TASK 1

In [2]:

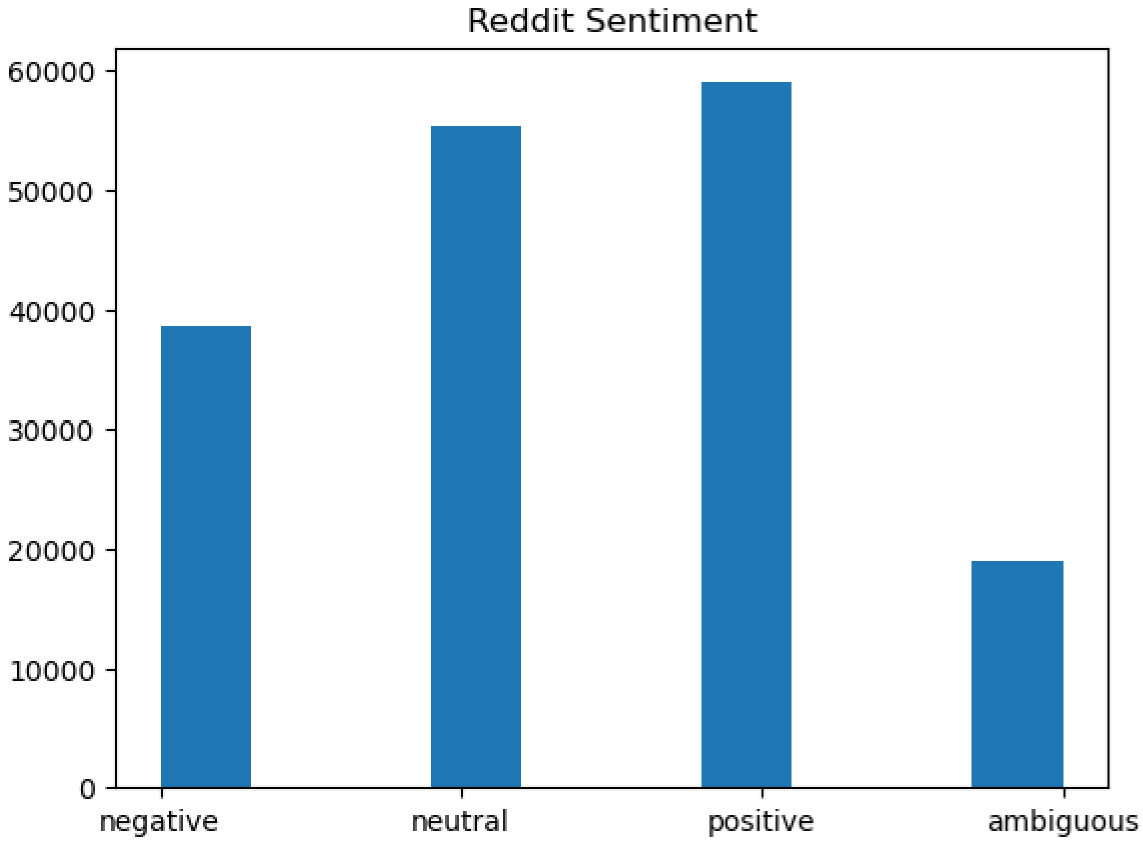
```
## imports
import gzip
import json
import matplotlib.pyplot as plt
import numpy as np
import nltk
from nltk.tokenize import word_tokenize
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.model_selection import train_test_split
from sklearn.naive_bayes import MultinomialNB
from sklearn.tree import DecisionTreeClassifier
from sklearn.neural_network import MLPClassifier
from sklearn.model_selection import GridSearchCV
from sklearn.metrics import confusion_matrix
from sklearn.metrics import classification_report
import gensim.downloader as gensim_loader
```

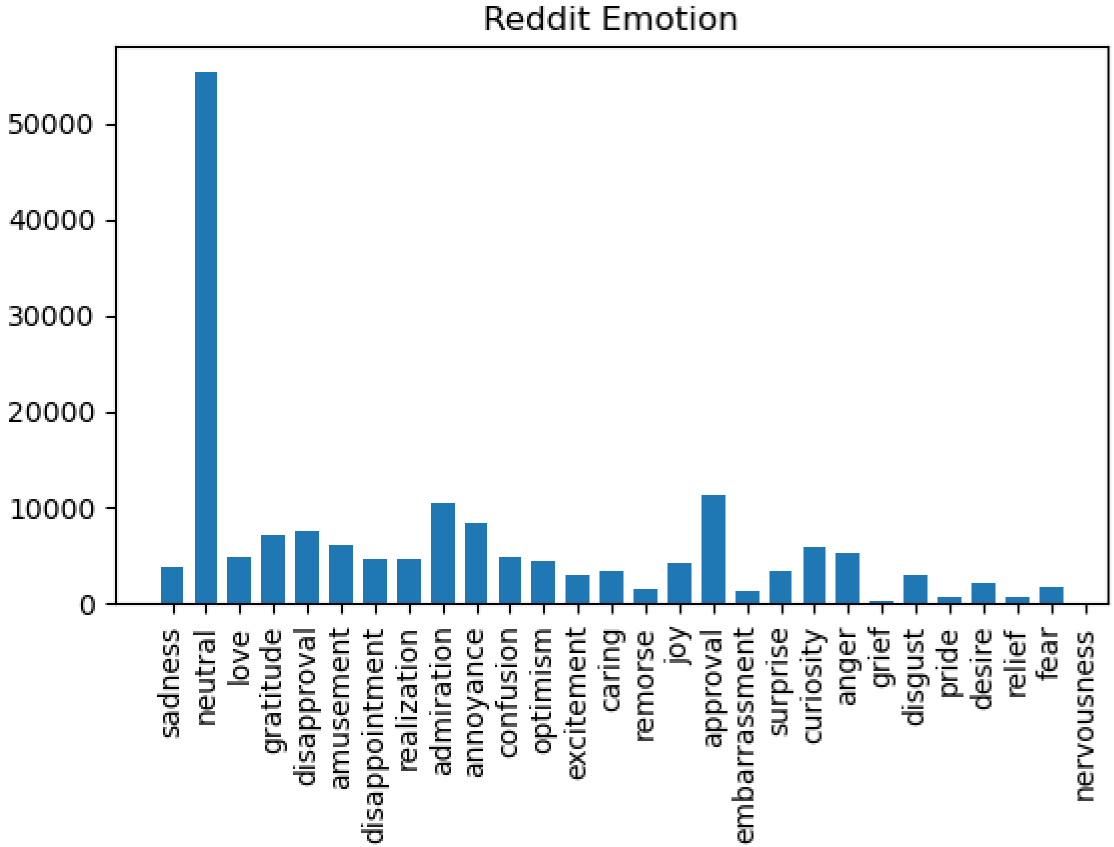
In [2]:

```
## 1.1 & 1.2 Load goemotions

gzipFile = gzip.open("goemotions.json.gz", 'rt', encoding='UTF-8')
jsonFile = json.load(gzipFile)
```

In [3]:

```
## 1.3 Extract posts and plot distributions

# plot data
postsOnlyArray = np.array(jsonFile)[:, 0]
emotionArray = np.array(jsonFile)[:, 1]
sentimentArray = np.array(jsonFile)[:, 2]

emotionsUniqueValues = list(set(emotionArray))
sentimentsUniqueValues = list(set(sentimentArray))

fig = plt.figure()
plt.title("Reddit Sentiment")
plt.hist(sentimentArray)
# plt.show()
fig.savefig('redditSentiment.pdf')

fig = plt.figure()
plt.title("Reddit Emotion")
plt.hist(emotionArray, rwidth=0.7, bins=np.arange(28)-0.5)
plt.xticks(rotation="vertical")
plt.subplots_adjust(bottom=0.3)
# plt.show()
fig.savefig('redditEmotion.pdf')
```





TASK 2

```
## 2.1 Vectorize dataset
```

In [5]:

```
vectorizer = CountVectorizer()
t = vectorizer.fit(postsOnlyArray)
tokenFrequencies = vectorizer.vocabulary_
vocabSize = len(tokenFrequencies)
print("Number of tokens in dataset: "+str(vocabSize))
```

```
Number of tokens in dataset: 30449
```

In [6]:

```
## 2.2 Split dataset

vectorizerTransformed = vectorizer.transform(postsOnlyArray)
x_train_emotion, x_test_emotion, y_train_emotion, y_test_emotion = train_test_split(vec
x_train_sentiment, x_test_sentiment, y_train_sentiment, y_test_sentiment = train_test_s
```

In [7]:

```
## 2.3.1 Base-MNB Algo

base_mnb_algo_emotions = MultinomialNB()
base_mnb_algo_emotions.fit(x_train_emotion, y_train_emotion)
base_mnb_test_score_emotions = base_mnb_algo_emotions.score(x_test_emotion, y_test_emot
print("Base-MNB emotions accuracy: " + str(round(100 * base_mnb_test_score_emotions, 2)

base_mnb_algo_sentiments = MultinomialNB()
base_mnb_algo_sentiments.fit(x_train_sentiment, y_train_sentiment)
base_mnb_test_score_sentiments = base_mnb_algo_sentiments.score(x_test_sentiment, y_tes
print("Base-MNB sentiments accuracy: " + str(round(100 * base_mnb_test_score_sentiments
```

```
Base-MNB emotions accuracy: 38.9%
Base-MNB sentiments accuracy: 54.2%
```

