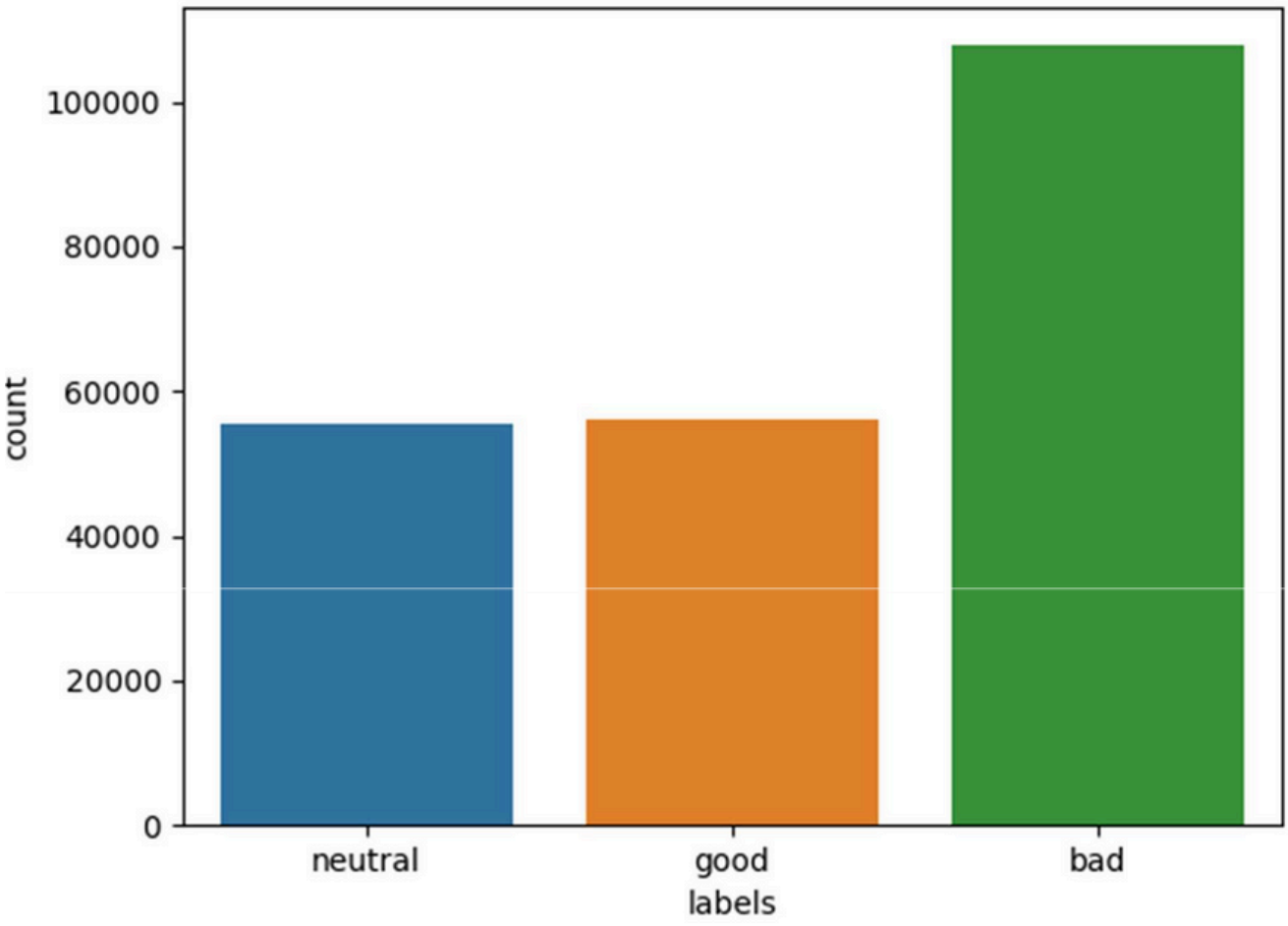
ChatGPT Sentiment Analysis Report

Majority of tweets



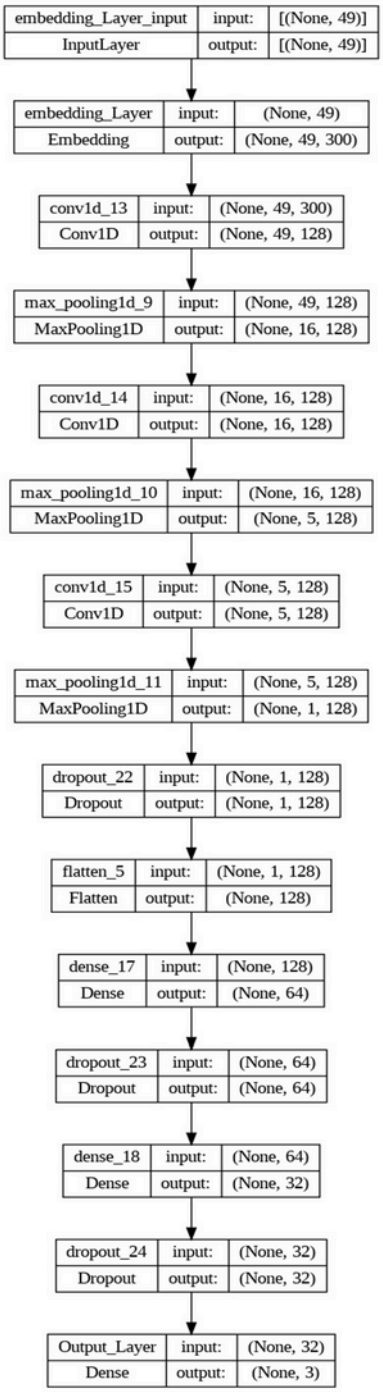
CNN Models

Trial-1

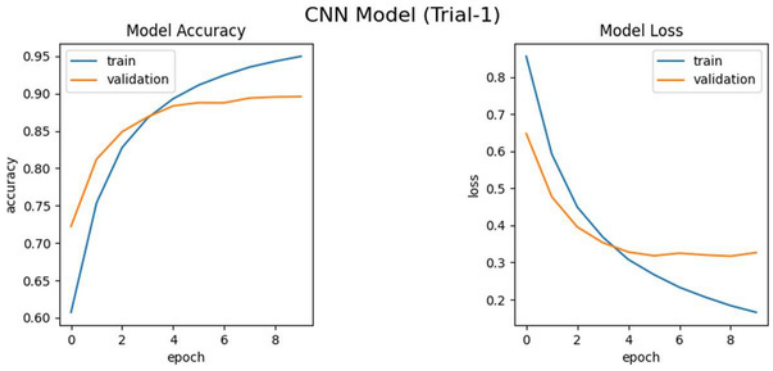
- 3 Layers of:-

Conv1D(128 , 16 , padding = 'same',activation = 'relu')

