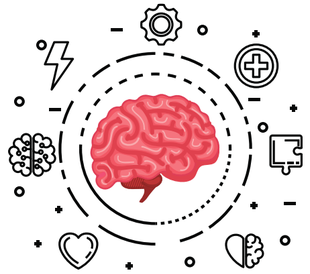


Mental and Emotional Analysis using Human Interaction

Analysing human emotions and predict the mental state of an individual

Dhritesh Bhagat . Aritra Ray
Debarghya Datta . Sneha Dasgupta
Saptarshi Mondal . Sohini Chatterjee

Institute of Engineering and Management

OUTLINE

- Asserting the most ignorant and stigmatic issue of today's generation, especially in low-income countries, mental health statistics has shown about 14% of the global burden of disease that has been attributed to neuropsychiatric disorder as the level of psychological well-being or an absence of mental illness.

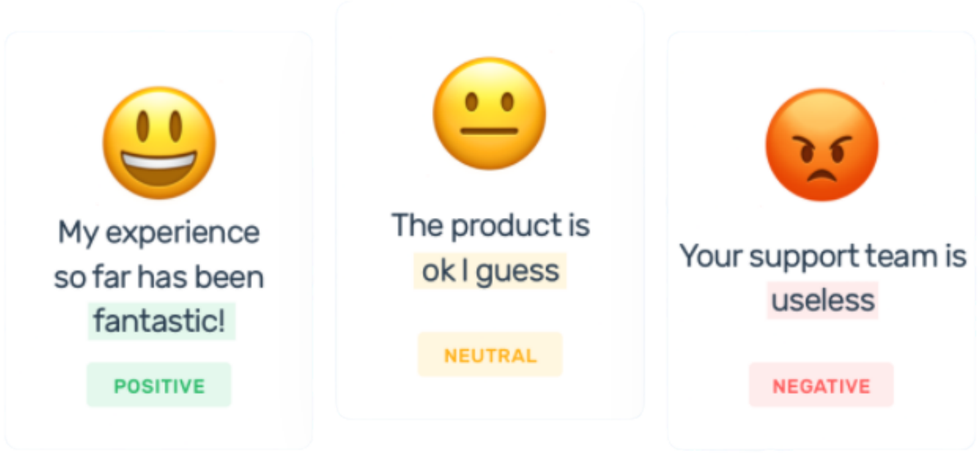
- With our studies focusing on the detection of mental health issues with core help of Machine Learning, the challenges have been accepted to contribute to the main-field research from our end.

BEYOND SENTIMENT

The goal of our session is to make our code connect with people better.