In [8]:

```
## 2.3.2 Base-DT algo

base_dt_algo_emotions = DecisionTreeClassifier()
base_dt_algo_emotions.fit(x_train_emotion, y_train_emotion)
base_dt_test_score_emotions = base_dt_algo_emotions.score(x_test_emotion, y_test_emotio
print("Base-DT emotions accuracy: " + str(round(100 * base_dt_test_score_emotions, 2))

base_dt_algo_sentiments = DecisionTreeClassifier()
base_dt_algo_sentiments.fit(x_train_sentiment, y_train_sentiment)
base_dt_test_score_sentiments = base_dt_algo_sentiments.score(x_test_sentiment, y_test_
print("Base-DT sentiments accuracy: " + str(round(100 * base_dt_test_score_sentiments,
```

```
Base-DT emotions accuracy: 35.97%
Base-DT sentiments accuracy: 53.99%
```

In [9]:

```
## 2.3.3 Base-MLP

base_mlp_algo_emotions = MLPClassifier()
base_mlp_algo_emotions.fit(x_train_emotion, y_train_emotion)
base_mlp_test_score_emotions = base_mlp_algo_emotions.score(x_test_emotion, y_test_emot
print("Base-MLP emotions accuracy: " + str(round(100 * base_mlp_test_score_emotions, 2)

base_mlp_algo_sentiments = MLPClassifier()
base_mlp_algo_sentiments.fit(x_train_sentiment, y_train_sentiment)
base_mlp_test_score_sentiments = base_mlp_algo_sentiments.score(x_test_sentiment, y_tes
print("Base-MLP sentiments accuracy: " + str(round(100 * base_mlp_test_score_sentiments
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(200) reached and the optimization hasn't converged yet.
  warnings.warn(
Base-MLP emotions accuracy: 37.32%
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(200) reached and the optimization hasn't converged yet.
  warnings.warn(
Base-MLP sentiments accuracy: 55.2%
```

In [10]:

```
## 2.3.4 Top-MNB

params = {
    'alpha':[0.5, 0, 2, 6]
}

top_mnb_algo_emotions = MultinomialNB()
top_mnb_gridsearch_emotions = GridSearchCV(estimator=top_mnb_algo_emotions, param_grid=
top_mnb_gridsearch_emotions.fit(x_train_emotion, y_train_emotion)
print("Top-MNB emotions best parameters: ")
print(top_mnb_gridsearch_emotions.best_estimator_)
top_mnb_test_score_emotions = top_mnb_gridsearch_emotions.score(x_test_emotion, y_test_
print("Top-MNB emotions accuracy: " + str(round(100 * top_mnb_test_score_emotions, 2))

top_mnb_algo_sentiments = MultinomialNB()
top_mnb_gridsearch_sentiments = GridSearchCV(estimator=top_mnb_algo_sentiments, param_g
top_mnb_gridsearch_sentiments.fit(x_train_sentiment, y_train_sentiment)
print("Top-MNB sentiments best parameters: ")
print(top_mnb_gridsearch_sentiments.best_estimator_)
top_mnb_test_score_sentiments = top_mnb_gridsearch_sentiments.score(x_test_sentiment, y
print("Top-MNB sentiments accuracy: " + str(round(100 * top_mnb_test_score_sentiments,
```

```
Top-MNB emotions best parameters:
MultinomialNB(alpha=0.5)
Top-MNB emotions accuracy: 39.33%
Top-MNB sentiments best parameters:
MultinomialNB(alpha=0.5)
Top-MNB sentiments accuracy: 54.2%
```

In [13]:

```
## 2.3.5 Top-DT

params = {
    'criterion': ["gini", "entropy"],
    'max_depth': [1, 4],
    'min_samples_split': [2, 4, 8]
}

top_dt_algo_emotions = DecisionTreeClassifier()
top_dt_gridsearch_emotions = GridSearchCV(estimator=top_dt_algo_emotions, param_grid=pa
top_dt_gridsearch_emotions.fit(x_train_emotion, y_train_emotion)
print("Top-DT emotions best parameters: ")
print(top_dt_gridsearch_emotions.best_estimator_)
top_dt_test_score_emotions = top_dt_gridsearch_emotions.score(x_test_emotion, y_test_em
print("Top-DT emotions accuracy: " + str(round(100 * top_dt_test_score_emotions, 2)) +

top_dt_algo_sentiments = DecisionTreeClassifier()
top_dt_gridsearch_sentiments = GridSearchCV(estimator=top_dt_algo_sentiments, param_gri
top_dt_gridsearch_sentiments.fit(x_train_sentiment, y_train_sentiment)
print("Top-DT sentiments best parameters: ")
print(top_dt_gridsearch_sentiments.best_estimator_)
top_dt_test_score_sentiments = top_dt_gridsearch_sentiments.score(x_test_sentiment, y_t
print("Top-DT sentiments accuracy: " + str(round(100 * top_dt_test_score_sentiments, 2)
```

```
Top-DT emotions best parameters:
DecisionTreeClassifier(max_depth=4)
Top-DT emotions accuracy: 37.48%
Top-DT sentiments best parameters:
DecisionTreeClassifier(max_depth=4, min_samples_split=4)
Top-DT sentiments accuracy: 38.39%
```

In [3]:

```
## 2.3.6 Top-MLP

params = {
    'activation': ["logistic", "tanh", "relu", "identity"],
    'hidden_layer_sizes': [(30, 50), (10, 10, 10)],
    'solver': ["adam", "sgd"],
    'max_iter': [3]
}

top_mlp_algo_emotions = MLPClassifier()
top_mlp_gridsearch_emotions = GridSearchCV(estimator=top_mlp_algo_emotions, param_grid=
top_mlp_gridsearch_emotions.fit(x_train_emotion, y_train_emotion)
print("Top-MLP emotions best parameters: ")
print(top_mlp_gridsearch_emotions.best_estimator_)
top_mlp_test_score_emotions = top_mlp_gridsearch_emotions.score(x_test_emotion, y_test_
print("Top-MLP emotions accuracy: " + str(round(100 * top_mlp_test_score_emotions, 2))

top_mlp_algo_sentiments = MLPClassifier()
top_mlp_gridsearch_sentiments = GridSearchCV(estimator=top_mlp_algo_sentiments, param_gr
top_mlp_gridsearch_sentiments.fit(x_train_sentiment, y_train_sentiment)
print("Top-MLP sentiments best parameters: ")
print(top_mlp_gridsearch_sentiments.best_estimator_)
top_mlp_test_score_sentiments = top_mlp_gridsearch_sentiments.score(x_test_sentiment, y_
print("Top-MLP sentiments accuracy: " + str(round(100 * top_mlp_test_score_sentiments,
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
Top-MLP emotions best parameters:
MLPClassifier(hidden_layer_sizes=(30, 50), max_iter=3)
Top-MLP emotions accuracy: 43.54%
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
Top-MLP sentiments best parameters:
MLPClassifier(hidden_layer_sizes=(30, 50), max_iter=3)
Top-MLP sentiments accuracy: 57.15%
```