- Embedding trainable=True
- learning rate=0.0001
- two hidden layers with RelU Activation Function:-
    1. 64 units with 0.2 Dropout
    2. 32 units with 0.2 Dropout
- Optimizer=Adam



Model Accuracy and Loss

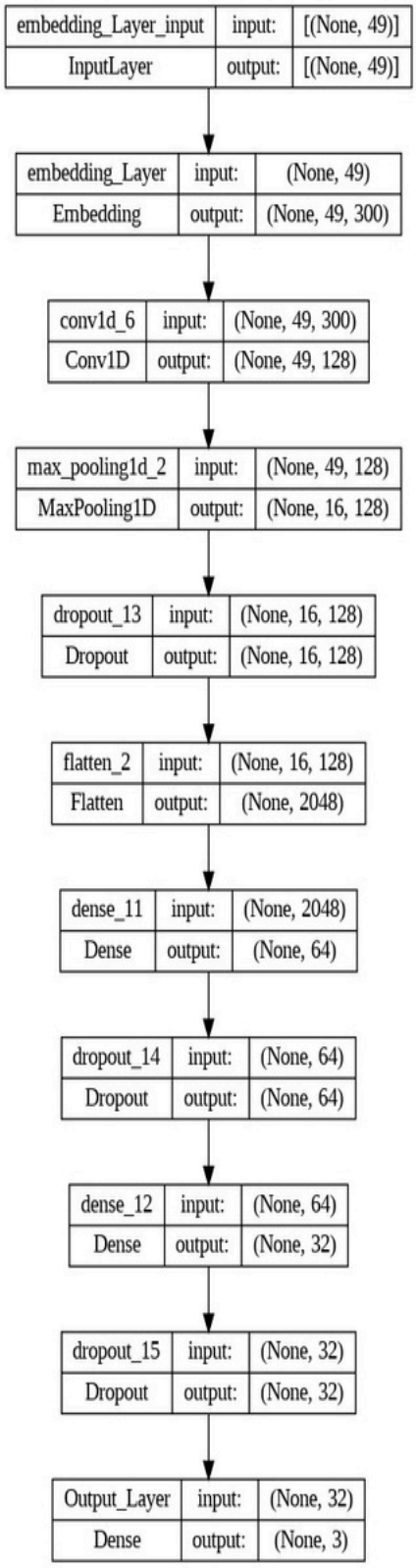


Trial-2

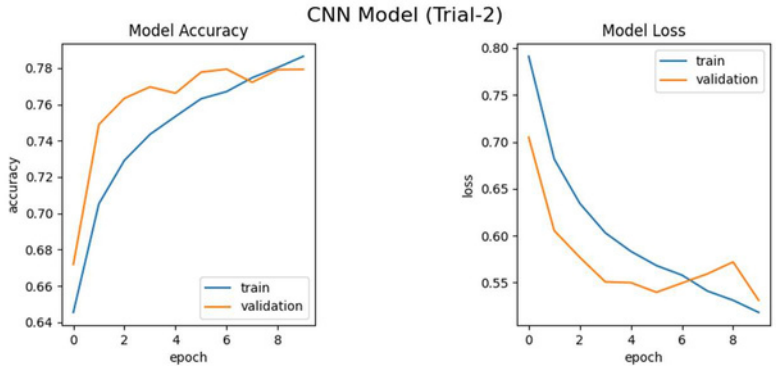
- 1 Layer of:-

Conv1D(128 , 16 , padding = 'same',activation = 'relu')

- Embedding trainable=False
- learning rate=0.01
- two hidden layers with RelU Activation Function:-
    1. 64 units with 0.2 Dropout
    2. 32 units with 0.2 Dropout
- Optimizer=Adam