- Difference between Sentimental Analysis and Emotional Analysis

Sentimental Analysis



Sentiments

Positive

Negative

Emotions

Good

Well

Sad

Angry

BEYOND SENTIMENT

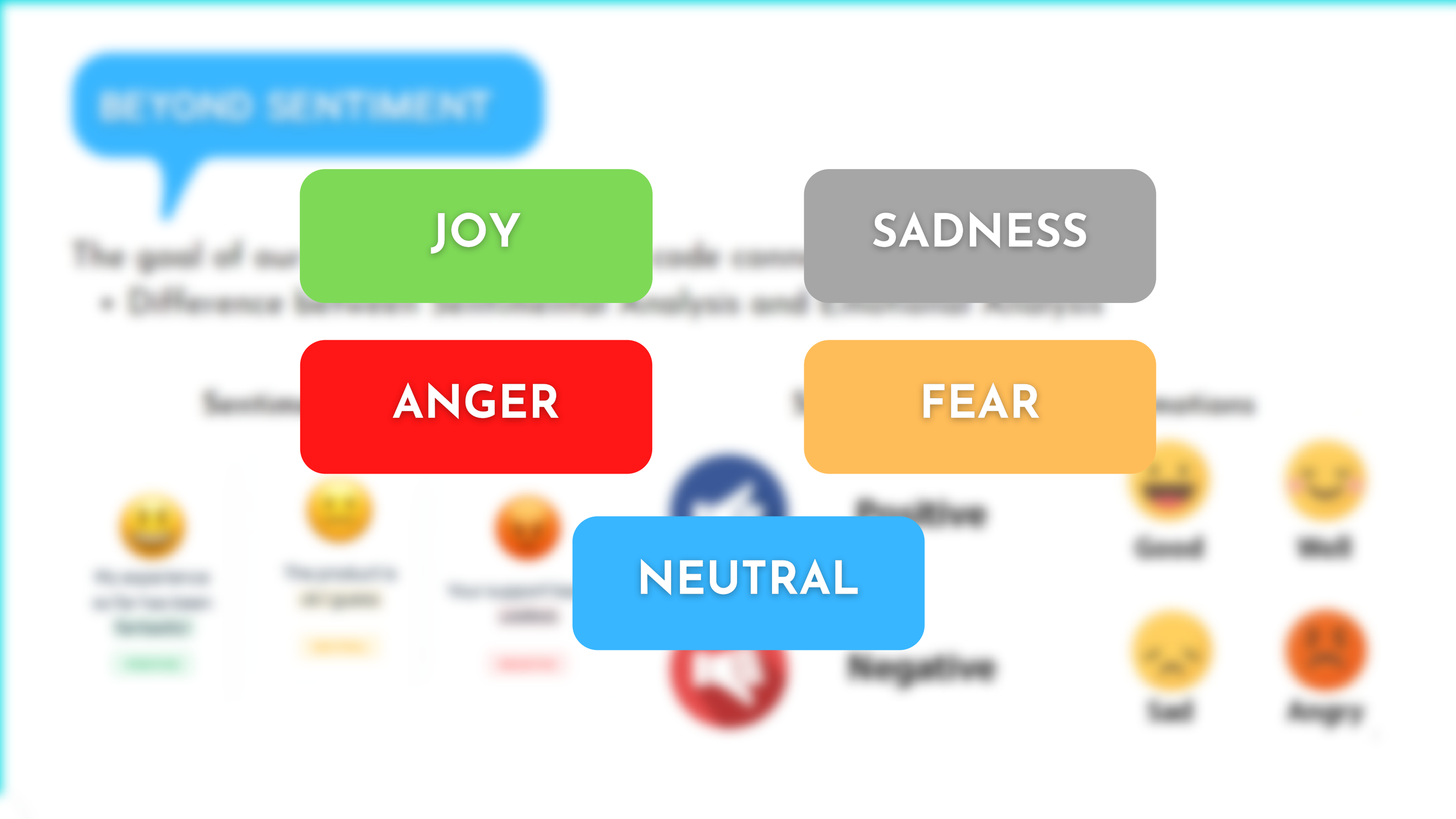
JOY

SADNESS

ANGER

FEAR

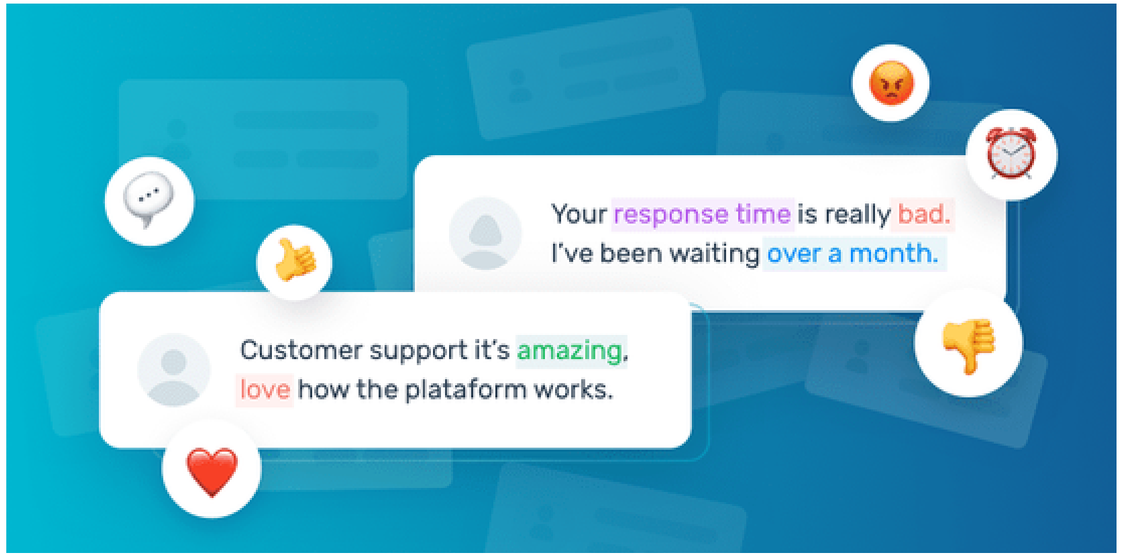
NEUTRAL



Application

1. Psychological and medical guidance and support system
   - Helping people come out and talk about mental health without any insecurities
   - Smart Medical Bots
   - OCD and other mental diseases

2. Studying behavioral analysis and media text grading
   - Religion
   - Political views
   - Reviews and comments



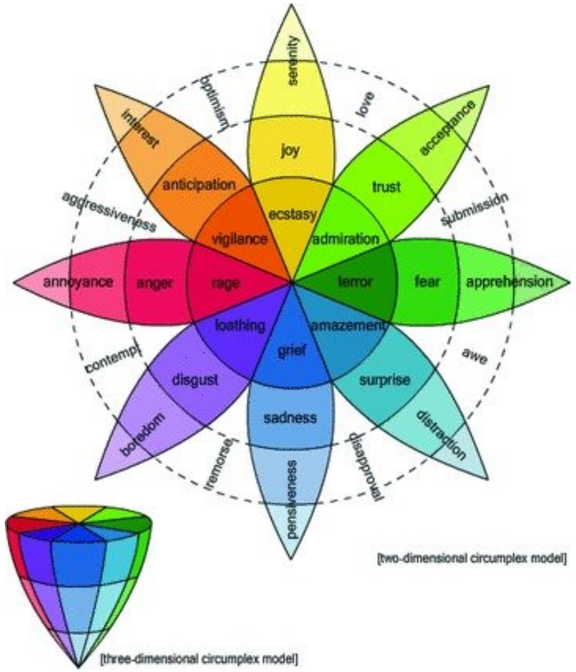
Psychological Models

1 Categorical Models

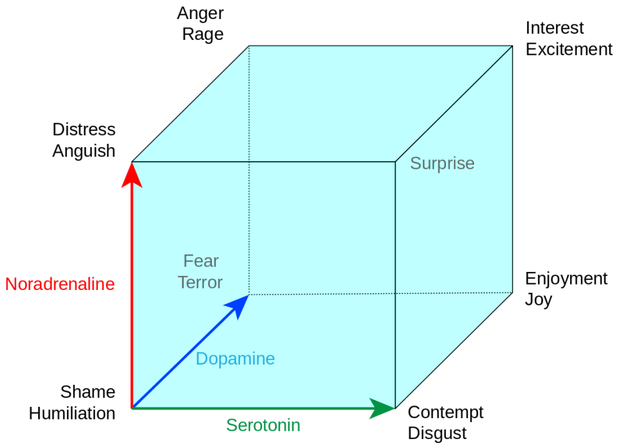
- Emotions have cross cultural universal counterparts.
- Basic emotions: joy, anger, fear,disgust, sadness, surprise etc

2 Dimensional Models

- Emotions are culturally sensitive.
- Represents emotions as coordinatets in multi-dimensional space.
- Valence and arousal are two common dimensions.