In [62]:

```
## 2.4 Performance file (Part 1)

perfo_file = open("performance.txt", "w")
perfo_file.write("Base-MNB (emotion):\n")
perfo_file.write("Confusion matrix:\n")
base_mnb_emo_pred = base_mnb_algo_emotions.predict(x_test_emotion)
base_mnb_emo_conf_matrix = np.array(confusion_matrix(y_test_emotion, base_mnb_emo_pred)
perfo_file.close()
perfo_file = open("performance.txt", "ab")
np.savetxt(perfo_file, base_mnb_emo_conf_matrix, fmt='%-7.1f')
perfo_file.close()
perfo_file = open("performance.txt", "a")
base_mnb_emo_classif_report = classification_report(y_test_emotion, base_mnb_emo_pred, 
perfo_file.write("Classification report:\n")
emotions_count = 0
for key in base_mnb_emo_classif_report:
    if emotions_count == 28:
        break
    emotions_count += 1
    perfo_file.write(key + ": Precision = " + str(base_mnb_emo_classif_report[key]["pre
perfo_file.write("Accuracy = " + str(base_mnb_emo_classif_report["accuracy"])+ ", Macro


perfo_file.write("\nBase-MNB (sentiment):\n")
perfo_file.write("Confusion matrix:\n")
base_mnb_senti_pred = base_mnb_algo_sentiments.predict(x_test_emotion)
base_mnb_senti_conf_matrix = confusion_matrix(y_test_sentiment, base_mnb_senti_pred)
perfo_file.close()
perfo_file = open("performance.txt", "ab")
np.savetxt(perfo_file, base_mnb_senti_conf_matrix, fmt='%-7.1f')
perfo_file.close()
perfo_file = open("performance.txt", "a")
base_mnb_senti_classif_report = classification_report(y_test_sentiment, base_mnb_senti_
perfo_file.write("Classification report:\n")
sentiments_count = 0
for key in base_mnb_senti_classif_report:
    if sentiments_count == 4:
        break
    sentiments_count += 1
    perfo_file.write(key + ": Precision = " + str(base_mnb_senti_classif_report[key]["p
perfo_file.write("Accuracy = " + str(base_mnb_senti_classif_report["accuracy"])+ ", Mac

perfo_file.write("\nBase-DT (emotion):\n")
perfo_file.write("Confusion matrix:\n")
base_dt_emo_pred = base_dt_algo_emotions.predict(x_test_emotion)
base_dt_emo_conf_matrix = confusion_matrix(y_test_emotion, base_dt_emo_pred)
perfo_file.close()
perfo_file = open("performance.txt", "ab")
np.savetxt(perfo_file, base_dt_emo_conf_matrix, fmt='%-7.1f')
perfo_file.close()
perfo_file = open("performance.txt", "a")
base_dt_emo_classif_report = classification_report(y_test_emotion, base_dt_emo_pred, la
perfo_file.write("Classification report:\n")
emotions_count = 0
for key in base_dt_emo_classif_report:
    if emotions_count == 28:
        break
    emotions_count += 1
    perfo_file.write(key + ": Precision = " + str(base_dt_emo_classif_report[key]["prec
perfo_file.write("Accuracy = " + str(base_dt_emo_classif_report["accuracy"])+ ", Macro-

perfo_file.write("\nBase-DT (sentiment):\n")
perfo_file.write("Confusion matrix:\n")
base_dt_senti_pred = base_dt_algo_sentiments.predict(x_test_emotion)
base_dt_senti_conf_matrix = confusion_matrix(y_test_sentiment, base_dt_senti_pred)
perfo_file.close()
perfo_file = open("performance.txt", "ab")
np.savetxt(perfo_file, base_dt_senti_conf_matrix, fmt='%-7.1f')
perfo_file.close()
perfo_file = open("performance.txt", "a")
base_dt_senti_classif_report = classification_report(y_test_sentiment, base_dt_senti_pr
perfo_file.write("Classification report:\n")
sentiments_count = 0
for key in base_dt_senti_classif_report:
    if sentiments_count == 4:
        break
    sentiments_count += 1
    perfo_file.write(key + ": Precision = " + str(base_dt_senti_classif_report[key]["pre
perfo_file.write("Accuracy = " + str(base_dt_senti_classif_report["accuracy"])+ ", Macro

perfo_file.write("\nBase-MLP (emotion):\n")
perfo_file.write("Confusion matrix:\n")
base_mlp_emo_pred = base_mlp_algo_emotions.predict(x_test_emotion)
base_mlp_emo_conf_matrix = confusion_matrix(y_test_emotion, base_mlp_emo_pred)
```

```
perfo_file.close()
perfo_file = open("performance.txt", "ab")
np.savetxt(perfo_file, base_mlp_emo_conf_matrix, fmt='%-7.1f')
perfo_file.close()
perfo_file = open("performance.txt", "a")
base_mlp_emo_classif_report = classification_report(y_test_emotion, base_mlp_emo_pred, l
perfo_file.write("Classification report:\n")
emotions_count = 0
for key in base_mlp_emo_classif_report:
    if emotions_count == 28:
        break
    emotions_count += 1
    perfo_file.write(key + ": Precision = " + str(base_mlp_emo_classif_report[key]["pre
perfo_file.write("Accuracy = " + str(base_mlp_emo_classif_report["accuracy"])+ ", Macro-

perfo_file.write("\nBase-MLP (sentiment):\n")
perfo_file.write("Confusion matrix:\n")
base_mlp_senti_pred = base_mlp_algo_sentiments.predict(x_test_emotion)
base_mlp_senti_conf_matrix = confusion_matrix(y_test_sentiment, base_mlp_senti_pred)
perfo_file.close()
perfo_file = open("performance.txt", "ab")
np.savetxt(perfo_file, base_mlp_senti_conf_matrix, fmt='%-7.1f')
perfo_file.close()
perfo_file = open("performance.txt", "a")
base_mlp_senti_classif_report = classification_report(y_test_sentiment, base_mlp_senti_p
perfo_file.write("Classification report:\n")
sentiments_count = 0
for key in base_mlp_senti_classif_report:
    if sentiments_count == 4:
        break
    sentiments_count += 1
    perfo_file.write(key + ": Precision = " + str(base_mlp_senti_classif_report[key]["pr
perfo_file.write("Accuracy = " + str(base_mlp_senti_classif_report["accuracy"])+ ", Macr

perfo_file.write("\nTop-MNB ")
top_mnb_emo_best_estimator = top_mnb_gridsearch_emotions.best_estimator_
top_mnb_emo_best_params = top_mnb_gridsearch_emotions.best_params_
perfo_file.write(str(top_mnb_emo_best_params) + " (emotion):\n")
perfo_file.write("Confusion matrix:\n")
top_mnb_emo_pred = top_mnb_emo_best_estimator.predict(x_test_emotion)
top_mnb_emo_conf_matrix = confusion_matrix(y_test_emotion, top_mnb_emo_pred)
perfo_file.close()
perfo_file = open("performance.txt", "ab")
np.savetxt(perfo_file, top_mnb_emo_conf_matrix, fmt='%-7.1f')
perfo_file.close()
perfo_file = open("performance.txt", "a")
top_mnb_emo_classif_report = classification_report(y_test_emotion, top_mnb_emo_pred, lab
perfo_file.write("Classification report:\n")
emotions_count = 0
for key in top_mnb_emo_classif_report:
    if emotions_count == 28:
        break
    emotions_count += 1
    perfo_file.write(key + ": Precision = " + str(top_mnb_emo_classif_report[key]["preci
perfo_file.write("Accuracy = " + str(top_mnb_emo_classif_report["accuracy"])+ ", Macro-a

perfo_file.write("\nTop-MNB ")
top_mnb_senti_best_estimator = top_mnb_gridsearch_sentiments.best_estimator_
top_mnb_senti_best_params = top_mnb_gridsearch_sentiments.best_params_
perfo_file.write(str(top_mnb_senti_best_params) + " (sentiment):\n")
perfo_file.write("Confusion matrix:\n")
top_mnb_senti_pred = top_mnb_senti_best_estimator.predict(x_test_sentiment)
top_mnb_senti_conf_matrix = confusion_matrix(y_test_sentiment, top_mnb_senti_pred)
perfo_file.close()
perfo_file = open("performance.txt", "ab")
np.savetxt(perfo_file, top_mnb_senti_conf_matrix, fmt='%-7.1f')
perfo_file.close()
perfo_file = open("performance.txt", "a")
top_mnb_senti_classif_report = classification_report(y_test_sentiment, top_mnb_senti_pre
perfo_file.write("Classification report:\n")
sentiments_count = 0
for key in top_mnb_senti_classif_report:
    if sentiments_count == 4:
        break
    sentiments_count += 1
    perfo_file.write(key + ": Precision = " + str(top_mnb_senti_classif_report[key]["pre
perfo_file.write("Accuracy = " + str(top_mnb_senti_classif_report["accuracy"])+ ", Macro

perfo_file.write("\nTop-DT ")
top_dt_emo_best_estimator = top_dt_gridsearch_emotions.best_estimator_
top_dt_emo_best_params = top_dt_gridsearch_emotions.best_params_
perfo_file.write(str(top_dt_emo_best_params) + " (emotion):\n")
perfo_file.write("Confusion matrix:\n")
top_dt_emo_pred = top_dt_emo_best_estimator.predict(x_test_emotion)
top_dt_emo_conf_matrix = np.array(confusion_matrix(y_test_emotion, top_dt_emo_pred))
perfo_file.close()
perfo_file = open("performance.txt", "ab")
np.savetxt(perfo_file, top_dt_emo_conf_matrix, fmt='%-7.1f')
perfo_file.close()
perfo_file = open("performance.txt", "a")
top_dt_emo_classif_report = classification_report(y_test_emotion, top_dt_emo_pred, label
perfo_file.write("Classification report:\n")
emotions_count = 0
for key in top_dt_emo_classif_report:
    if emotions_count == 28:
        break
    emotions_count += 1
    perfo_file.write(key + ": Precision = " + str(top_dt_emo_classif_report[key]["precis
perfo_file.write("Accuracy = " + str(top_dt_emo_classif_report["accuracy"])+ ", Macro-av

perfo_file.write("\nTop-DT ")
top_dt_senti_best_estimator = top_dt_gridsearch_sentiments.best_estimator_
top_dt_senti_best_params = top_dt_gridsearch_sentiments.best_params_
perfo_file.write(str(top_dt_senti_best_params) + " (sentiment):\n")
perfo_file.write("Confusion matrix:\n")
top_dt_senti_pred = top_dt_senti_best_estimator.predict(x_test_sentiment)
top_dt_senti_conf_matrix = confusion_matrix(y_test_sentiment, top_dt_senti_pred)
perfo_file.close()
perfo_file = open("performance.txt", "ab")
np.savetxt(perfo_file, top_dt_senti_conf_matrix, fmt='%-7.1f')
perfo_file.close()
perfo_file = open("performance.txt", "a")
top_dt_senti_classif_report = classification_report(y_test_sentiment, top_dt_senti_pred,
perfo_file.write("Classification report:\n")
sentiments_count = 0
for key in top_dt_senti_classif_report:
    if sentiments_count == 4:
        break
    sentiments_count += 1
    perfo_file.write(key + ": Precision = " + str(top_dt_senti_classif_report[key]["pre
perfo_file.write("Accuracy = " + str(top_dt_senti_classif_report["accuracy"])+ ", Macro

perfo_file.write("\nTop-MLP ")
top_mlp_emo_best_estimator = top_mlp_gridsearch_emotions.best_estimator_
top_mlp_emo_best_params = top_mlp_gridsearch_emotions.best_params_
perfo_file.write(str(top_mlp_emo_best_params) + " (emotion):\n")
perfo_file.write("Confusion matrix:\n")
top_mlp_emo_pred = top_mlp_emo_best_estimator.predict(x_test_emotion)
top_mlp_emo_conf_matrix = confusion_matrix(y_test_emotion, top_mlp_emo_pred)
perfo_file.close()
perfo_file = open("performance.txt", "ab")
np.savetxt(perfo_file, top_mlp_emo_conf_matrix, fmt='%-7.1f')
perfo_file.close()
perfo_file = open("performance.txt", "a")
top_mlp_emo_classif_report = classification_report(y_test_emotion, top_mlp_emo_pred, la
perfo_file.write("Classification report:\n")
emotions_count = 0
for key in top_mlp_emo_classif_report:
    if emotions_count == 28:
        break
    emotions_count += 1
    perfo_file.write(key + ": Precision = " + str(top_mlp_emo_classif_report[key]["prec
perfo_file.write("Accuracy = " + str(top_mlp_emo_classif_report["accuracy"])+ ", Macro-

perfo_file.write("\nTop-MLP ")
top_mlp_senti_best_estimator = top_mlp_gridsearch_sentiments.best_estimator_
top_mlp_senti_best_params = top_mlp_gridsearch_sentiments.best_params_
perfo_file.write(str(top_mlp_senti_best_params) + " (sentiment):\n")
perfo_file.write("Confusion matrix:\n")
top_mlp_senti_pred = top_mlp_senti_best_estimator.predict(x_test_sentiment)
top_mlp_senti_conf_matrix = confusion_matrix(y_test_sentiment, top_mlp_senti_pred)
perfo_file.close()
perfo_file = open("performance.txt", "ab")
np.savetxt(perfo_file, top_mlp_senti_conf_matrix, fmt='%-7.1f')
perfo_file.close()
perfo_file = open("performance.txt", "a")
top_mlp_senti_classif_report = classification_report(y_test_sentiment, top_mlp_senti_pr
perfo_file.write("Classification report:\n")
sentiments_count = 0
for key in top_mlp_senti_classif_report:
    if sentiments_count == 4:
        break
    sentiments_count += 1
    perfo_file.write(key + ": Precision = " + str(top_mlp_senti_classif_report[key]["pr
perfo_file.write("Accuracy = " + str(top_mlp_senti_classif_report["accuracy"])+ ", Macr

perfo_file.close()
```

```
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1327: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1327: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1327: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1327: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1327: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1327: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
```

