MNB

Hyper-parameters:

default

Emotion

```
Score for Emotion: 0.4397625421953207
Accuracy for Emotion: 0.4397625421953207
Precision (Weighted) for Emotion: 0.48926029471973104
F1 Score (Weighted) for Emotion: 0.3719129846247145
F1 Score (Macro) for Emotion: 0.22479721508367329
```

	precision	recall	f1-score	support
0	0.53	0.52	0.53	2069
1	0.65	0.38	0.48	1226
2	0.56	0.20	0.30	1051
3	0.36	0.12	0.18	1615
4	0.46	0.16	0.24	2276
5	0.50	0.11	0.17	745
6	0.46	0.08	0.14	959
7	0.56	0.17	0.26	1208
8	0.61	0.06	0.11	389
9	0.53	0.08	0.14	926
10	0.44	0.15	0.22	1531
11	0.61	0.11	0.18	585
12	0.75	0.03	0.06	268
13	0.57	0.08	0.14	609
14	0.68	0.07	0.12	383
15	0.79	0.71	0.75	1481
16	0.00	0.00	0.00	66
17	0.52	0.17	0.25	872
18	0.73	0.42	0.53	1035
19	0.00	0.00	0.00	148
20	0.39	0.89	0.54	11077
21	0.57	0.20	0.30	875
22	0.00	0.00	0.00	122
23	0.49	0.06	0.11	961
24	0.00	0.00	0.00	152
25	0.59	0.07	0.12	287
26	0.54	0.13	0.21	736
27	0.53	0.13	0.21	712
accuracy			0.44	34364
macro_avg	0.48	0.18	0.22	34364
weighted_avg	0.49	0.44	0.37	34364

Confusion Matrix
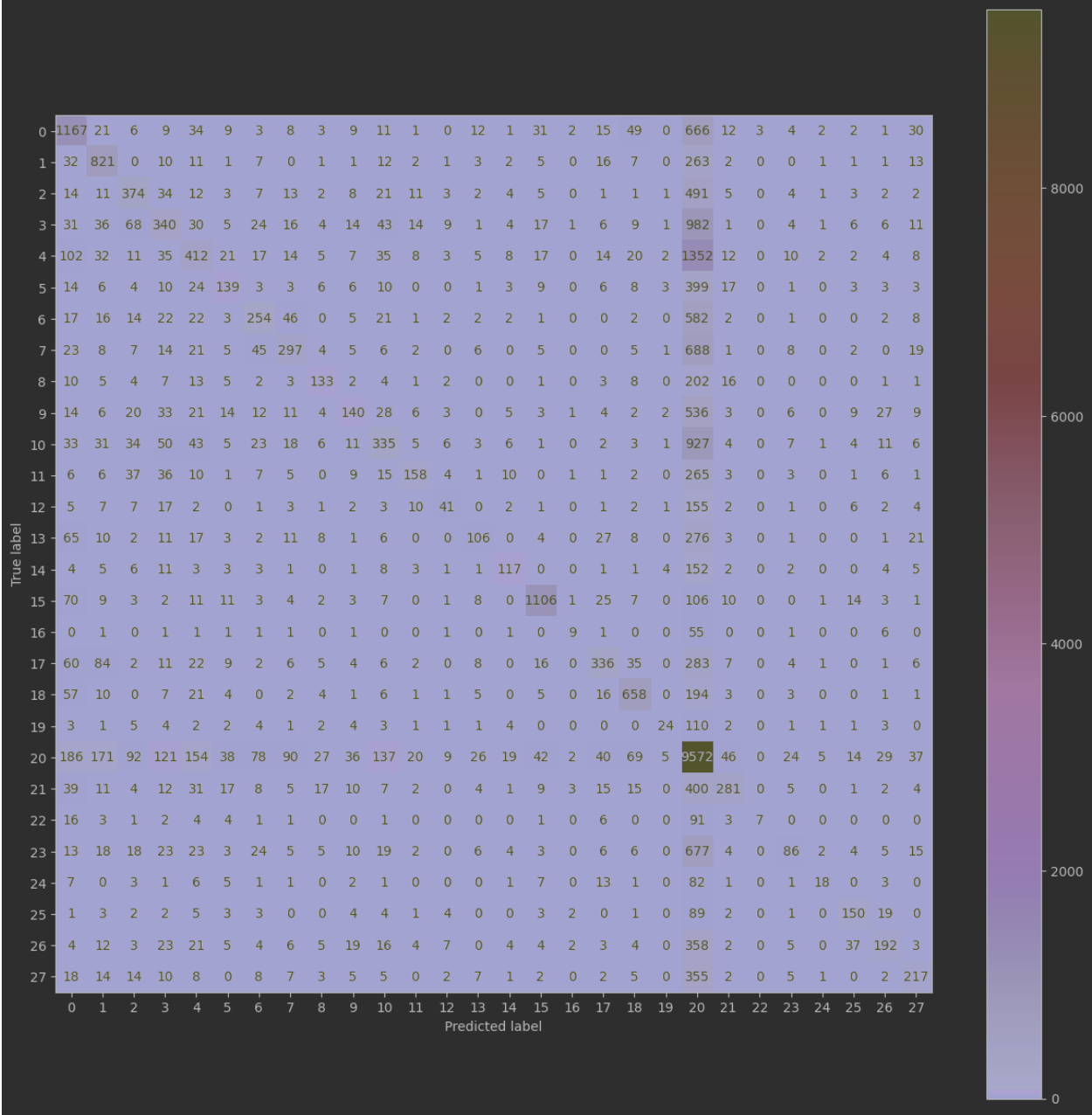
Sentiment

```
Score for Sentiment: 0.6100570364334769
Accuracy for Emotion: 0.6100570364334769
Precision (Weighted) for Emotion: 0.6054869973993441
F1 Score (Weighted) for Emotion: 0.6028268711398485
F1 Score (Macro) for Emotion: 0.5676173771892744
```