Model Accuracy and Loss

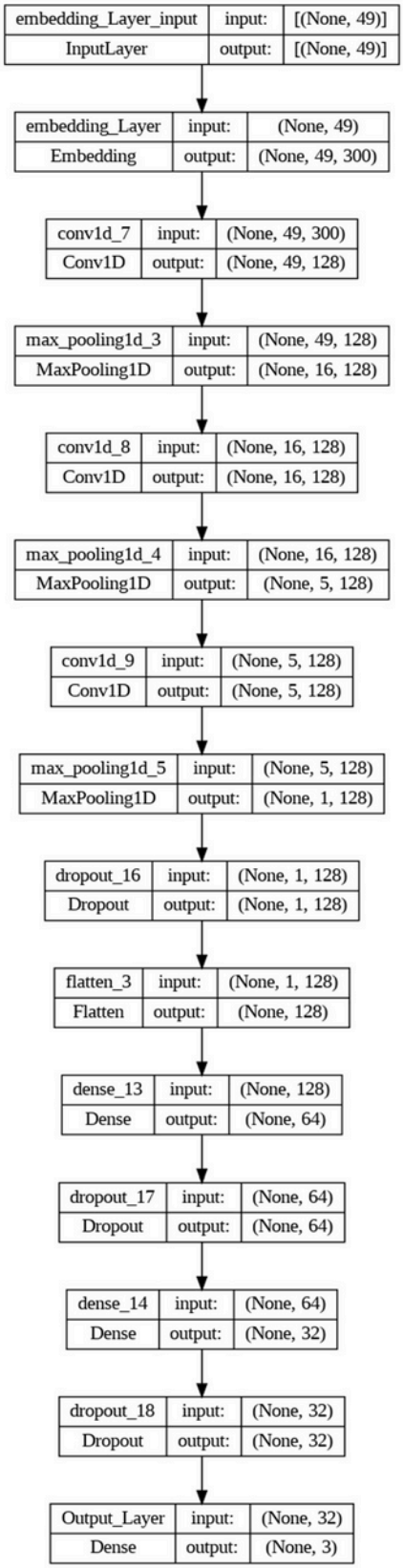


Trial-3

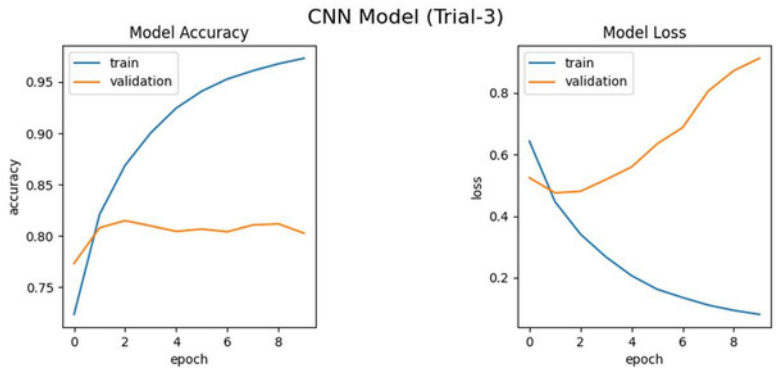
- 3 Layer of:-

```
Conv1D(128 , 16 , padding = 'same',activation = 'relu')
```

- Embedding trainable=False
- learning rate=0.001
- two hidden layers with RelU Activation Function:-
    1. 64 units with 0.2 Dropout
    2. 32 units with 0.2 Dropout
- Optimizer=Adam



Model Accuracy and Loss

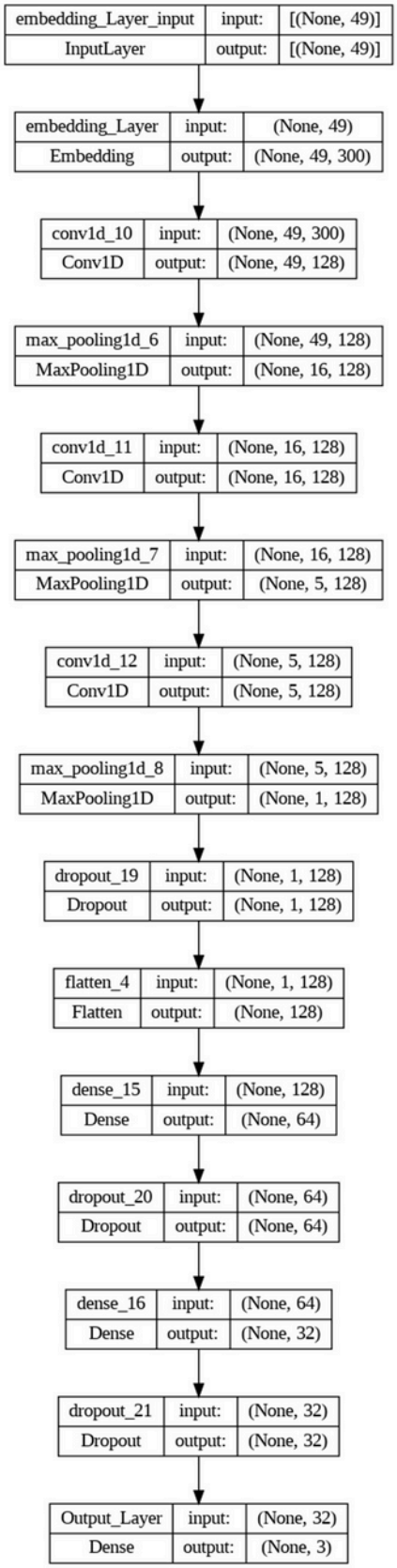


Trial-4

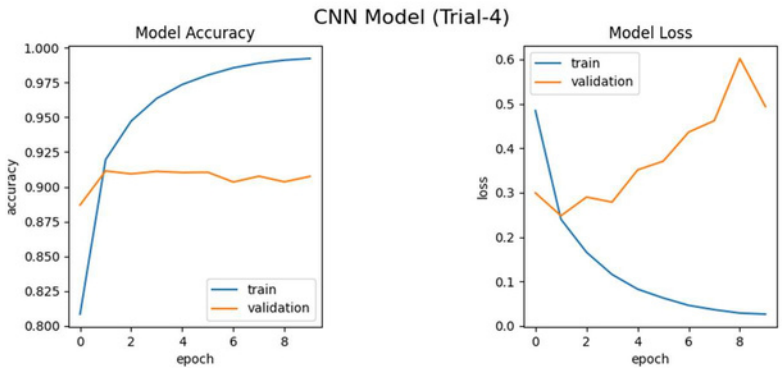
- 3 Layer of:-

```
Conv1D(128 , 16 , padding = 'same',activation = 'relu')
```

- Embedding trainable=True
- learning rate=0.001
- two hidden layers with RelU Activation Function:-
    1. 64 units with 0.2 Dropout
    2. 32 units with 0.2 Dropout
- Optimizer=Adam