Plutchik's wheel of emotions



Lövheim cube of emotion

Data

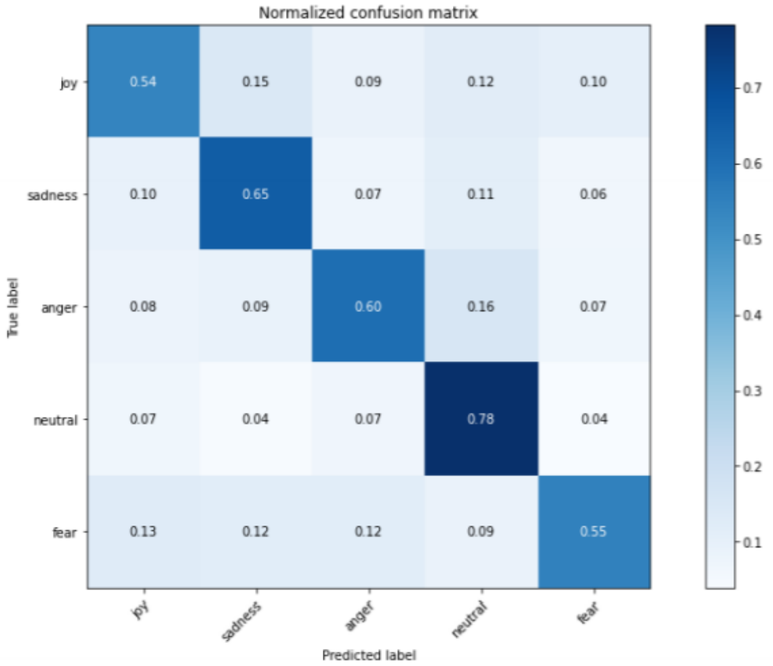
These are some datasets we have freely available online but most of them are categorical. Taking reference from several Data Science Summits and scientists', we encountered the same problem.

Dataset	Type	Granularity	# emotions	Size	Description
ISEAR	categorical	sentences	4 emotions	5522	- Psychological experiences - 37 countries
Tales	categorical	sentences	4 emotions	1094	
Reddit	**categorical**	**sentences**	**4 emotions**	**100**	- Mainly 'fear' - Internal
Movie reviews	**categorical**	**sentences**	**5 emotions**	**2361**	- Internal
ANET	dimensional	sentences	VAD	120	
SemEval	categorical	sentences	4 emotions	1250	- Emotion intensity
DepecheMood	dimensional	words	5 emotions	37K	- Lexicon

Traditional Classifiers

1

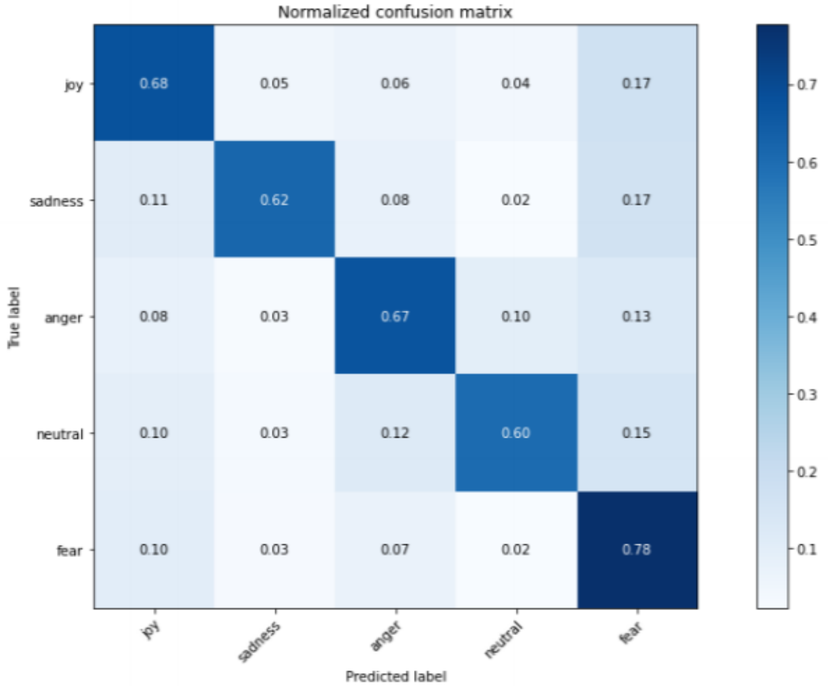
```
Accuracy: 62.28%

F1 Score: 62.28

COnfusion Matrix:
 [[374 101  61  85  72]
 [ 65 443  50  77  44]
 [ 57  64 426 113  47]
 [ 43  27  44 499  25]
 [ 86  80  81  58 371]]
```



Random Forest

2

```
F1 Score: 67.02

COnfusion Matrix:
 [[469  32  44  28 120]
 [ 73 420  55  16 115]
 [ 56  18 475  68  90]
 [ 61  20  76 385  96]
 [ 68  20  48  15 525]]
```