	precision	recall	f1-score	support
0	0.56	0.31	0.40	3840
1	0.59	0.59	0.59	7596
2	0.57	0.57	0.57	11077

		precision	recall	f1-score	support
3		0.66	0.75	0.71	11851
accuracy				0.61	34364
macro_avg		0.60	0.56	0.57	34364
weighted_avg		0.61	0.61	0.60	34364

Confusion Matrix

_____

DT
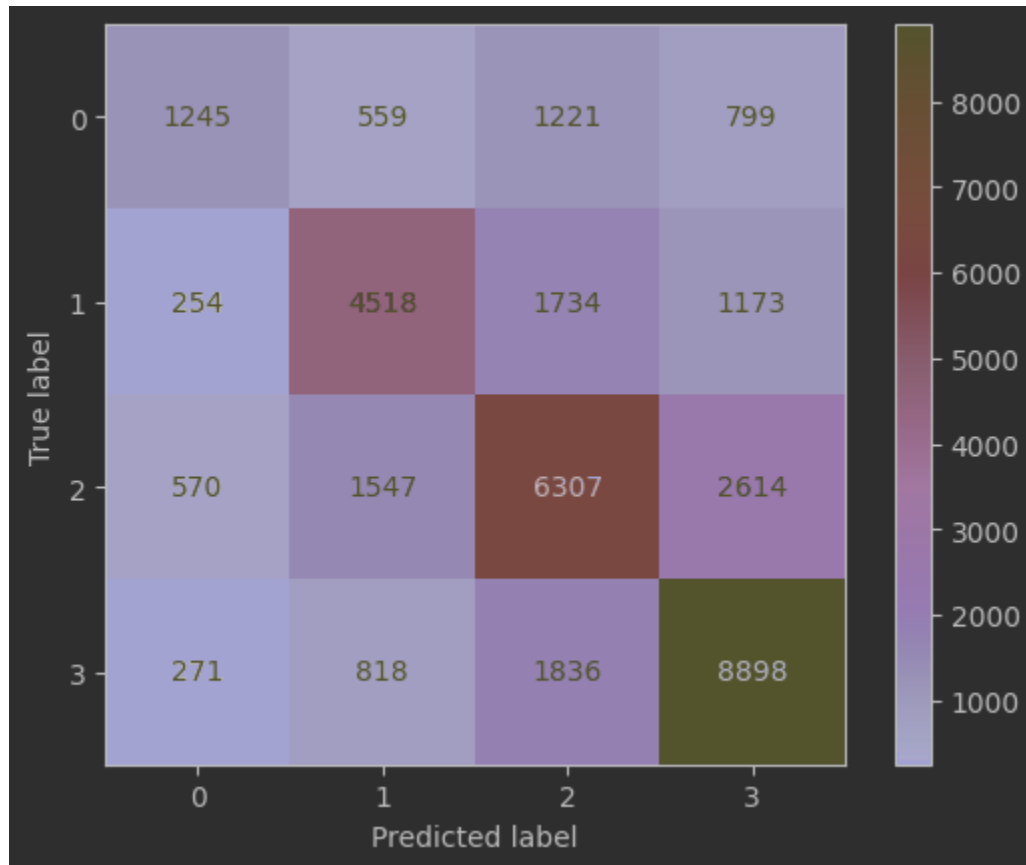
Hyper-parameters:

default

Emotion

```
Score for Emotion: 0.5957979280642532
Accuracy for Emotion: 0.5957979280642532
Precision (Weighted) for Emotion: 0.6123241872646431
F1 Score (Weighted) for Emotion: 0.592676569178555
F1 Score (Macro) for Emotion: 0.5123542638921981
              precision    recall   f1-score    support

           0       0.56      0.82       0.67       2069
           1       0.58      0.82       0.68       1226
           2       0.45      0.72       0.55       1051
           3       0.38      0.56       0.45       1615
```

	precision	recall	f1-score	support
4	0.47	0.57	0.51	2276
5	0.49	0.54	0.52	745
6	0.47	0.55	0.51	959
7	0.58	0.60	0.59	1208
8	0.49	0.55	0.52	389
9	0.44	0.45	0.45	926
10	0.54	0.47	0.50	1531
11	0.55	0.40	0.46	585
12	0.47	0.41	0.44	268
13	0.54	0.43	0.48	609
14	0.69	0.56	0.62	383
15	0.88	0.82	0.85	1481
16	0.40	0.35	0.37	66
17	0.58	0.46	0.51	872
18	0.75	0.69	0.72	1035
19	0.46	0.26	0.33	148
20	0.71	0.66	0.68	11077
21	0.67	0.37	0.48	875
22	0.55	0.17	0.26	122
23	0.58	0.22	0.32	961
24	0.55	0.19	0.28	152
25	0.67	0.51	0.57	287
26	0.68	0.38	0.49	736
27	0.70	0.41	0.52	712
accuracy			0.60	34364
macro_avg	0.57	0.50	0.51	34364
weighted_avg	0.61	0.60	0.59	34364