Model Accuracy and Loss

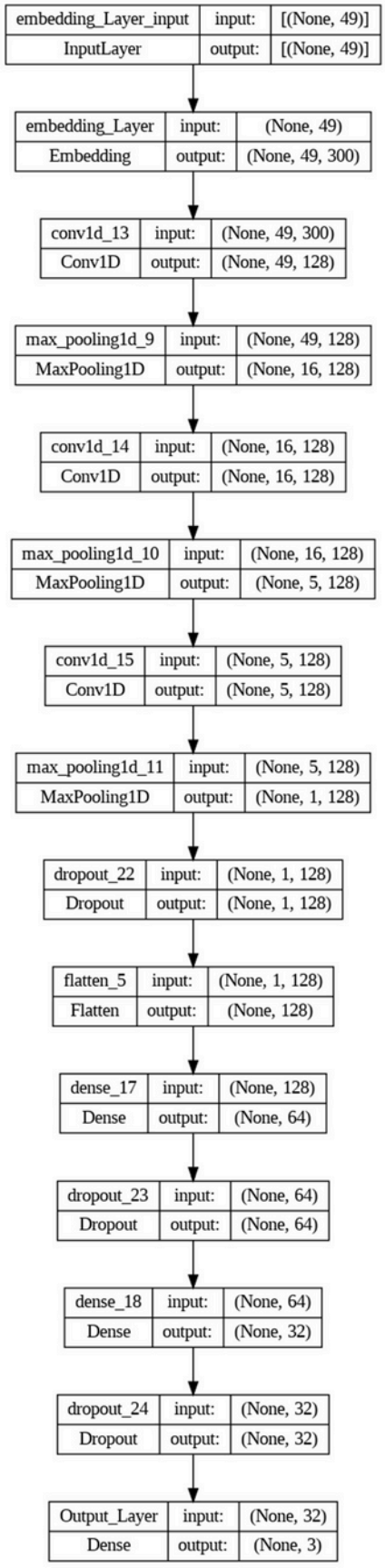


Trial-5

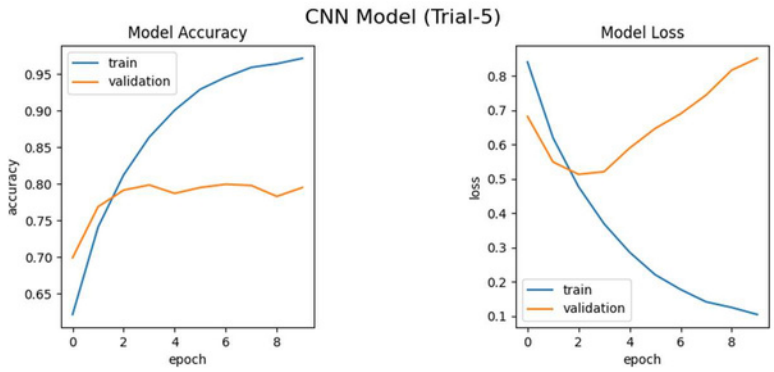
- 3 Layer of:-

```
Conv1D(128 , 16 , padding = 'same',activation = 'relu')
```

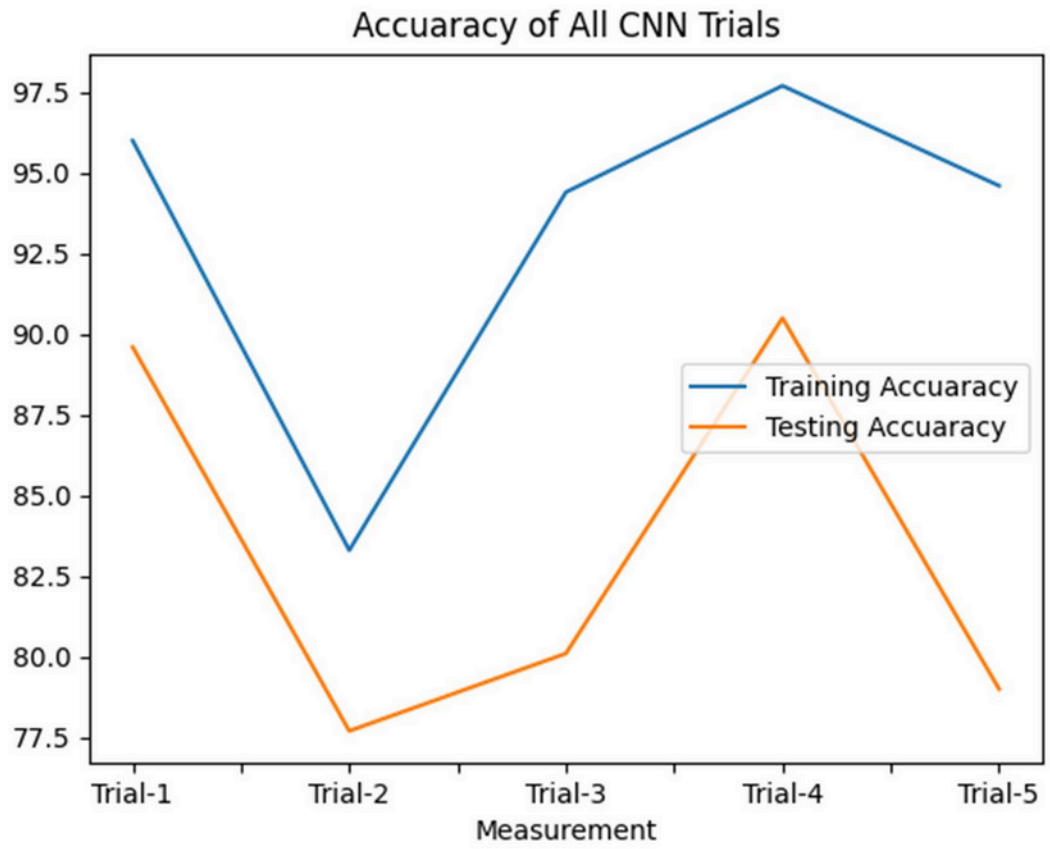
- Embedding trainable=True
- learning rate=0.0001
- two hidden layers with RelU Activation Function:-
    1. 64 units with 0.2 Dropout
    2. 32 units with 0.2 Dropout
- Optimizer=Adam



Model Accuracy and Loss



Model Accuracy For all Trials



So, The Best Accuracy is Trial-4

Training Accuracy (Trial 4): 97.7%

Testing Accuracy (Trial 4): 90.5%

```
Trial 4
Training Accuaracy (Trial 4): 97.7%
Testing Accuaracy (Trial 4): 90.5%
5483/5483 [==============================] - 24s 4ms/step - loss: 0.2227 - accuracy: 0.9456 - f1_m: 0.9456 - precision_m: 0.9458 - recall_m: 0.9453
1371/1371 [==============================] - 6s 4ms/step - loss: 0.8698 - accuracy: 0.7901 - f1_m: 0.7899 - precision_m: 0.7905 - recall_m: 0.7893
```