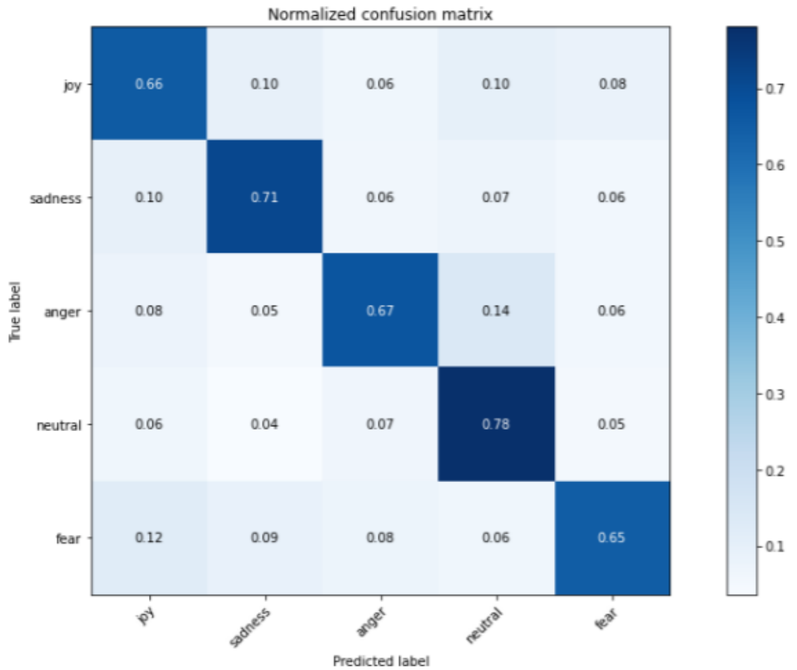


Naive Bayes

Traditional Classifiers

3

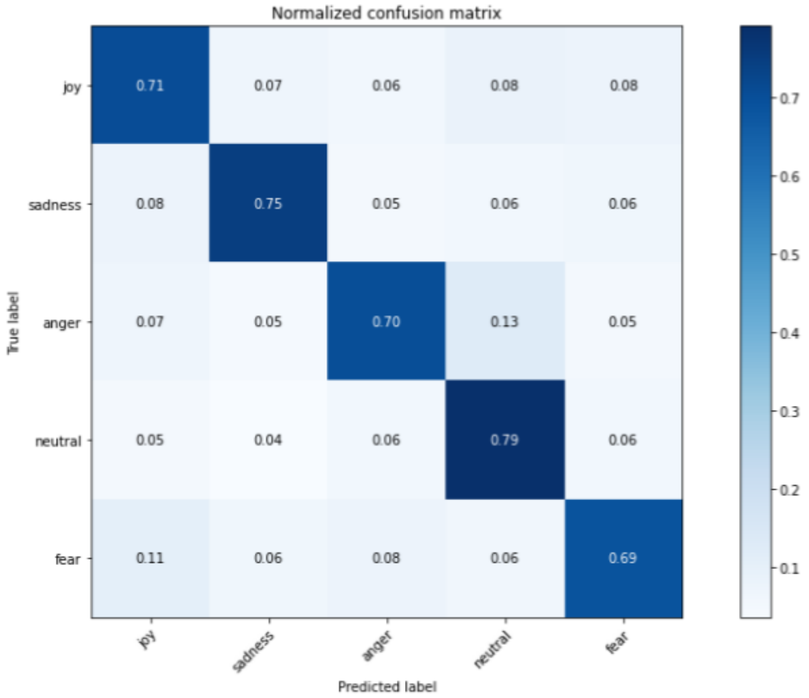
```
Accuracy: 69.35%

F1 Score: 69.35

COnfusion Matrix:
 [[456  67  44  68  58]
 [ 65 483  42  50  39]
 [ 56  34 476 101  40]
 [ 41  23  42 498  34]
 [ 82  60  51  43 440]]
```



Logistic Regression

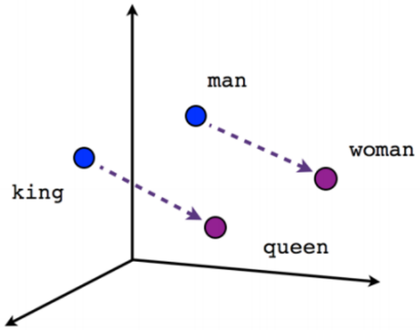
4

```
F1 Score: 72.71

COnfusion Matrix:
 [[490  49  41  58  55]
 [ 53 508  34  40  44]
 [ 50  33 498  91  35]
 [ 34  23  38 505  38]
 [ 72  43  53  42 466]]
```

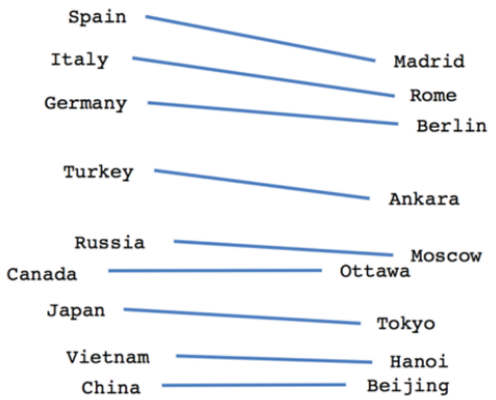


SVM

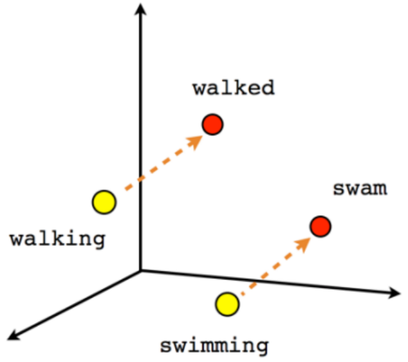
KEY FEATURES



Male-Female



Country-Capital



Verb tense

SEMANTIC

WORD EMBEDDING

- Represent word in continuous semantic vector space.

SYNTACTIC

- Capture structure of sentences
- Semantic meaning is sensitive to word order.