In [63]:

```
## 2.5 Re-run all previous algorithms with stop words removed

#vectorizing dataset
vectorizer = CountVectorizer(stop_words='english')
t = vectorizer.fit(postsOnlyArray)

#splitting test and train sets
vectorizerTransformed = vectorizer.transform(postsOnlyArray)
x_train_emotion, x_test_emotion, y_train_emotion, y_test_emotion = train_test_split(vec
x_train_sentiment, x_test_sentiment, y_train_sentiment, y_test_sentiment = train_test_s
```

In [64]:

```
#Base-MNB

base_mnb_algo_emotions = MultinomialNB()
base_mnb_algo_emotions.fit(x_train_emotion, y_train_emotion)
base_mnb_test_score_emotions = base_mnb_algo_emotions.score(x_test_emotion, y_test_emot
print("Base-MNB emotions accuracy: " + str(round(100 * base_mnb_test_score_emotions, 2)

base_mnb_algo_sentiments = MultinomialNB()
base_mnb_algo_sentiments.fit(x_train_sentiment, y_train_sentiment)
base_mnb_test_score_sentiments = base_mnb_algo_sentiments.score(x_test_sentiment, y_tes
print("Base-MNB sentiments accuracy: " + str(round(100 * base_mnb_test_score_sentiments
```

```
Base-MNB emotions accuracy: 38.68%
Base-MNB sentiments accuracy: 53.72%
```

In [65]:

```
#Base-DT
```

```
base_dt_algo_emotions = DecisionTreeClassifier()
base_dt_algo_emotions.fit(x_train_emotion, y_train_emotion)
base_dt_test_score_emotions = base_dt_algo_emotions.score(x_test_emotion, y_test_emotio
print("Base-DT emotions accuracy: " + str(round(100 * base_dt_test_score_emotions, 2)) 

base_dt_algo_sentiments = DecisionTreeClassifier()
base_dt_algo_sentiments.fit(x_train_sentiment, y_train_sentiment)
base_dt_test_score_sentiments = base_dt_algo_sentiments.score(x_test_sentiment, y_test_
print("Base-DT sentiments accuracy: " + str(round(100 * base_dt_test_score_sentiments, 
```

```
Base-DT emotions accuracy: 35.91%
Base-DT sentiments accuracy: 53.94%
```

In [67]:

```
#Base-MLP

base_mlp_algo_emotions = MLPClassifier(max_iter = 3)
base_mlp_algo_emotions.fit(x_train_emotion, y_train_emotion)
base_mlp_test_score_emotions = base_mlp_algo_emotions.score(x_test_emotion, y_test_emot
print("Base-MLP emotions accuracy: " + str(round(100 * base_mlp_test_score_emotions, 2)

base_mlp_algo_sentiments = MLPClassifier(max_iter = 3)
base_mlp_algo_sentiments.fit(x_train_sentiment, y_train_sentiment)
base_mlp_test_score_sentiments = base_mlp_algo_sentiments.score(x_test_sentiment, y_tes
print("Base-MLP sentiments accuracy: " + str(round(100 * base_mlp_test_score_sentiments
```

```
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
Base-MLP emotions accuracy: 42.62%
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
Base-MLP sentiments accuracy: 56.62%
```

In [68]:

```
#Top-MNB

params = {
    'alpha':[0.5, 0, 2, 6]
}

top_mnb_algo_emotions = MultinomialNB()
top_mnb_gridsearch_emotions = GridSearchCV(estimator=top_mnb_algo_emotions, param_grid=
top_mnb_gridsearch_emotions.fit(x_train_emotion, y_train_emotion)
print("Top-MNB emotions best parameters: ")
print(top_mnb_gridsearch_emotions.best_estimator_)
top_mnb_test_score_emotions = top_mnb_gridsearch_emotions.score(x_test_emotion, y_test_
print("Top-MNB emotions accuracy: " + str(round(100 * top_mnb_test_score_emotions, 2)) 

top_mnb_algo_sentiments = MultinomialNB()
top_mnb_gridsearch_sentiments = GridSearchCV(estimator=top_mnb_algo_sentiments, param_g
top_mnb_gridsearch_sentiments.fit(x_train_sentiment, y_train_sentiment)
print("Top-MNB sentiments best parameters: ")
print(top_mnb_gridsearch_sentiments.best_estimator_)
top_mnb_test_score_sentiments = top_mnb_gridsearch_sentiments.score(x_test_sentiment, y
print("Top-MNB sentiments accuracy: " + str(round(100 * top_mnb_test_score_sentiments, 
Top-MNB emotions best parameters:
MultinomialNB(alpha=0.5)
Top-MNB emotions accuracy: 38.78%
Top-MNB sentiments best parameters:
MultinomialNB(alpha=2)
Top-MNB sentiments accuracy: 53.49%
```