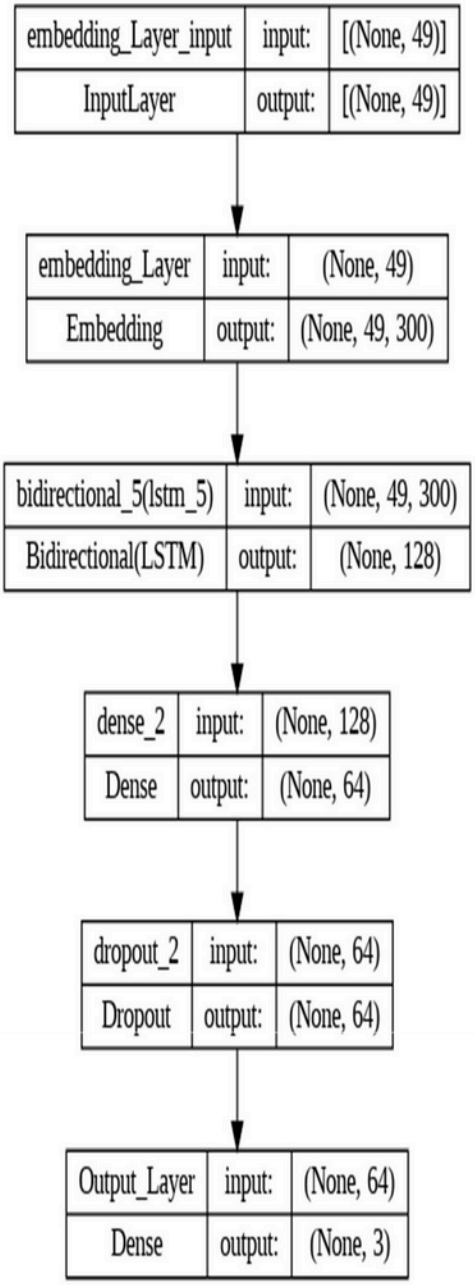
LSTM Models

Trial-1

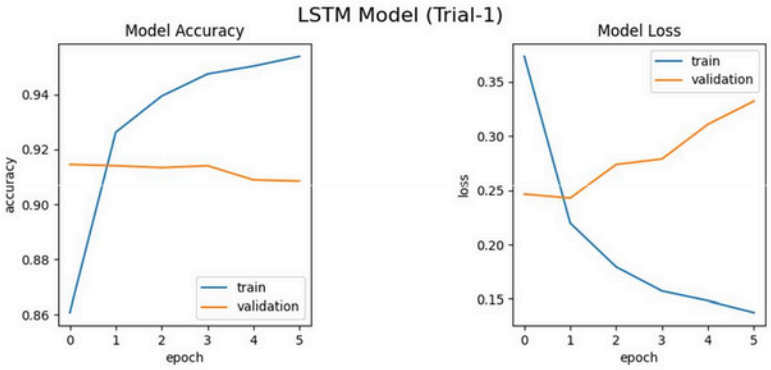
- **No Layers of:-**

```
Conv1D(64  , 8 ,activation = 'relu')
```

- **Embedding trainable=True**
- **learning rate=0.01**
- **one hidden layer with RelU Activation Function:-**
    1. **64 units with 0.5 Dropout**
- **Optimizer=Adam**
- **LSTM Units=64**



Model Accuracy and Loss

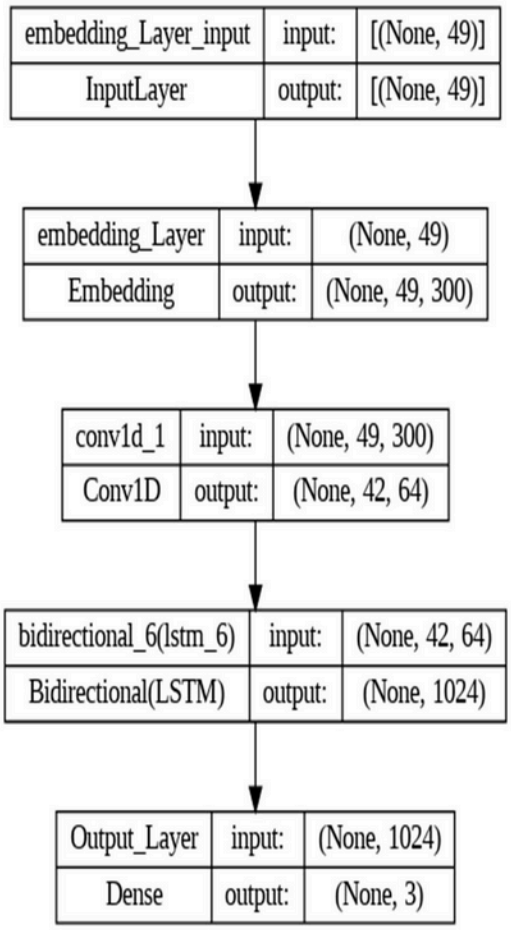


Trial-2

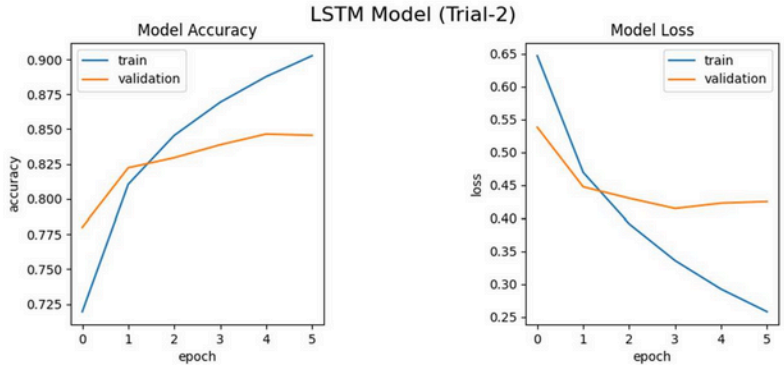
- **one Layer of:-**

```
Conv1D(64  , 8 ,activation = 'relu')
```