The dangerous killer escaped one month ago, but recently he was arrested. 😀

The dangerous killer was arrested one month ago, but recently he escaped. 😱

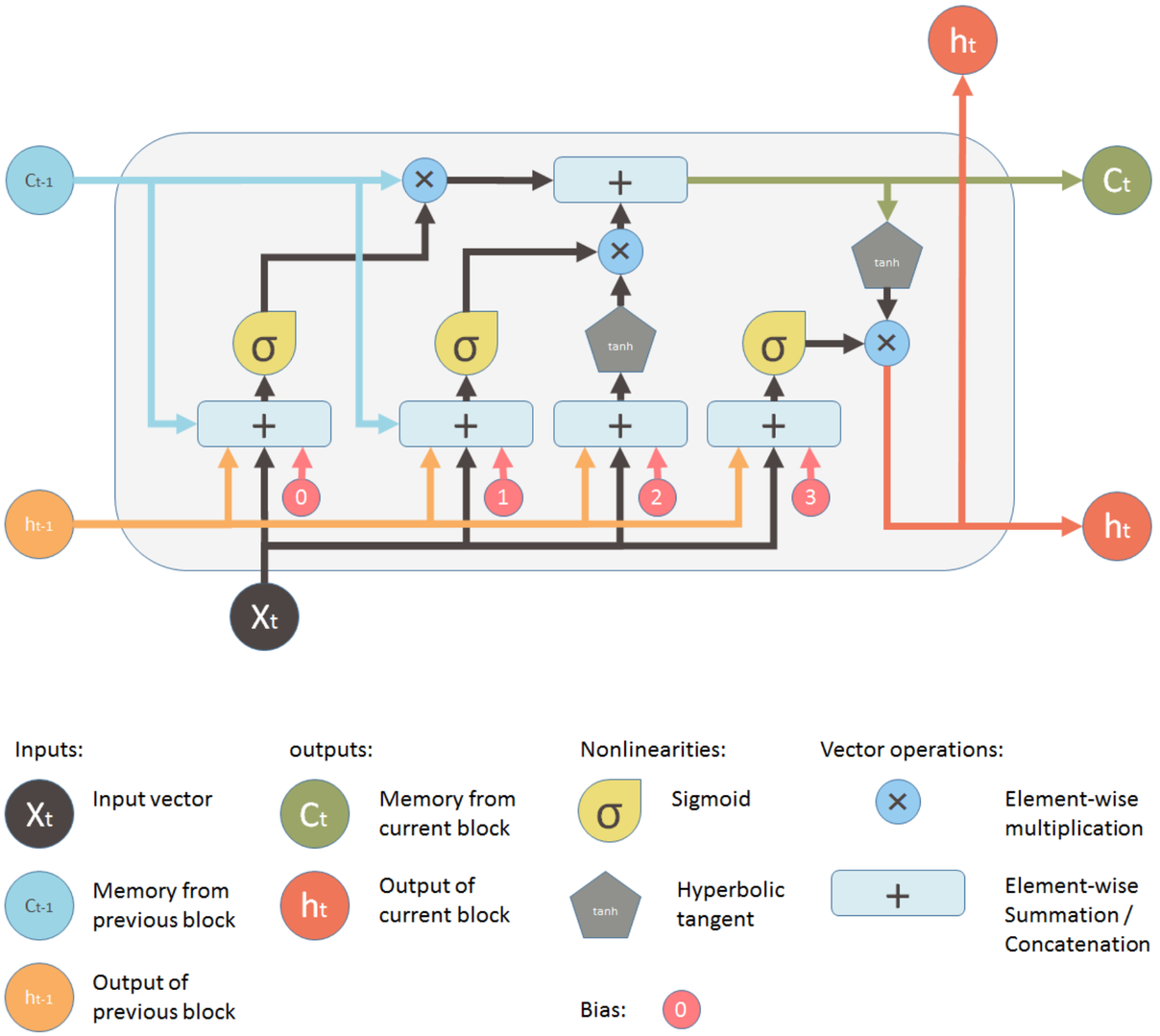
DL Approach

Quantify semantics with word embedding:

- Using a w2v model pre-trained on Wikipedia.
- 2.2M Vocabulary and 300 dimensions.

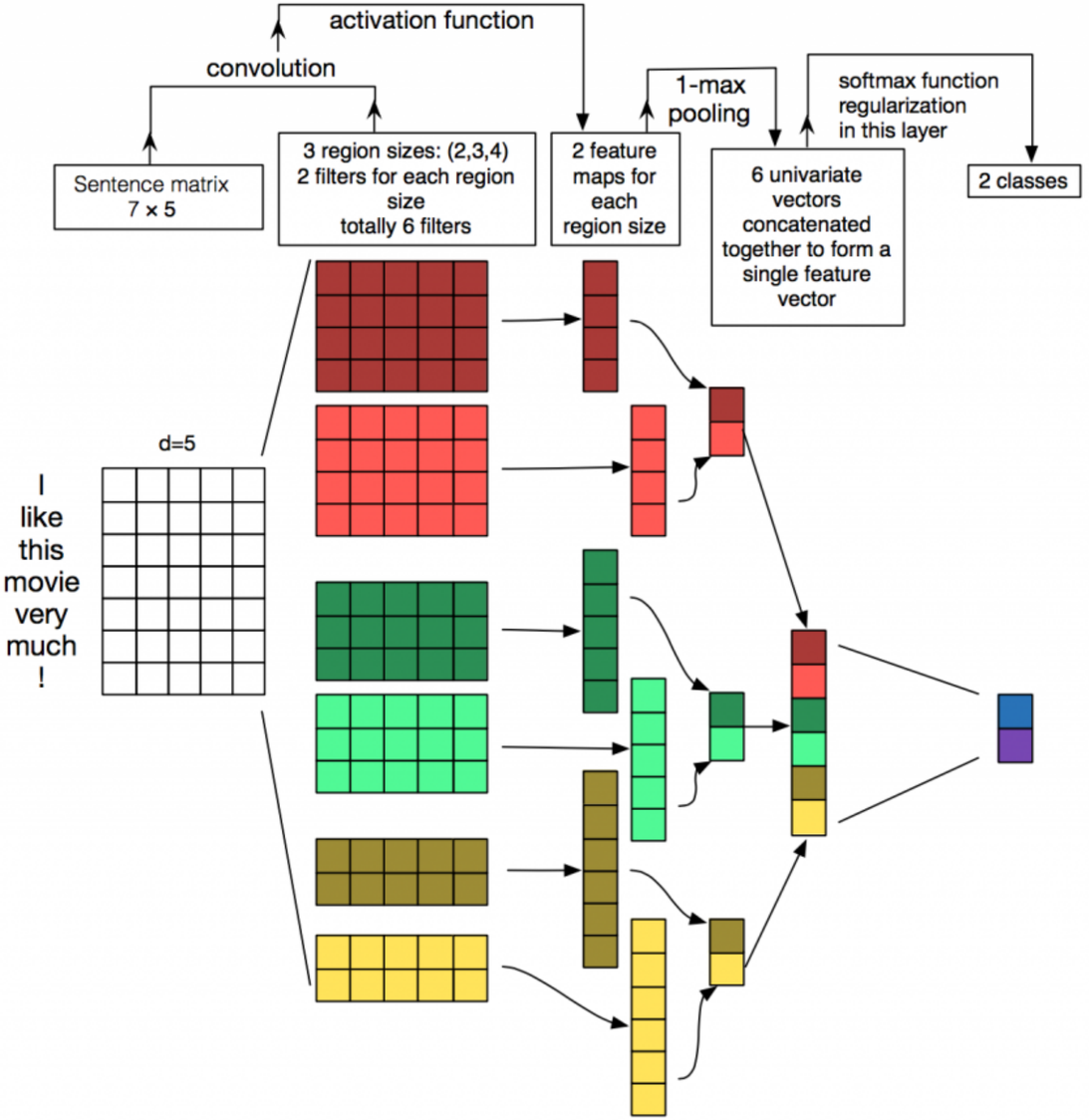
Capture syntactic properties using Recurrent Neural Network (in this case LSTM : Long Short Term Memory). We get an accuracy of 74%.