In [69]:

```
#Top-DT

params = {
    'criterion': ["gini", "entropy"],
    'max_depth': [1, 4],
    'min_samples_split': [2, 4, 8]
}

top_dt_algo_emotions = DecisionTreeClassifier()
top_dt_gridsearch_emotions = GridSearchCV(estimator=top_dt_algo_emotions, param_grid=par
top_dt_gridsearch_emotions.fit(x_train_emotion, y_train_emotion)
print("Top-DT emotions best parameters: ")
print(top_dt_gridsearch_emotions.best_estimator_)
top_dt_test_score_emotions = top_dt_gridsearch_emotions.score(x_test_emotion, y_test_em
print("Top-DT emotions accuracy: " + str(round(100 * top_dt_test_score_emotions, 2)) + 

top_dt_algo_sentiments = DecisionTreeClassifier()
top_dt_gridsearch_sentiments = GridSearchCV(estimator=top_dt_algo_sentiments, param_gri
top_dt_gridsearch_sentiments.fit(x_train_sentiment, y_train_sentiment)
print("Top-DT sentiments best parameters: ")
print(top_dt_gridsearch_sentiments.best_estimator_)
top_dt_test_score_sentiments = top_dt_gridsearch_sentiments.score(x_test_sentiment, y_t
print("Top-DT sentiments accuracy: " + str(round(100 * top_dt_test_score_sentiments, 2)
```

```
Top-DT emotions best parameters:
DecisionTreeClassifier(criterion='entropy', max_depth=4, min_samples_split=4)
Top-DT emotions accuracy: 37.26%
Top-DT sentiments best parameters:
DecisionTreeClassifier(max_depth=4)
Top-DT sentiments accuracy: 38.89%
```

In [70]:

```
#Top-MLP

params = {
    'activation': ["logistic", "tanh", "relu", "identity"],
    'hidden_layer_sizes': [(30, 50), (10, 10, 10)],
    'solver': ["adam", "sgd"],
    'max_iter': [3]
}
top_mlp_algo_emotions = MLPClassifier()
top_mlp_gridsearch_emotions = GridSearchCV(estimator=top_mlp_algo_emotions, param_grid=
top_mlp_gridsearch_emotions.fit(x_train_emotion, y_train_emotion)
print("Top-MLP emotions best parameters: ")
print(top_mlp_gridsearch_emotions.best_estimator_)
top_mlp_test_score_emotions = top_mlp_gridsearch_emotions.score(x_test_emotion, y_test_
print("Top-MLP emotions accuracy: " + str(round(100 * top_mlp_test_score_emotions, 2)) 

top_mlp_algo_sentiments = MLPClassifier()
top_mlp_gridsearch_sentiments = GridSearchCV(estimator=top_mlp_algo_sentiments, param_g
top_mlp_gridsearch_sentiments.fit(x_train_sentiment, y_train_sentiment)
print("Top-MLP sentiments best parameters: ")
print(top_mlp_gridsearch_sentiments.best_estimator_)
```

```
top_mlp_test_score_sentiments = top_mlp_gridsearch_sentiments.score(x_test_sentiment, y_
print("Top-MLP sentiments accuracy: " + str(round(100 * top_mlp_test_score_sentiments, 
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
```

```
Top-MLP emotions best parameters:
MLPClassifier(hidden_layer_sizes=(30, 50), max_iter=3)
Top-MLP emotions accuracy: 42.56%
```

```
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
Top-MLP sentiments best parameters:
MLPClassifier(hidden_layer_sizes=(30, 50), max_iter=3)
Top-MLP sentiments accuracy: 56.55%
```

Task 3

In [4]:

```
## 3.1 Load word2vec-google-news-300
word2vec_model = gensim_loader.load("word2vec-google-news-300")
```

```
[=================================================-] 99.4% 1652.0/1662.8MB downloaded
```

In [6]:

```
## 3.2 Use NLTK to extract words from Reddit posts

nltk.download('punkt')
tokenized_posts = []
vocab_dict = {}
token_count = 0

for post in postsOnlyArray:
    tokenized_post = word_tokenize(post)
    tokenized_posts.append(tokenized_post)

x_train_emotion, x_test_emotion, y_train_emotion, y_test_emotion = train_test_split(tok
unique_emotions_list = []
for row in x_train_emotion:
    for elem in row:
        unique_emotions_list.append(elem)
unique_emotions_list = list(set(unique_emotions_list))
emotion_training_size = len(unique_emotions_list)

x_train_sentiment, x_test_sentiment, y_train_sentiment, y_test_sentiment = train_test_sp
unique_sentiments_list = []
for row in x_train_sentiment:
    for elem in row:
        unique_sentiments_list.append(elem)
unique_sentiments_list = list(set(unique_sentiments_list))
sentiment_training_size = len(unique_sentiments_list)

print("Emotion training set size: " + str(emotion_training_size))
print("Sentiment training set size: " + str(sentiment_training_size))
```

```
[nltk_data] Downloading package punkt to
[nltk_data]     C:\Users\Marc\AppData\Roaming\nltk_data...
[nltk_data]   Package punkt is already up-to-date!
Emotion training set size: 40957
Sentiment training set size: 41057
```

In [6]:

```
## 3.3 Compute embeddings

#embeddings for training set (emotion)
total_words_train_emo = 0
nb_embedding_hit_train_emo = 0
new_x_train_emotion = x_train_emotion
for index in range(len(new_x_train_emotion)):
    post = new_x_train_emotion[index]
    nb_successful_embeddings = 0
    sum_vectors = np.zeros(300)
    for word in post:
        total_words_train_emo += 1
        try:
            word_embedding = word2vec_model[word]
            sum_vectors = np.add(sum_vectors, word_embedding)
            nb_successful_embeddings += 1
        except KeyError:
            pass
    nb_embedding_hit_train_emo += nb_successful_embeddings
    if nb_successful_embeddings != 0:
        avg_embedding = np.true_divide(sum_vectors, nb_successful_embeddings)
        new_x_train_emotion[index] = avg_embedding
    else:
        new_x_train_emotion[index] = sum_vectors

#embeddings for test set (emotion)
total_words_test_emo = 0
nb_embedding_hit_test_emo = 0
new_x_test_emotion = x_test_emotion
for index in range(len(new_x_test_emotion)):
    post = new_x_test_emotion[index]
    nb_successful_embeddings = 0
    sum_vectors = np.zeros(300)
    for word in post:
        total_words_test_emo += 1
        try:
            word_embedding = word2vec_model[word]
            sum_vectors = np.add(sum_vectors, word_embedding)
            nb_successful_embeddings += 1
        except KeyError:
            pass
    nb_embedding_hit_test_emo += nb_successful_embeddings
    if nb_successful_embeddings != 0:
        avg_embedding = np.true_divide(sum_vectors, nb_successful_embeddings)
        new_x_test_emotion[index] = avg_embedding
    else:
        new_x_test_emotion[index] = sum_vectors
```

```
#embeddings for training set (sentiment)
total_words_train_senti = 0
nb_embedding_hit_train_senti = 0
new_x_train_sentiment = x_train_sentiment
for index in range(len(new_x_train_sentiment)):
    post = new_x_train_sentiment[index]
    nb_successful_embeddings = 0
    sum_vectors = np.zeros(300)
    for word in post:
        total_words_train_senti += 1
        try:
            word_embedding = word2vec_model[word]
            sum_vectors = np.add(sum_vectors, word_embedding)
            nb_successful_embeddings += 1
        except KeyError:
            pass
    nb_embedding_hit_train_senti += nb_successful_embeddings
    if nb_successful_embeddings != 0:
        avg_embedding = np.true_divide(sum_vectors, nb_successful_embeddings)
        new_x_train_sentiment[index] = avg_embedding
    else:
        new_x_train_sentiment[index] = sum_vectors

#embeddings for test set (sentiment)
total_words_test_senti = 0
nb_embedding_hit_test_senti = 0
new_x_test_sentiment = x_test_sentiment
for index in range(len(new_x_test_sentiment)):
    post = new_x_test_sentiment[index]
    nb_successful_embeddings = 0
    sum_vectors = np.zeros(300)
    for word in post:
        total_words_test_senti += 1
        try:
            word_embedding = word2vec_model[word]
            sum_vectors = np.add(sum_vectors, word_embedding)
            nb_successful_embeddings += 1
        except KeyError:
            pass
    nb_embedding_hit_test_senti += nb_successful_embeddings
    if nb_successful_embeddings != 0:
        avg_embedding = np.true_divide(sum_vectors, nb_successful_embeddings)
        new_x_test_sentiment[index] = avg_embedding
    else:
        new_x_test_sentiment[index] = sum_vectors
```

In [7]:

```
## 3.4 Compute embeddings hit rates

hit_r_train_emo = 100 * nb_embedding_hit_train_emo / total_words_train_emo
hit_r_test_emo = 100 * nb_embedding_hit_test_emo / total_words_test_emo
hit_r_train_senti = 100 * nb_embedding_hit_train_senti / total_words_train_senti
hit_r_test_senti =  100 * nb_embedding_hit_test_senti / total_words_test_senti

print("Hit rate training set: "+str((hit_r_train_emo + hit_r_train_senti) / 2)+"%")
print("Hit rate test set: "+str((hit_r_test_emo + hit_r_test_senti) / 2)+"%")
```

```
Hit rate training set: 77.46198579539214%
Hit rate test set: 77.40534285121839%
```