- **Embedding trainable=**False
- **learning rate=**0.001
- **no dense hidden layers.**
- **Optimizer=**Adam
- **LSTM Units=**512



Model Accuracy and Loss

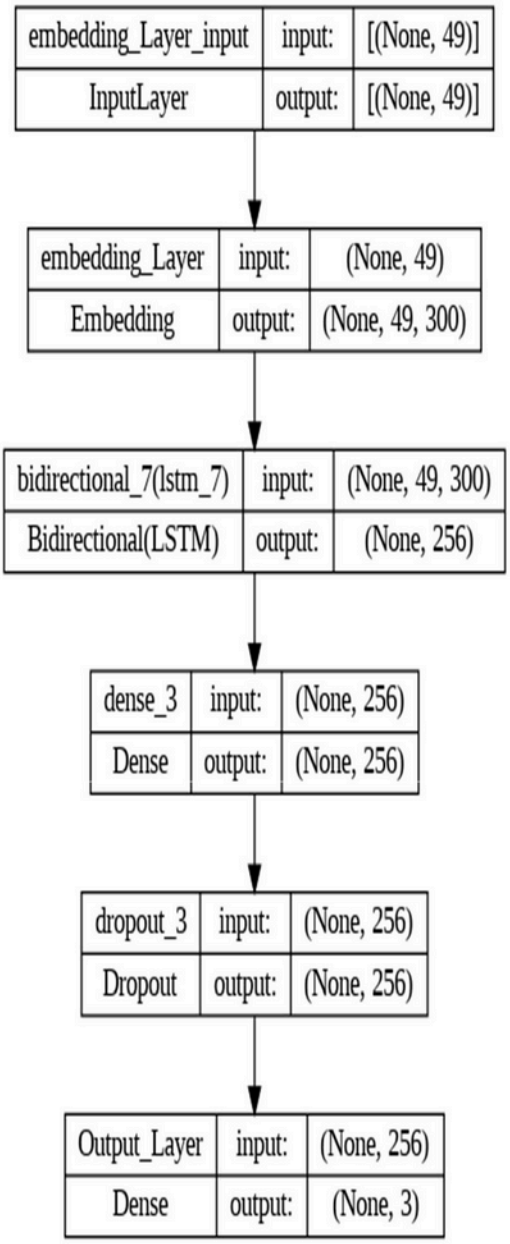


Trial-3

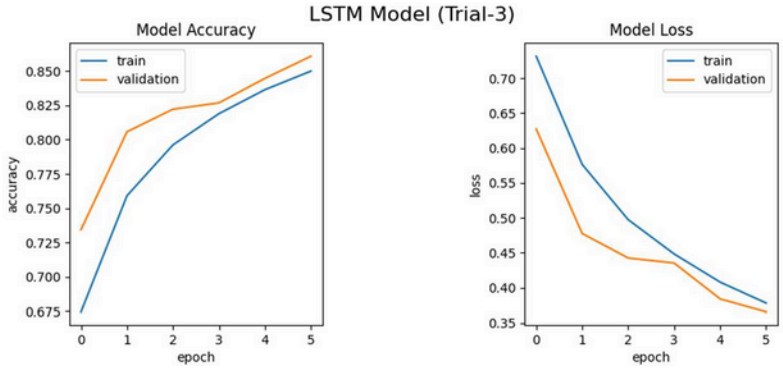
- **No Layers of:-**

```
Conv1D(64  , 8 ,activation = 'relu')
```

- **Embedding trainable=**False
- **learning rate=**0.001
- **one hidden layer with RelU Activation Function:-**
    1. 256 **units with** 0.5 **Dropout**
- **Optimizer=**Rmsp
- **LSTM Units=**128