We also used CNN model to compare as to which is giving more accuracy.

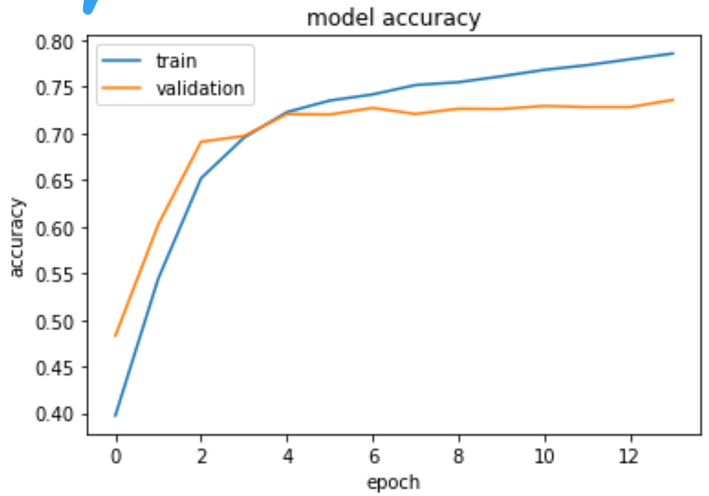


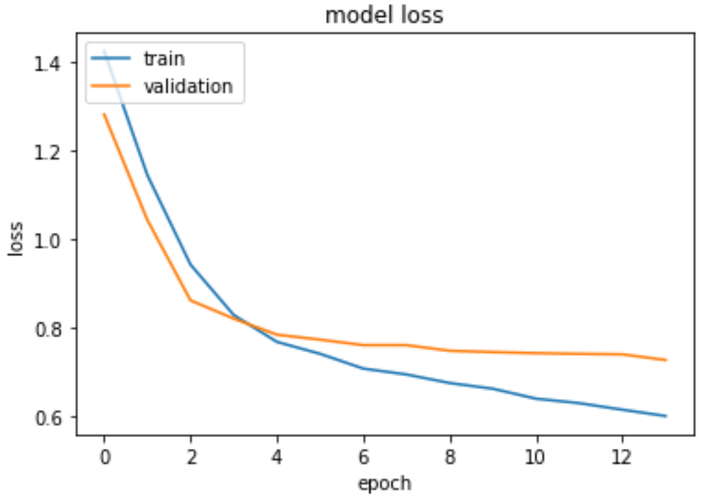
DL Approach

- We build a CNN based model on 1D Convolution to measure the values on six epochs. Here, we get a slightly improved accuracy score of 75.66%.
- Using a w2v model pre-trained on Wikipedia from the previously updated data.
- Finally, we are completing it with newly added words to the data and feeding it to a well-organized Pipeline,