Confusion Matrix
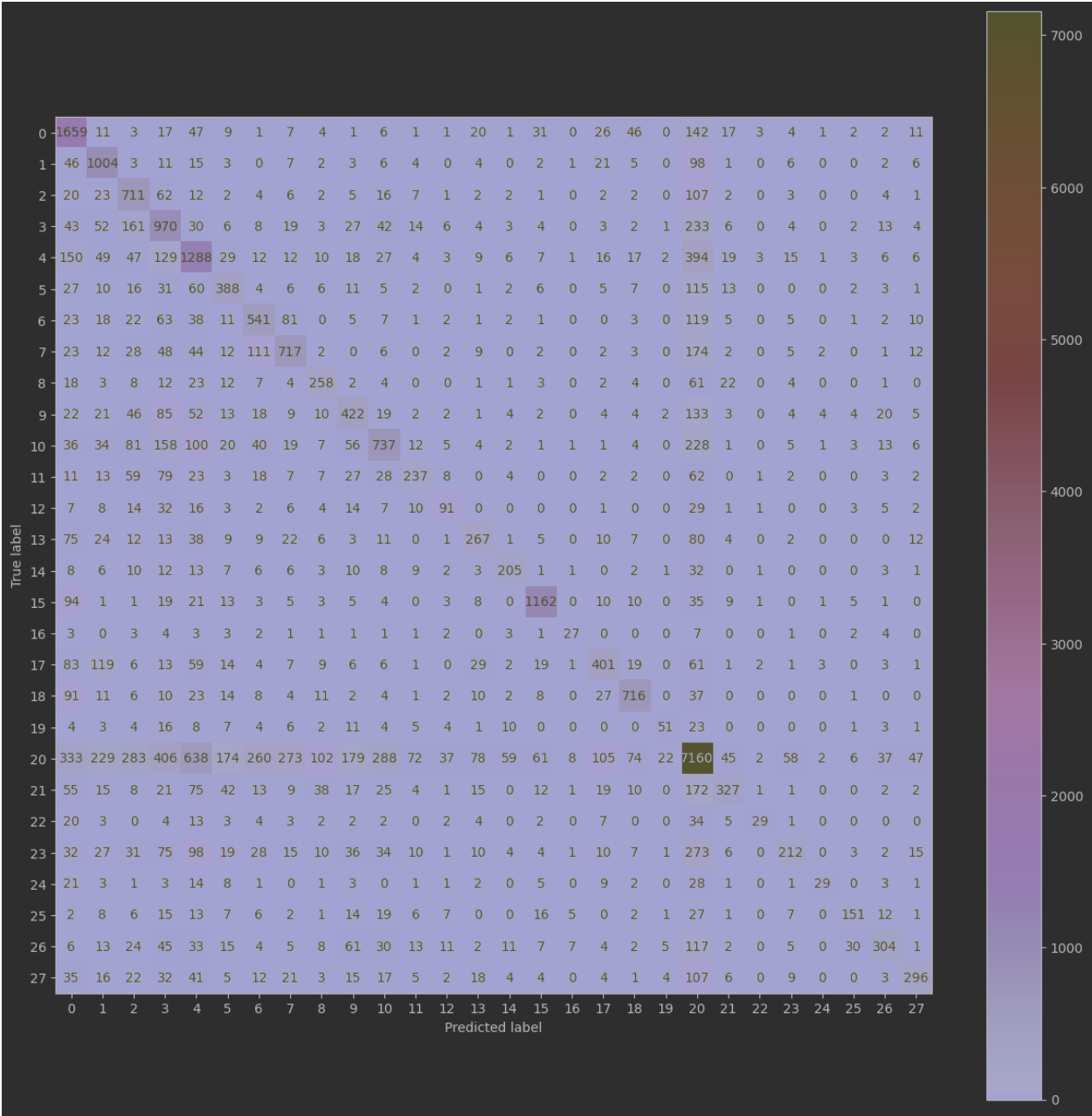
Sentiment

Score for Sentiment: 0.7210452799441276
Accuracy for Emotion: 0.7210452799441276
Precision (Weighted) for Emotion: 0.7322662048390615
F1 Score (Weighted) for Emotion: 0.7234404452427878
F1 Score (Macro) for Emotion: 0.7081389607742599

	precision	recall	f1-score	support
0	0.58	0.72	0.64	3840
1	0.66	0.77	0.71	7596
2	0.71	0.67	0.69	11077

	precision	recall	f1-score	support
3	0.84	0.74	0.79	11851
accuracy			0.72	34364
macro_avg	0.70	0.72	0.71	34364
weighted_avg	0.73	0.72	0.72	34364

Confusion Matrix

MLP
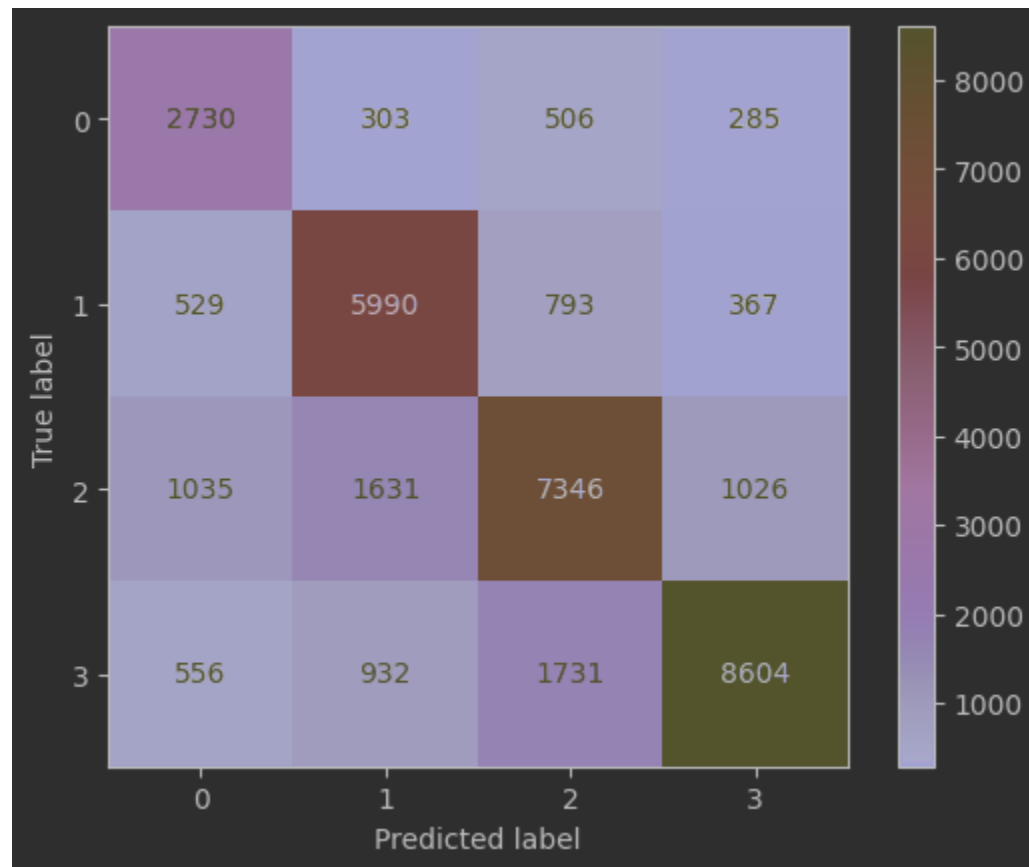
Hyper-parameters:

default

Emotion

```
Score for Emotion: 0.5758642765685019
Accuracy for Emotion: 0.5758642765685019
Precision (Weighted) for Emotion: 0.5688540009909064
F1 Score (Weighted) for Emotion: 0.5698661637580398
F1 Score (Macro) for Emotion: 0.507047923081078
```

	precision	recall	f1-score	support
0	0.64	0.67	0.65	2111
1	0.65	0.68	0.67	1213
2	0.53	0.54	0.53	1035
3	0.46	0.40	0.43	1684
4	0.46	0.36	0.41	2158
5	0.49	0.47	0.48	681

	precision	recall	f1-score	support
6	0.51	0.46	0.48	1025
7	0.56	0.48	0.52	1172
8	0.47	0.61	0.53	423
9	0.43	0.39	0.41	919
10	0.48	0.47	0.47	1576
11	0.52	0.46	0.49	588
12	0.47	0.49	0.48	276
13	0.45	0.39	0.42	583
14	0.55	0.54	0.54	338
15	0.84	0.82	0.83	1408
16	0.43	0.37	0.40	81
17	0.54	0.51	0.53	910
18	0.65	0.80	0.71	1000
19	0.46	0.39	0.42	180
20	0.63	0.70	0.66	11089
21	0.49	0.55	0.52	903
22	0.43	0.30	0.35	141
23	0.44	0.27	0.34	981
24	0.37	0.36	0.36	154
25	0.49	0.64	0.56	299
26	0.52	0.48	0.50	743
27	0.55	0.48	0.51	693
accuracy			0.58	34364
macro_avg	0.52	0.50	0.51	34364
weighted_avg	0.57	0.58	0.57	34364

Confusion Matrix

True label (rows 0–27) × Predicted label (columns 0–27):