Model Accuracy and Loss

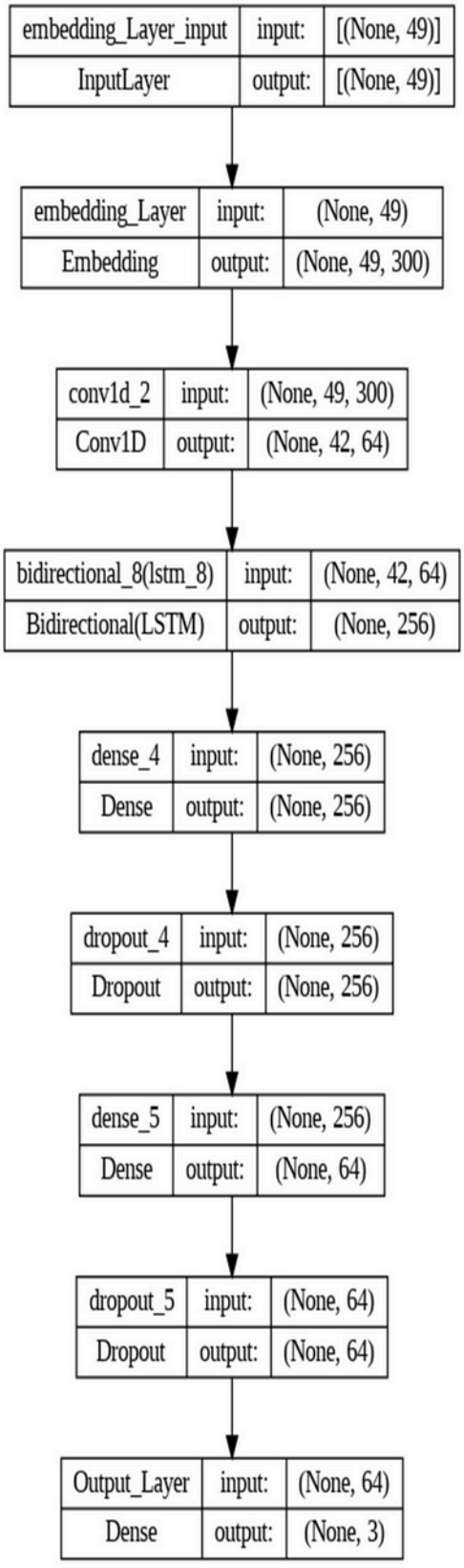


Trial-4

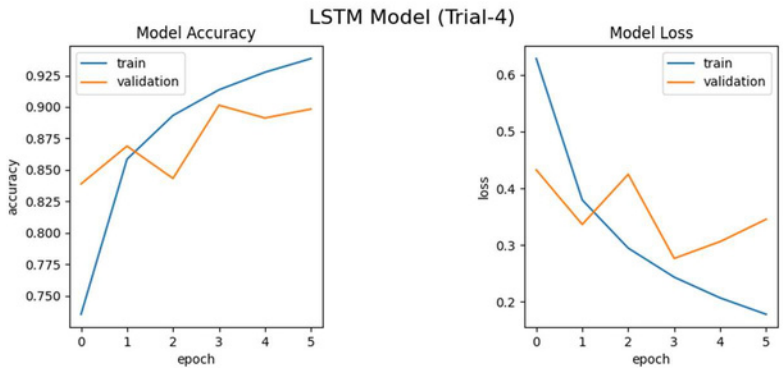
One Layer of:-

Conv1D(64 , 8 ,activation = 'relu')

- Embedding trainable=True
- learning rate=0.001
- two hidden layers with RelU Activation Function:-
    1. 256 units with 0.5 Dropout
    2. 64 units with 0.5 Dropout
- Optimizer= Rmsp
- LSTM Units=128



Model Accuracy and Loss

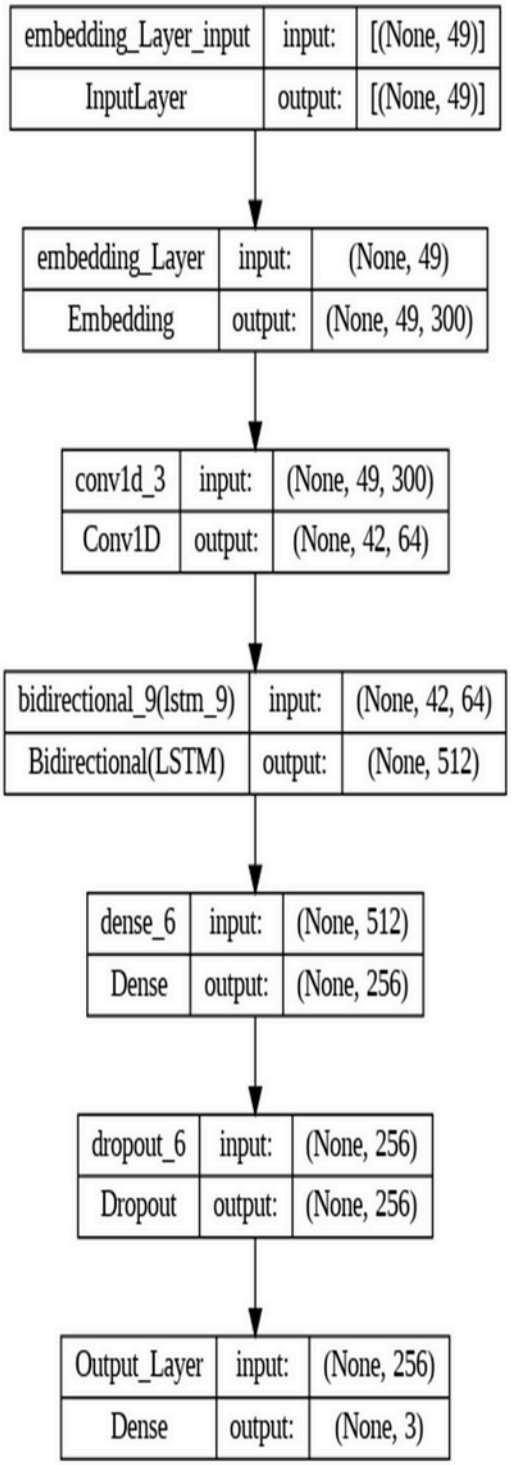


Trial-5

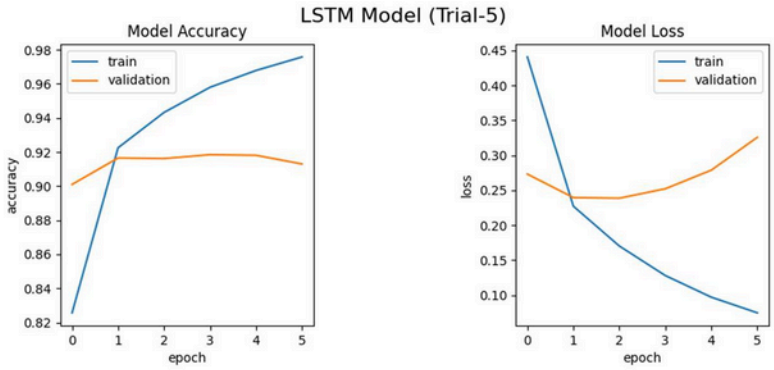
- **One Layer of:-**

```
Conv1D(64  , 8 ,activation = 'relu')
```