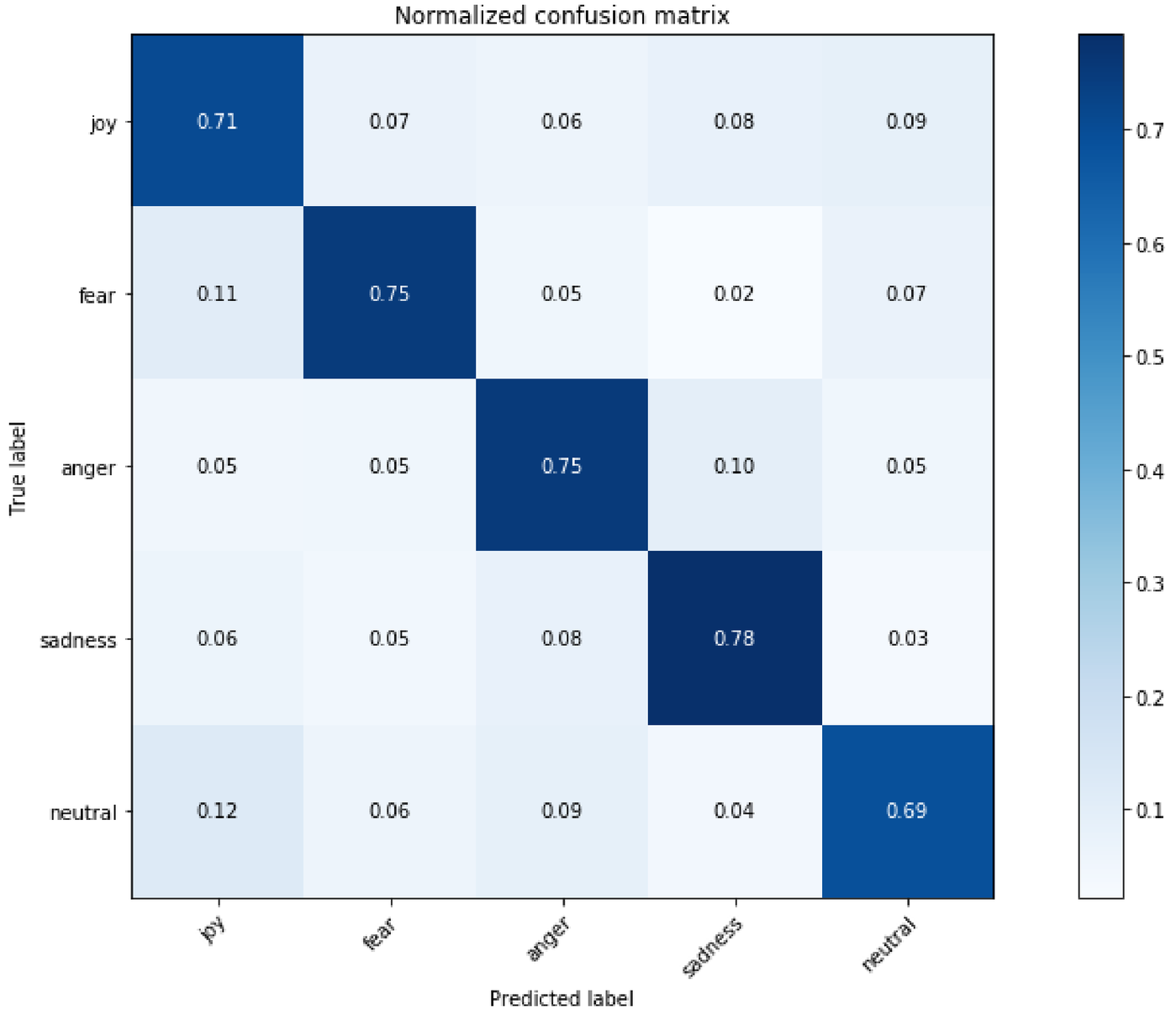


LSTM Evaluation

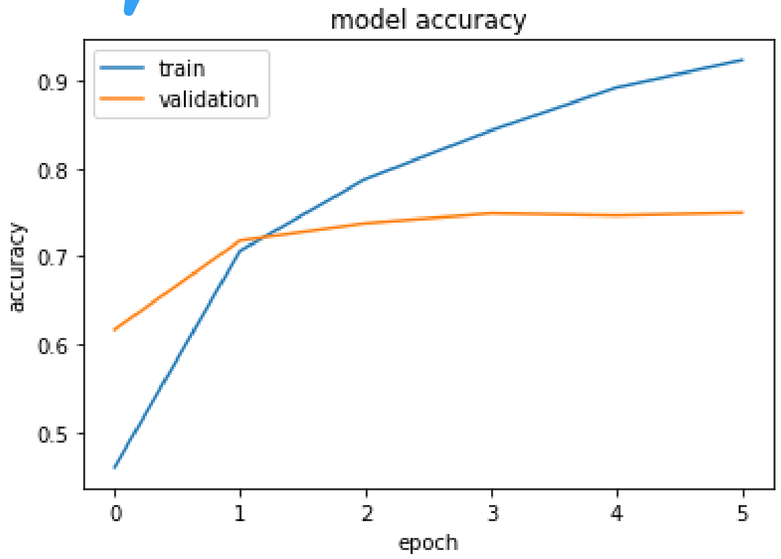


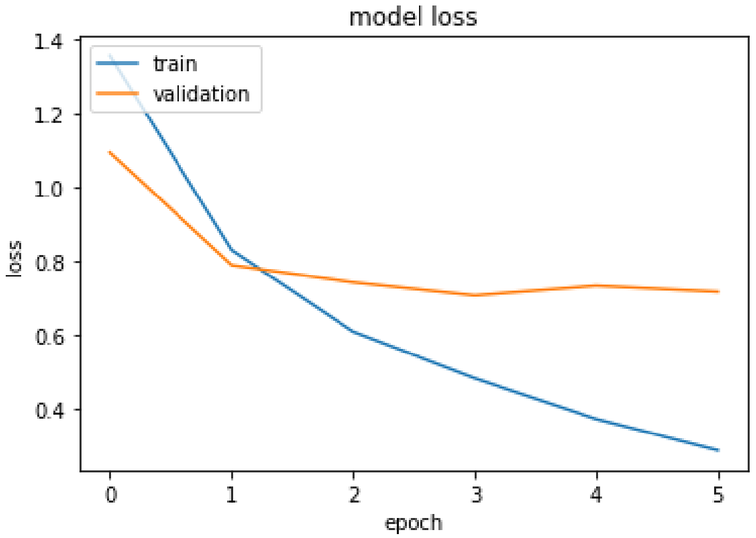


F1 Score: 73.56

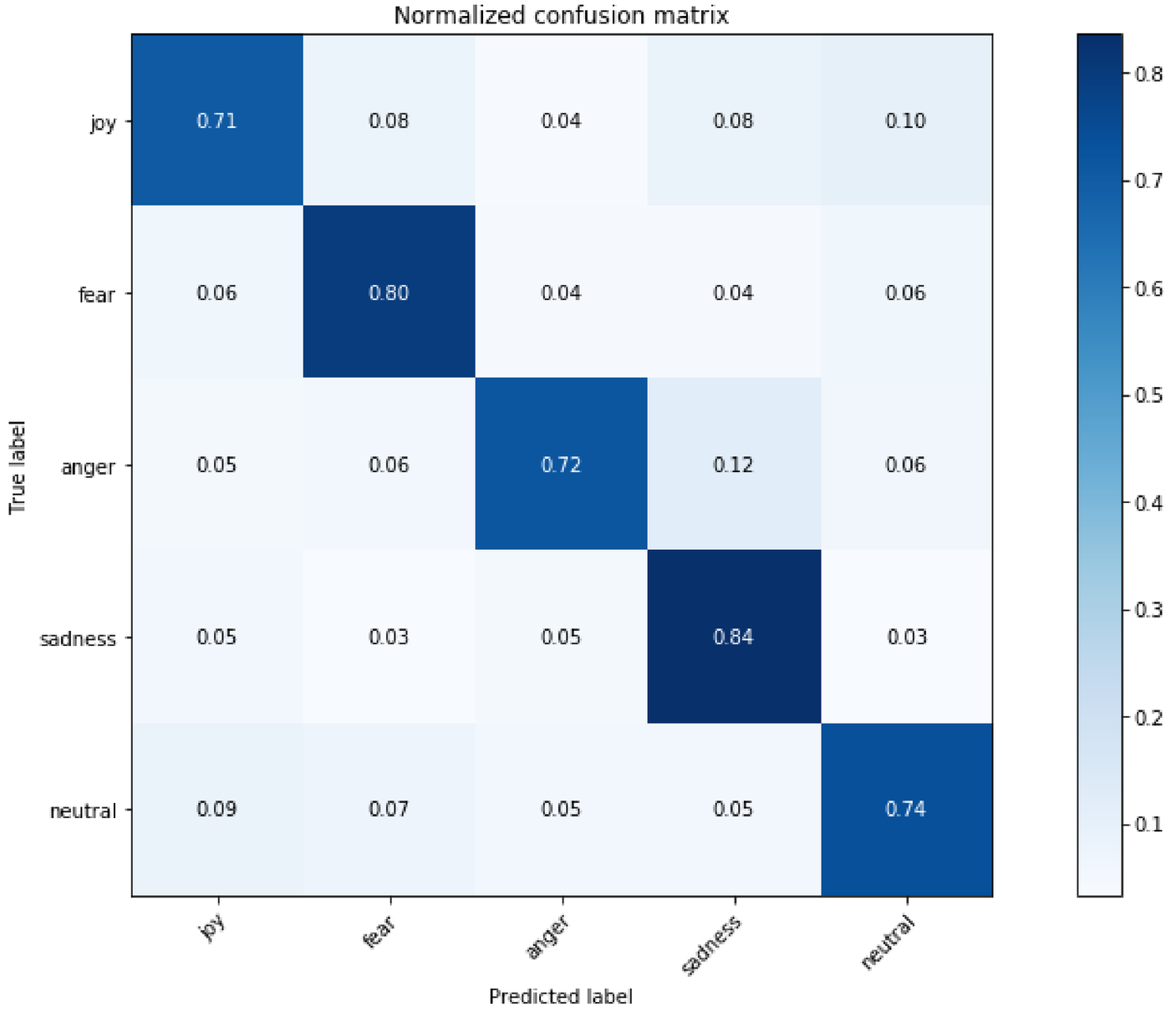


CNN Evaluation





F1 Score: 75.66



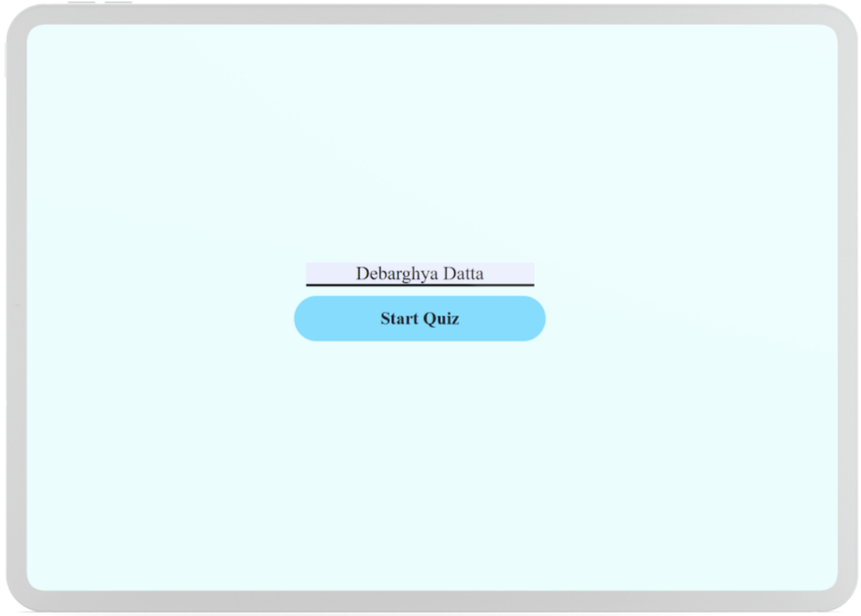
Examples

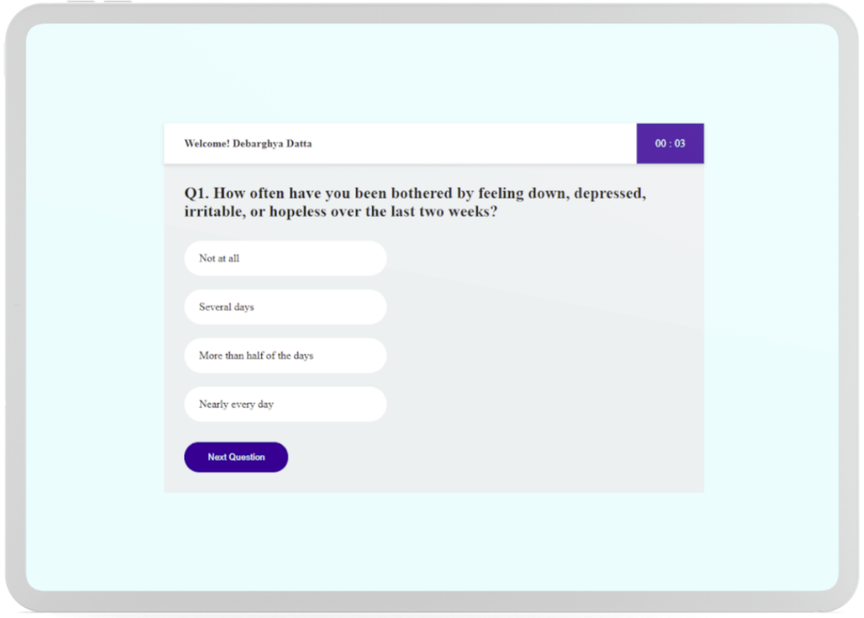
```
Message: ['I met my father after ten years!']
predicted: joy (0.19 seconds)

Message: ['Shit! Someone is following me.']
predicted: fear (0.22 seconds)

Message: ['People are dying because of COVID-19.']
predicted: sadness (0.22 seconds)

Message: ['delivery was hour late and my pizza was cold!']
predicted: sadness (0.06 seconds)

Message: ['I hate everyone around me.']
predicted: anger (0.20 seconds)

Message: ['I dont like going to the doctor.']
predicted: fear (0.21 seconds)
```

```
Message: ['Why are you not paying attention to me??']
predicted: anger (0.22 seconds)

Message: ['Bro! I got reaally good maarks.']
predicted: joy (0.20 seconds)

Message: ['I am confused about my life.']
predicted: sadness (0.21 seconds)

Message: ['Life has been toooooo eaasy.']
predicted: neutral (0.23 seconds)

Message: ['Why do we give exams']
predicted: anger (0.20 seconds)
```

Future Prospect

- We created this webpage with the help of JavaScript for the end users with a set of possible questions related to everyday dealings.
- It'll then get tallied with the categories of emotions set in the ML model for mental health scoring.
- Piped with further predictions via better performing dimensional models for unique connections and understanding with end users.





Thank you!

Have a great day ahead.