, there's a song in my hear
Because of you, my romance had its start
Because of you, the sun will shine
The moon and stars will say you're mine
Forever, and never to part

[Chorus]
I only live for your love and your kiss
It's paradise to be near you like this
Because of you, my life is now worthwhile
And I can smile
because of you

[Instrumental Break]

[Chorus]
I only live for your love and your kiss
It's paradise to be near you like this
Because of you, my life is now worthwhile
And I can smile
because of you
```

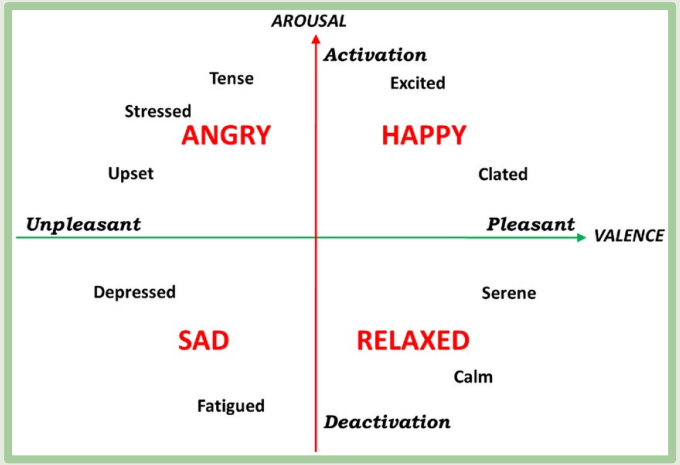
Actual Label:
Happy
Predicted Label:
Relaxed
Explanation:
The mention of a "song in my heart," "paradise," and the overall soothing tone could contribute to a sense of relaxation

Actual Label:
Angry
Predicted Label:
Angry
Explanation:
The presence of phrases such as "evil minds," "destruction," and expressions of contempt for war elicits feelings of anger.

```
[Verse 1]
Generals gathered in their masses
Just like witches at black masses
Evil minds that plot destruction
Sorcerers of death's construction
In the fields, the bodies burning
As the war machine keeps turning
Death and hatred to mankind
Poisoning their brainwashed minds
Oh, Lord, yeah

[Bridge]
Politicians hide themselves away
They only started the war
Why should they go out to fight?
They leave that all to the poor, yeah
Time will tell on their power minds
Making war just for fun
Treating people just like pawns in
chess
Wait till their judgment day comes,
yeah
```

General Trends Observed

Emotion	Highest Misclassified label
Happy	**Relaxed**
Sad	**Angry**
Angry	**Sad**
Relaxed	**Happy**



05 Discussion and Learnings

Interesting Findings

01

BERT performs better than GPT2- due to its bi-direction context learning

02

Minimal pre-processing gives better performance of models

03

Class 'Relaxed' consistently tends to be misclassified as 'Happy'

04

The model is inclining towards valence more than arousal

Thanks!

Do you have any questions?