In [9]:

```
## 3.5 Base-MLP

base_mlp_algo_emotions_emb = MLPClassifier(max_iter=3)
base_mlp_algo_emotions_emb.fit(x_train_emotion, y_train_emotion)
base_mlp_test_score_emotions_embed = base_mlp_algo_emotions_emb.score(x_test_emotion, y_
print("Base-MLP emotions accuracy: " + str(round(100 * base_mlp_test_score_emotions_embe

base_mlp_algo_sentiments_emb = MLPClassifier(max_iter=3)
base_mlp_algo_sentiments_emb.fit(x_train_sentiment, y_train_sentiment)
base_mlp_test_score_sentiments_emb = base_mlp_algo_sentiments_emb.score(x_test_sentimen
print("Base-MLP sentiments accuracy: " + str(round(100 * base_mlp_test_score_sentiments_
```

```
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
Base-MLP emotions accuracy: 40.17%
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
Base-MLP sentiments accuracy: 53.08%
```

In [10]:

```
## 3.6 Top-MLP

params = {
    'activation': ["logistic", "tanh", "relu", "identity"],
    'hidden_layer_sizes': [(30, 50), (10, 10, 10)],
    'solver': ["adam", "sgd"],
    'max_iter': [3]
}

top_mlp_algo_emotions_emb = MLPClassifier()
top_mlp_gridsearch_emotions_emb = GridSearchCV(estimator=top_mlp_algo_emotions_emb, para
top_mlp_gridsearch_emotions_emb.fit(x_train_emotion, y_train_emotion)
print("Top-MLP emotions best parameters: ")
print(top_mlp_gridsearch_emotions_emb.best_estimator_)
top_mlp_test_score_emotions_emb = top_mlp_gridsearch_emotions_emb.score(x_test_emotion,
print("Top-MLP emotions accuracy: " + str(round(100 * top_mlp_test_score_emotions_emb,

top_mlp_algo_sentiments_emb = MLPClassifier()
top_mlp_gridsearch_sentiments_emb = GridSearchCV(estimator=top_mlp_algo_sentiments_emb,
top_mlp_gridsearch_sentiments_emb.fit(x_train_sentiment, y_train_sentiment)
print("Top-MLP sentiments best parameters: ")
print(top_mlp_gridsearch_sentiments_emb.best_estimator_)
top_mlp_test_score_sentiments_emb = top_mlp_gridsearch_sentiments_emb.score(x_test_senti
print("Top-MLP sentiments accuracy: " + str(round(100 * top_mlp_test_score_sentiments_e
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
Top-MLP emotions best parameters:
MLPClassifier(hidden_layer_sizes=(30, 50), max_iter=3)
Top-MLP emotions accuracy: 39.78%
```

```
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
Top-MLP sentiments best parameters:
MLPClassifier(hidden_layer_sizes=(30, 50), max_iter=3)
Top-MLP sentiments accuracy: 53.12%
```

In [12]:

```
## 3.7 Performance file
perfo_file = open("performance.txt", "a")

perfo_file.write("\n\nBase-MLP embeddings (emotion):\n")
perfo_file.write("Confusion matrix:\n")
base_mlp_emo_pred_emb = base_mlp_algo_emotions_emb.predict(x_test_emotion)
base_mlp_emo_conf_matrix_emb = confusion_matrix(y_test_emotion, base_mlp_emo_pred_emb)
perfo_file.close()
perfo_file = open("performance.txt", "ab")
np.savetxt(perfo_file, base_mlp_emo_conf_matrix_emb, fmt='%-7.1f')
perfo_file.close()
perfo_file = open("performance.txt", "a")
base_mlp_emo_classif_report_emb = classification_report(y_test_emotion, base_mlp_emo_pr
perfo_file.write("Classification report:\n")
emotions_count = 0
for key in base_mlp_emo_classif_report_emb:
    if emotions_count == 4:
        break
    emotions_count += 1
    perfo_file.write(key + ": Precision = " + str(base_mlp_emo_classif_report_emb[key][
perfo_file.write("Accuracy = " + str(base_mlp_emo_classif_report_emb["accuracy"])+ ", M

perfo_file.write("\nBase-MLP embeddings (sentiment):\n")
perfo_file.write("Confusion matrix:\n")
base_mlp_senti_pred_emb = base_mlp_algo_sentiments_emb.predict(x_test_sentiment)
base_mlp_senti_conf_matrix_emb = confusion_matrix(y_test_sentiment, base_mlp_senti_pred_
perfo_file.close()
perfo_file = open("performance.txt", "ab")
np.savetxt(perfo_file, base_mlp_senti_conf_matrix_emb, fmt='%-7.1f')
perfo_file.close()
perfo_file = open("performance.txt", "a")
base_mlp_senti_classif_report_emb = classification_report(y_test_sentiment, base_mlp_se
print(base_mlp_senti_classif_report_emb)
perfo_file.write("Classification report:\n")
sentiments_count = 0
for key in base_mlp_senti_classif_report_emb:
    if sentiments_count == 4:
        break
    sentiments_count += 1
    perfo_file.write(key + ": Precision = " + str(base_mlp_senti_classif_report_emb[key
perfo_file.write("Accuracy = " + str(base_mlp_senti_classif_report_emb["accuracy"])+ ",

perfo_file.write("\nTop-MLP embeddings")
top_mlp_emo_best_estimator_emb = top_mlp_gridsearch_emotions_emb.best_estimator_
top_mlp_emo_best_params_emb = top_mlp_gridsearch_emotions_emb.best_params_
perfo_file.write(str(top_mlp_emo_best_params_emb) + " (emotion):\n")
perfo_file.write("Confusion matrix:\n")
top_mlp_emo_pred_emb = top_mlp_emo_best_estimator_emb.predict(x_test_emotion)
top_mlp_emo_conf_matrix_emb = confusion_matrix(y_test_emotion, top_mlp_emo_pred_emb)
perfo_file.close()
perfo_file = open("performance.txt", "ab")
np.savetxt(perfo_file, top_mlp_emo_conf_matrix_emb, fmt='%-7.1f')
perfo_file.close()
perfo_file = open("performance.txt", "a")
top_mlp_emo_classif_report_emb = classification_report(y_test_emotion, top_mlp_emo_pred_
perfo_file.write("Classification report:\n")
emotions_count = 0
for key in top_mlp_emo_classif_report_emb:
    if emotions_count == 4:
        break
    emotions_count += 1
    perfo_file.write(key + ": Precision = " + str(top_mlp_emo_classif_report_emb[key]["
perfo_file.write("Accuracy = " + str(top_mlp_emo_classif_report_emb["accuracy"])+ ", Ma

perfo_file.write("\nTop-MLP embeddings")
top_mlp_senti_best_estimator_emb = top_mlp_gridsearch_sentiments_emb.best_estimator_
top_mlp_senti_best_params_emb = top_mlp_gridsearch_sentiments_emb.best_params_
perfo_file.write(str(top_mlp_senti_best_params_emb) + " (sentiment):\n")
perfo_file.write("Confusion matrix:\n")
top_mlp_senti_pred_emb = top_mlp_senti_best_estimator_emb.predict(x_test_sentiment)
top_mlp_senti_conf_matrix_emb = confusion_matrix(y_test_sentiment, top_mlp_senti_pred_e
perfo_file.close()
perfo_file = open("performance.txt", "ab")
np.savetxt(perfo_file, top_mlp_senti_conf_matrix_emb, fmt='%-7.1f')
perfo_file.close()
perfo_file = open("performance.txt", "a")
top_mlp_senti_classif_report_emb = classification_report(y_test_sentiment, top_mlp_sent
perfo_file.write("Classification report:\n")
sentiments_count = 0
for key in top_mlp_senti_classif_report_emb:
    if sentiments_count == 4:
        break
    sentiments_count += 1
    perfo_file.write(key + ": Precision = " + str(top_mlp_senti_classif_report_emb[key]
perfo_file.write("Accuracy = " + str(top_mlp_senti_classif_report_emb["accuracy"])+ ",
perfo_file.close()
```

```
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1334: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1334: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1334: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
```

```
{'positive': {'precision': 0.6169942929613189, 'recall': 0.6632583503749148, 'f1-scor
e': 0.6392904073587384, 'support': 11736}, 'ambiguous': {'precision': 0.441911764705882
34, 'recall': 0.15667361835245047, 'f1-score': 0.2313317936874519, 'support': 3836}, 'n
eutral': {'precision': 0.47392908711695814, 'recall': 0.5354844557237379, 'f1-score':
0.502829907655645, 'support': 11033}, 'negative': {'precision': 0.49848523100227216, 'r
ecall': 0.5089573398633844, 'f1-score': 0.503666857980996, 'support': 7759}, 'accurac
y': 0.5308462344313817, 'macro avg': {'precision': 0.5078300939466078, 'recall': 0.4660
934410786219, 'f1-score': 0.46927974167070785, 'support': 34364}, 'weighted avg': {'pre
cision': 0.5247591979139167, 'recall': 0.5308462344313817, 'f1-score': 0.51931598485585
2, 'support': 34364}}
```

```
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1334: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1334: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1334: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
```

In [4]:

```python
## 3.8 Re-run with other embedding models

#new embedding model 1 (Wiki GloVE embeddings)
pretrained_model = gensim_loader.load("glove-wiki-gigaword-200")
```