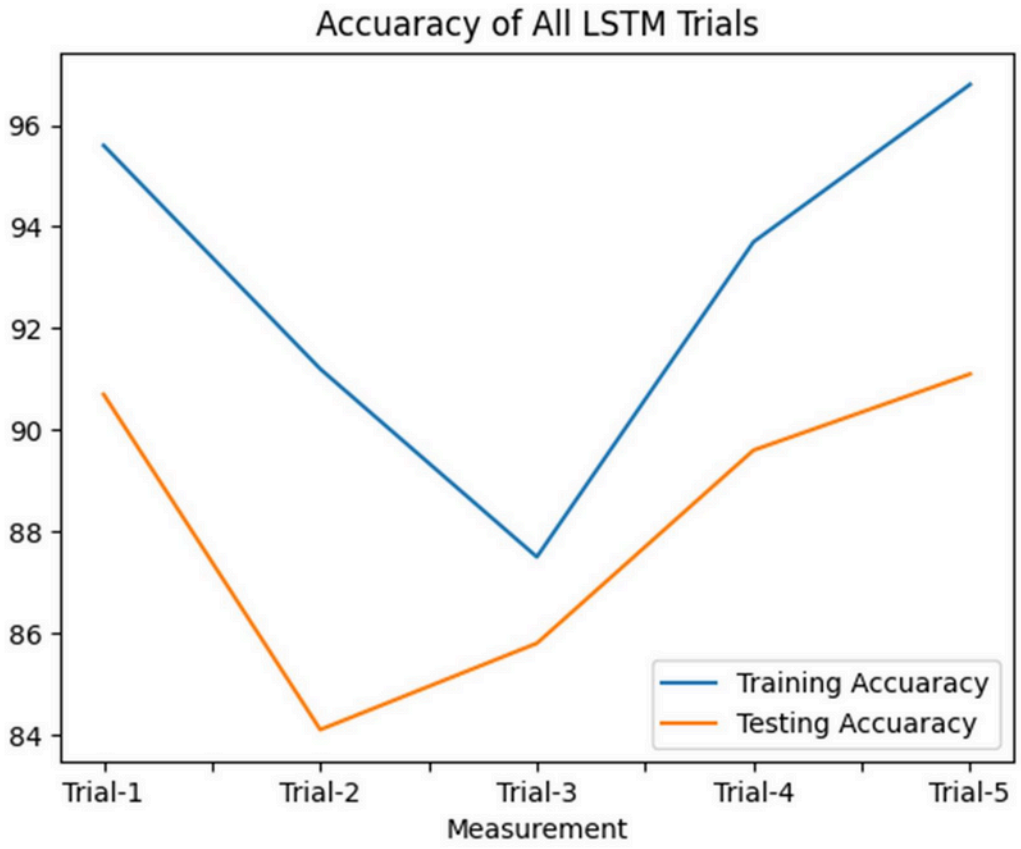
- **Embedding trainable=**True
- **learning rate=**0.001
- **one hidden layer with RelU Activation Function:-**
    1. 256 **units with** 0.5 **Dropout**
- **Optimizer=** Adam
- **LSTM Units=**256



Model Accuracy and Loss



Model Accuracy For all Trials



So, The Best Accuracy is Trial-5

Training Accuracy (Trial 5): 96.8%

TesϴngAccuracy (Trial 5): 91.1%

```
5483/5483 [==============================] - 158s 29ms/step - loss: 0.1077 - accuracy: 0.9681 - f1_m: 0.9681 - precision_m: 0.9691 - recall_m: 0.9671
1371/1371 [==============================] - 39s 29ms/step - loss: 0.3362 - accuracy: 0.9106 - f1_m: 0.9106 - precision_m: 0.9117 - recall_m: 0.9096

Trial 5
Training Accuaracy (Trial 5): 96.8%
Testing Accuaracy (Trial 5): 91.1%
```

New Tweets Sample Inputs

Using CNN Model (Trial 4)

```
cnn_model = tf.keras.models.load_model('/content/drive/MyDrive/Colab Notebooks/ChatGPT_SentimentAnalysis/Saved Models/CNN/CNN_model_trial4_Saved',
                                       custom_objects={"f1_m": f1_m, "precision_m": precision_m, "recall_m": recall_m })
cnn_model.summary()
```

```
1/1 [==============================] - 0s 43ms/step
Text: High quality pants. Very comfortable and great for sport activities. Good price for nice quality! I recommend to all fans of sports
Label ID: 1
Label Name: positive
Polarity: 0.9909900426864624


1/1 [==============================] - 0s 41ms/step
Text: Sooo SAD I will miss you here in San Diego
Label ID: 0
Label Name: negative
Polarity: 0.9999892711639404


1/1 [==============================] - 0s 53ms/step
Text:  My daughter went to a Bday party today caled, 'Grace' of Cakes...the little girl is named Grace & they made cupcakes!
Label ID: 2
Label Name: neutral
Polarity: 0.8654656410217285
```

Using LSTM Model (Trial 5)

```
lstm_model = tf.keras.models.load_model('/content/drive/MyDrive/Colab Notebooks/ChatGPT_SentimentAnalysis/Saved Models/LSTM/LSTM_model_trial5_Saved',
                                        custom_objects={"f1_m": f1_m, "precision_m": precision_m, "recall_m": recall_m })
lstm_model.summary()
```

```
1/1 [==============================] - 1s 985ms/step
Text: High quality pants. Very comfortable and great for sport activities. Good price for nice quality! I recommend to all fans of sports
Label ID: 1
Label Name: positive
Polarity: 0.997701108455658


1/1 [==============================] - 0s 53ms/step
Text: Sooo SAD I will miss you here in San Diego
Label ID: 0
Label Name: negative
Polarity: 0.9965170621871948


1/1 [==============================] - 0s 47ms/step
Text:  My daughter went to a Bday party today caled, 'Grace' of Cakes...the little girl is named Grace & they made cupcakes!
Label ID: 2
Label Name: neutral
Polarity: 0.9750921130180359
```

CNN Model Training Trials Comparison

Measurement	Training Accuracy	Testing Accuracy	Embedding layer Trainable
Trial-1	94.6	79	Yes
Trial-2	83.3	77.7	No
Trial-3	94.4	80.1	No
Trial-4	97.7	90.5	Yes
Trial-5	94.6	79.75	No

LSTM Model Training Trials Comparison

Measurement	Training Accuracy	Testing Accuracy	Embedding layer Trainable
Trial-1	95.6	90.7	Yes
Trial-2	91.2	84.1	No
Trial-3	87.5	85.8	No
Trial-4	93.7	89.6	Yes
Trial-5	96.8	91.1	Yes