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
0	1395	27	7	18	61	12	5	10	8	9	11	3	3	37	3	43	0	38	79	0	227	34	9	6	4	1	6	17
1	31	826	12	15	18	2	11	9	4	5	18	5	6	16	2	7	1	60	13	2	149	8	1	11	0	3	4	11
2	15	11	511	82	16	4	9	9	3	19	42	19	5	6	7	3	0	3	4	1	197	6	1	8	0	3	5	8
3	27	33	96	699	48	16	12	28	14	49	71	30	18	11	5	9	3	9	9	7	387	18	1	14	2	7	23	14
4	101	35	17	54	881	36	28	17	34	33	73	15	8	26	9	18	2	35	46	7	668	58	4	28	10	11	15	14
5	17	5	7	14	28	319	4	7	10	12	12	2	6	2	3	6	1	14	9	2	191	30	1	2	1	4	10	2
6	12	9	8	23	21	4	446	88	2	15	21	2	3	0	3	5	2	1	2	2	241	13	0	11	2	4	5	16
7	13	5	12	28	24	9	77	580	11	10	16	5	2	13	0	3	1	8	8	1	335	9	1	7	1	4	6	28
8	10	3	4	6	10	7	1	3	254	6	7	1	0	5	1	5	0	3	11	0	74	28	0	5	0	1	4	1
9	7	7	17	40	21	9	7	7	9	359	49	13	5	4	5	3	2	5	8	8	233	13	2	8	1	11	49	9
10	25	15	38	71	42	14	28	9	3	26	777	19	10	6	8	5	3	9	6	4	365	22	1	28	1	7	20	13
11	3	7	39	46	7	2	10	5	5	14	34	271	12	4	3	1	0	3	5	0	104	7	2	3	1	1	8	1
12	3	2	6	17	7	1	2	3	1	11	4	6	102	0	6	0	0	1	2	2	51	5	1	6	2	6	6	3
13	50	11	7	14	15	8	2	17	9	5	6	1	0	240	1	7	0	22	22	0	127	15	2	2	1	0	1	26
14	5	4	4	12	3	2	2	4	3	7	5	8	2	1	188	1	0	2	1	9	59	5	1	8	0	2	10	2
15	65	8	2	5	11	12	2	1	3	3	3	0	2	8	0	1152	0	23	12	0	65	17	1	0	7	8	2	2
16	2	0	1	0	1	1	0	0	1	0	1	1	2	1	1	1	26	0	0	0	16	0	0	1	0	6	6	2
17	52	78	3	7	14	7	2	5	4	4	9	1	2	32	1	17	1	432	45	1	114	16	5	3	7	0	4	4
18	37	5	2	5	11	7	1	2	6	1	4	1	1	6	2	5	0	16	820	1	42	4	0	0	3	3	2	1
19	1	2	2	3	6	6	2	3	1	5	2	6	1	1	7	0	1	1	0	64	42	3	0	1	0	2	4	2
20	220	147	161	227	391	134	149	175	111	137	301	63	56	71	41	46	13	116	126	22	7773	175	12	143	21	30	104	73
21	22	7	4	6	34	22	10	7	29	10	16	3	3	6	0	15	1	13	12	1	156	483	4	6	4	2	5	4
22	15	2	0	6	6	0	1	2	2	2	0	0	5	1	0	4	0	3	0	0	29	5	52	5	0	0	0	0
23	14	17	11	26	74	9	20	6	15	29	42	11	7	4	4	6	2	6	10	3	302	10	0	295	2	10	7	22
24	8	1	1	1	12	9	1	0	0	3	1	1	0	0	1	4	0	8	2	0	22	2	1	4	52	1	3	0
25	1	2	2	9	4	3	5	0	3	12	6	3	6	2	0	8	1	0	1	1	30	1	1	12	0	201	13	2
26	3	9	13	28	12	8	3	2	11	39	32	12	6	1	12	4	6	3	5	3	120	4	1	4	2	36	385	1
27	23	10	9	15	16	4	9	18	2	9	7	4	5	10	4	7	0	4	1	1	128	11	0	14	3	2	2	364