In [7]:

```python
#embeddings for training set (emotion)
total_words_train_emo = 0
nb_embedding_hit_train_emo = 0
new_x_train_emotion = x_train_emotion
for index in range(len(new_x_train_emotion)):
    post = new_x_train_emotion[index]
    nb_successful_embeddings = 0
    sum_vectors = np.zeros(200)
    for word in post:
        total_words_train_emo += 1
        try:
            word_embedding = pretrained_model[word]
            sum_vectors = np.add(sum_vectors, word_embedding)
            nb_successful_embeddings += 1
        except KeyError:
            pass
    nb_embedding_hit_train_emo += nb_successful_embeddings
    if nb_successful_embeddings != 0:
        avg_embedding = np.true_divide(sum_vectors, nb_successful_embeddings)
        new_x_train_emotion[index] = avg_embedding
    else:
        new_x_train_emotion[index] = sum_vectors

#embeddings for test set (emotion)
total_words_test_emo = 0
nb_embedding_hit_test_emo = 0
new_x_test_emotion = x_test_emotion
for index in range(len(new_x_test_emotion)):
    post = new_x_test_emotion[index]
    nb_successful_embeddings = 0
    sum_vectors = np.zeros(200)
    for word in post:
        total_words_test_emo += 1
        try:
            word_embedding = pretrained_model[word]
            sum_vectors = np.add(sum_vectors, word_embedding)
            nb_successful_embeddings += 1
        except KeyError:
            pass
    nb_embedding_hit_test_emo += nb_successful_embeddings
    if nb_successful_embeddings != 0:
        avg_embedding = np.true_divide(sum_vectors, nb_successful_embeddings)
        new_x_test_emotion[index] = avg_embedding
    else:
        new_x_test_emotion[index] = sum_vectors

#embeddings for training set (sentiment)
total_words_train_senti = 0
nb_embedding_hit_train_senti = 0
new_x_train_sentiment = x_train_sentiment
for index in range(len(new_x_train_sentiment)):
    post = new_x_train_sentiment[index]
    nb_successful_embeddings = 0
    sum_vectors = np.zeros(200)
    for word in post:
        total_words_train_senti += 1
        try:
            word_embedding = pretrained_model[word]
            sum_vectors = np.add(sum_vectors, word_embedding)
            nb_successful_embeddings += 1
        except KeyError:
            pass
    nb_embedding_hit_train_senti += nb_successful_embeddings
    if nb_successful_embeddings != 0:
        avg_embedding = np.true_divide(sum_vectors, nb_successful_embeddings)
        new_x_train_sentiment[index] = avg_embedding
    else:
        new_x_train_sentiment[index] = sum_vectors

#embeddings for test set (sentiment)
total_words_test_senti = 0
nb_embedding_hit_test_senti = 0
new_x_test_sentiment = x_test_sentiment
```

```
for index in range(len(new_x_test_sentiment)):
    post = new_x_test_sentiment[index]
    nb_successful_embeddings = 0
    sum_vectors = np.zeros(200)
    for word in post:
        total_words_test_senti += 1
        try:
            word_embedding = pretrained_model[word]
            sum_vectors = np.add(sum_vectors, word_embedding)
            nb_successful_embeddings += 1
        except KeyError:
            pass
    nb_embedding_hit_test_senti += nb_successful_embeddings
    if nb_successful_embeddings != 0:
        avg_embedding = np.true_divide(sum_vectors, nb_successful_embeddings)
        new_x_test_sentiment[index] = avg_embedding
    else:
        new_x_test_sentiment[index] = sum_vectors
```

In [8]:

```
#train with best top mlp
base_mlp_algo_emotions_emb = MLPClassifier(hidden_layer_sizes = (30, 50), max_iter=3, a
base_mlp_algo_emotions_emb.fit(x_train_emotion, y_train_emotion)
base_mlp_test_score_emotions_embed = base_mlp_algo_emotions_emb.score(x_test_emotion, y_
print("Base-MLP emotions accuracy (glove-wiki-gigaword-200 embeddings): " + str(round(1
base_mlp_emo_pred_emb = base_mlp_algo_emotions_emb.predict(x_test_emotion)
print(classification_report(y_test_emotion, base_mlp_emo_pred_emb, labels=emotionsUniqu

base_mlp_algo_sentiments_emb = MLPClassifier(hidden_layer_sizes = (30, 50), max_iter=3,
base_mlp_algo_sentiments_emb.fit(x_train_sentiment, y_train_sentiment)
base_mlp_test_score_sentiments_emb = base_mlp_algo_sentiments_emb.score(x_test_sentimen
print("Base-MLP sentiments accuracy (glove-wiki-gigaword-200 embeddings): " + str(round
base_mlp_emo_senti_emb = base_mlp_algo_emotions_emb.predict(x_test_sentiment)
print(classification_report(y_test_sentiment, base_mlp_emo_senti_emb, labels=emotionsUn
```

```
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
Base-MLP emotions accuracy (glove-wiki-gigaword-200 embeddings): 36.46%
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1334: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1334: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1334: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
```

```
                precision    recall  f1-score   support

      approval       1.00      0.00      0.00      2369
      surprise       0.00      0.00      0.00       735
     amusement       0.50      0.23      0.32      1194
   realization       0.00      0.00      0.00       925
    admiration       0.43      0.35      0.38      2140
   disapproval       0.30      0.00      0.00      1562
 embarrassment       0.00      0.00      0.00       268
       remorse       0.00      0.00      0.00       307
          fear       0.44      0.03      0.06       331
         anger       0.35      0.05      0.09      1017
           joy       0.43      0.04      0.07       858
        desire       0.00      0.00      0.00       410
         grief       0.00      0.00      0.00        67
       disgust       0.44      0.05      0.09       546
    excitement       0.67      0.00      0.01       618
        relief       0.00      0.00      0.00       136
      optimism       0.41      0.02      0.04       901
       sadness       0.25      0.12      0.16       758
     gratitude       0.60      0.30      0.40      1446
     confusion       0.00      0.00      0.00      1007
         pride       0.00      0.00      0.00       152
     curiosity       0.35      0.12      0.18      1158
       neutral       0.35      0.93      0.51     11098
   nervousness       0.00      0.00      0.00       164
          love       0.49      0.42      0.45       904
disappointment       0.00      0.00      0.00       978
        caring       0.00      0.00      0.00       704
     annoyance       0.24      0.00      0.01      1611

      accuracy                           0.36     34364
     macro avg       0.26      0.10      0.10     34364
  weighted avg       0.36      0.36      0.25     34364
```

```
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
Base-MLP sentiments accuracy (glove-wiki-gigaword-200 embeddings): 48.44%
```

```
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1334: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1334: UndefinedMetricWarning: Recall and F-score are ill-defined and being set t
o 0.0 in labels with no true samples. Use `zero_division` parameter to control this beh
avior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1334: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1334: UndefinedMetricWarning: Recall and F-score are ill-defined and being set t
o 0.0 in labels with no true samples. Use `zero_division` parameter to control this beh
avior.
  _warn_prf(average, modifier, msg_start, len(result))
```

```
                precision    recall  f1-score   support

      approval       0.00      0.00      0.00         0
      surprise       0.00      0.00      0.00         0
     amusement       0.00      0.00      0.00         0
   realization       0.00      0.00      0.00         0
    admiration       0.00      0.00      0.00         0
   disapproval       0.00      0.00      0.00         0
 embarrassment       0.00      0.00      0.00         0
       remorse       0.00      0.00      0.00         0
          fear       0.00      0.00      0.00         0
         anger       0.00      0.00      0.00         0
           joy       0.00      0.00      0.00         0
        desire       0.00      0.00      0.00         0
         grief       0.00      0.00      0.00         0
       disgust       0.00      0.00      0.00         0
    excitement       0.00      0.00      0.00         0
        relief       0.00      0.00      0.00         0
      optimism       0.00      0.00      0.00         0
       sadness       0.00      0.00      0.00         0
     gratitude       0.00      0.00      0.00         0
     confusion       0.00      0.00      0.00         0
         pride       0.00      0.00      0.00         0
     curiosity       0.00      0.00      0.00         0
       neutral       0.35      0.93      0.51     11090
   nervousness       0.00      0.00      0.00         0
          love       0.00      0.00      0.00         0
disappointment       0.00      0.00      0.00         0
        caring       0.00      0.00      0.00         0
     annoyance       0.00      0.00      0.00         0

     micro avg       0.30      0.93      0.45     11090
     macro avg       0.01      0.03      0.02     11090
  weighted avg       0.35      0.93      0.51     11090
```

```
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1334: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1334: UndefinedMetricWarning: Recall and F-score are ill-defined and being set t
o 0.0 in labels with no true samples. Use `zero_division` parameter to control this beh
avior.
  _warn_prf(average, modifier, msg_start, len(result))
```

In [5]:

```
#new embedding model 2 (Twitter GloVE embeddings)
pretrained_model = gensim_loader.load("glove-twitter-50")
```

In [7]:

```
#embeddings for training set (emotion)
total_words_train_emo = 0
nb_embedding_hit_train_emo = 0
new_x_train_emotion = x_train_emotion
for index in range(len(new_x_train_emotion)):
    post = new_x_train_emotion[index]
    nb_successful_embeddings = 0
    sum_vectors = np.zeros(50)
    for word in post:
        total_words_train_emo += 1
        try:
            word_embedding = pretrained_model[word]
            sum_vectors = np.add(sum_vectors, word_embedding)
            nb_successful_embeddings += 1
        except KeyError:
            pass
    nb_embedding_hit_train_emo += nb_successful_embeddings
    if nb_successful_embeddings != 0:
        avg_embedding = np.true_divide(sum_vectors, nb_successful_embeddings)
        new_x_train_emotion[index] = avg_embedding
    else:
        new_x_train_emotion[index] = sum_vectors

#embeddings for test set (emotion)
total_words_test_emo = 0
nb_embedding_hit_test_emo = 0
new_x_test_emotion = x_test_emotion
for index in range(len(new_x_test_emotion)):
    post = new_x_test_emotion[index]
    nb_successful_embeddings = 0
    sum_vectors = np.zeros(50)
    for word in post:
        total_words_test_emo += 1
        try:
            word_embedding = pretrained_model[word]
            sum_vectors = np.add(sum_vectors, word_embedding)
            nb_successful_embeddings += 1
        except KeyError:
            pass
    nb_embedding_hit_test_emo += nb_successful_embeddings
    if nb_successful_embeddings != 0:
        avg_embedding = np.true_divide(sum_vectors, nb_successful_embeddings)
        new_x_test_emotion[index] = avg_embedding
    else:
        new_x_test_emotion[index] = sum_vectors
```

```
#embeddings for training set (sentiment)
total_words_train_senti = 0
nb_embedding_hit_train_senti = 0
new_x_train_sentiment = x_train_sentiment
for index in range(len(new_x_train_sentiment)):
    post = new_x_train_sentiment[index]
    nb_successful_embeddings = 0
    sum_vectors = np.zeros(50)
    for word in post:
        total_words_train_senti += 1
        try:
            word_embedding = pretrained_model[word]
            sum_vectors = np.add(sum_vectors, word_embedding)
            nb_successful_embeddings += 1
        except KeyError:
            pass
    nb_embedding_hit_train_senti += nb_successful_embeddings
    if nb_successful_embeddings != 0:
        avg_embedding = np.true_divide(sum_vectors, nb_successful_embeddings)
        new_x_train_sentiment[index] = avg_embedding
    else:
        new_x_train_sentiment[index] = sum_vectors

#embeddings for test set (sentiment)
total_words_test_senti = 0
nb_embedding_hit_test_senti = 0
new_x_test_sentiment = x_test_sentiment
for index in range(len(new_x_test_sentiment)):
    post = new_x_test_sentiment[index]
    nb_successful_embeddings = 0
    sum_vectors = np.zeros(50)
    for word in post:
        total_words_test_senti += 1
        try:
            word_embedding = pretrained_model[word]
            sum_vectors = np.add(sum_vectors, word_embedding)
            nb_successful_embeddings += 1
        except KeyError:
            pass
    nb_embedding_hit_test_senti += nb_successful_embeddings
    if nb_successful_embeddings != 0:
        avg_embedding = np.true_divide(sum_vectors, nb_successful_embeddings)
        new_x_test_sentiment[index] = avg_embedding
    else:
        new_x_test_sentiment[index] = sum_vectors
```

In [10]:

```
#train with best top mlp
base_mlp_algo_emotions_emb = MLPClassifier(hidden_layer_sizes = (30, 50), max_iter=3, a
base_mlp_algo_emotions_emb.fit(x_train_emotion, y_train_emotion)
base_mlp_test_score_emotions_embed = base_mlp_algo_emotions_emb.score(x_test_emotion, y_
print("Base-MLP emotions accuracy (glove-twitter-50 embeddings): " + str(round(100 * ba
base_mlp_emo_pred_emb = base_mlp_algo_emotions_emb.predict(x_test_emotion)
print(classification_report(y_test_emotion, base_mlp_emo_pred_emb, labels=emotionsUniqu

base_mlp_algo_sentiments_emb = MLPClassifier(hidden_layer_sizes = (30, 50), max_iter=3,
base_mlp_algo_sentiments_emb.fit(x_train_sentiment, y_train_sentiment)
base_mlp_test_score_sentiments_emb = base_mlp_algo_sentiments_emb.score(x_test_sentimen
print("Base-MLP sentiments accuracy (glove-twitter-50 embeddings): " + str(round(100 * 
base_mlp_emo_senti_emb = base_mlp_algo_emotions_emb.predict(x_test_sentiment)
print(classification_report(y_test_sentiment, base_mlp_emo_senti_emb, labels=emotionsUn
```

```
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
```

```
Base-MLP emotions accuracy (glove-twitter-50 embeddings): 35.19%
```

```
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1327: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1327: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1327: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
```

```
                precision    recall  f1-score   support

         anger       0.37      0.06      0.10      1080
   nervousness       0.00      0.00      0.00       144
         grief       0.00      0.00      0.00        63
    admiration       0.34      0.37      0.35      2102
    excitement       0.25      0.00      0.01       617
     gratitude       0.46      0.37      0.41      1373
        relief       0.00      0.00      0.00       162
disappointment       1.00      0.00      0.00       932
     annoyance       0.19      0.01      0.02      1685
       remorse       0.00      0.00      0.00       300
     amusement       0.26      0.09      0.13      1194
       sadness       0.33      0.05      0.09       800
         pride       0.00      0.00      0.00       126
          fear       0.11      0.01      0.01       349
     curiosity       0.31      0.14      0.19      1176
          love       0.42      0.26      0.32       989
 embarrassment       0.00      0.00      0.00       286
       neutral       0.35      0.91      0.51     11123
           joy       0.33      0.02      0.04       868
     confusion       0.50      0.01      0.01       978
      surprise       0.00      0.00      0.00       712
   disapproval       0.17      0.00      0.01      1509
      approval       0.60      0.00      0.00      2232
        desire       0.00      0.00      0.00       429
   realization       0.00      0.00      0.00       937
      optimism       0.18      0.01      0.02       871
       disgust       0.30      0.03      0.05       613
        caring       0.18      0.00      0.01       714

      accuracy                           0.35     34364
     macro avg       0.24      0.08      0.08     34364
  weighted avg       0.33      0.35      0.23     34364
```

```
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\neural_network\_mult
ilayer_perceptron.py:702: ConvergenceWarning: Stochastic Optimizer: Maximum iterations
(3) reached and the optimization hasn't converged yet.
  warnings.warn(
```

```
Base-MLP sentiments accuracy (glove-twitter-50 embeddings): 47.01%
```

```
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1327: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1327: UndefinedMetricWarning: Recall and F-score are ill-defined and being set t
o 0.0 in labels with no true samples. Use `zero_division` parameter to control this beh
avior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1327: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1327: UndefinedMetricWarning: Recall and F-score are ill-defined and being set t
o 0.0 in labels with no true samples. Use `zero_division` parameter to control this beh
avior.
  _warn_prf(average, modifier, msg_start, len(result))
```

```
                precision    recall  f1-score   support

         anger       0.00      0.00      0.00         0
   nervousness       0.00      0.00      0.00         0
         grief       0.00      0.00      0.00         0
    admiration       0.00      0.00      0.00         0
    excitement       0.00      0.00      0.00         0
     gratitude       0.00      0.00      0.00         0
        relief       0.00      0.00      0.00         0
disappointment       0.00      0.00      0.00         0
     annoyance       0.00      0.00      0.00         0
       remorse       0.00      0.00      0.00         0
     amusement       0.00      0.00      0.00         0
       sadness       0.00      0.00      0.00         0
         pride       0.00      0.00      0.00         0
          fear       0.00      0.00      0.00         0
     curiosity       0.00      0.00      0.00         0
          love       0.00      0.00      0.00         0
 embarrassment       0.00      0.00      0.00         0
       neutral       0.35      0.91      0.50     11055
           joy       0.00      0.00      0.00         0
     confusion       0.00      0.00      0.00         0
      surprise       0.00      0.00      0.00         0
   disapproval       0.00      0.00      0.00         0
      approval       0.00      0.00      0.00         0
        desire       0.00      0.00      0.00         0
   realization       0.00      0.00      0.00         0
      optimism       0.00      0.00      0.00         0
       disgust       0.00      0.00      0.00         0
        caring       0.00      0.00      0.00         0

     micro avg       0.29      0.91      0.44     11055
     macro avg       0.01      0.03      0.02     11055
  weighted avg       0.35      0.91      0.50     11055
```

```
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1327: UndefinedMetricWarning: Precision and F-score are ill-defined and being se
t to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control
this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
C:\Users\Marc\miniconda3\envs\comp472_a1\lib\site-packages\sklearn\metrics\_classificat
ion.py:1327: UndefinedMetricWarning: Recall and F-score are ill-defined and being set t
o 0.0 in labels with no true samples. Use `zero_division` parameter to control this beh
avior.
  _warn_prf(average, modifier, msg_start, len(result))
```