Sentiment

Score for Sentiment: 0.5605575602374578
Accuracy for Emotion: 0.5605575602374578
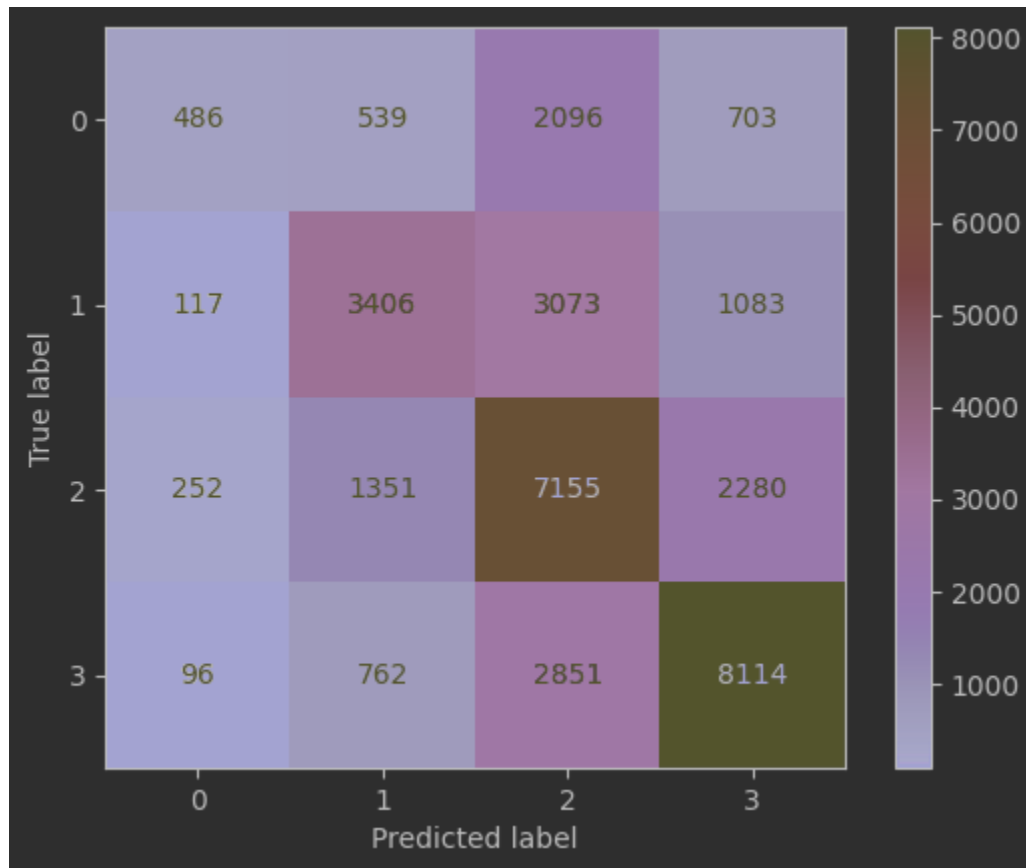Precision (Weighted) for Emotion: 0.5669766498918233
F1 Score (Weighted) for Emotion: 0.5438949258055783
F1 Score (Macro) for Emotion: 0.4838282812103384

	precision	recall	f1-score	support
0	0.54	0.13	0.20	3871
1	0.56	0.46	0.50	7719
2	0.48	0.65	0.55	11089
3	0.67	0.69	0.68	11685

	precision	recall	f1-score	support
accuracy			0.56	34364
macro_avg	0.56	0.48	0.48	34364
weighted_avg	0.57	0.56	0.54	34364

Confusion Matrix

MNB (Grid Search CV)

Hyper-parameters:

alpha

Emotion

alpha_emotion = 0.36
Best estimator (Emotion): MultinomialNB(alpha=0.36), Best Score: 0.3834754
477508645
Accuracy for Emotion: 0.4887964148527529
Precision (Weighted) for Emotion: 0.48370589971275646
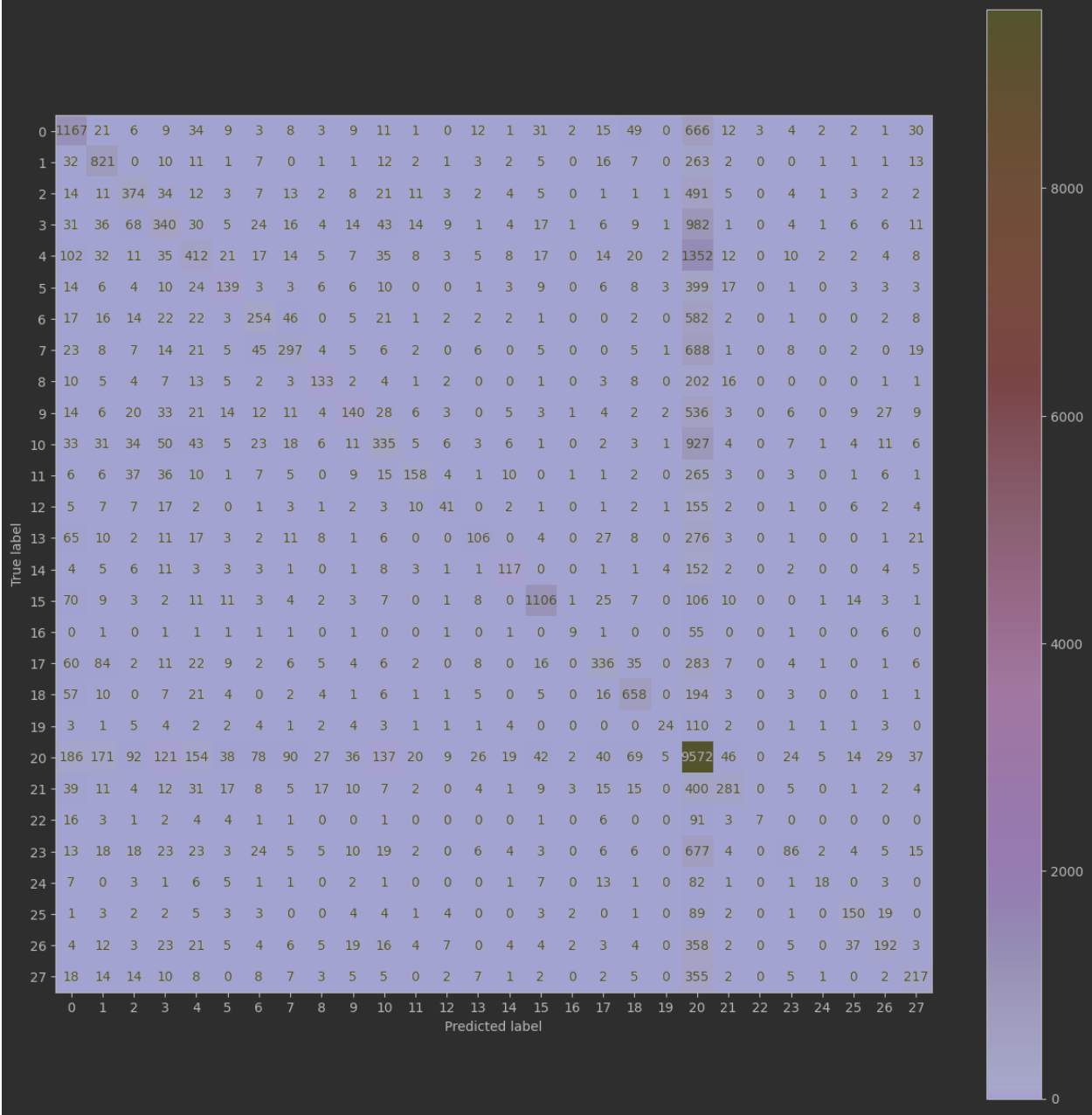F1 Score (Weighted) for Emotion: 0.4637513743481372
F1 Score (Macro) for Emotion: 0.363446634702298

	precision	recall	f1-score	support
0	0.54	0.62	0.58	2111
1	0.59	0.62	0.61	1213
2	0.48	0.37	0.42	1035
3	0.41	0.27	0.32	1684

4	0.39	0.24	0.30	2158
5	0.37	0.30	0.33	681
6	0.46	0.28	0.35	1025
7	0.46	0.31	0.37	1172
8	0.52	0.26	0.35	423
9	0.48	0.22	0.30	919
10	0.43	0.30	0.35	1576
11	0.54	0.29	0.38	588
12	0.46	0.16	0.23	276
13	0.43	0.19	0.26	583
14	0.57	0.30	0.39	338
15	0.73	0.80	0.76	1408
16	0.20	0.01	0.02	81
17	0.50	0.36	0.42	910
18	0.65	0.62	0.63	1000
19	0.46	0.06	0.11	180
20	0.47	0.73	0.57	11089
21	0.51	0.40	0.45	903
22	0.56	0.06	0.11	141
23	0.38	0.18	0.25	981
24	0.41	0.07	0.12	154
25	0.59	0.32	0.41	299
26	0.44	0.31	0.36	743
27	0.48	0.34	0.40	693
accuracy			0.49	34364
macro_avg	0.48	0.32	0.36	34364
weighted_avg	0.48	0.49	0.46	34364

Confusion Matrix

Sentiment

alpha_sentiment=1

Best estimator (Sentiment): MultinomialNB(alpha=1), Best Score: 0.53839043
67141189
Accuracy for Emotion: 0.6124723547898964
Precision (Weighted) for Emotion: 0.6070489450627047
F1 Score (Weighted) for Emotion: 0.6054871499390746
F1 Score (Macro) for Emotion: 0.5722786365590198

	precision	recall	f1-score	support
0	0.55	0.33	0.41	3871
1	0.61	0.60	0.60	7719

	precision	recall	f1-score	support
2	0.57	0.56	0.57	11089
3	0.66	0.76	0.71	11685
accuracy			0.61	34364
macro_avg	0.60	0.56	0.57	34364
weighted_avg	0.61	0.61	0.61	34364

Confusion Matrix
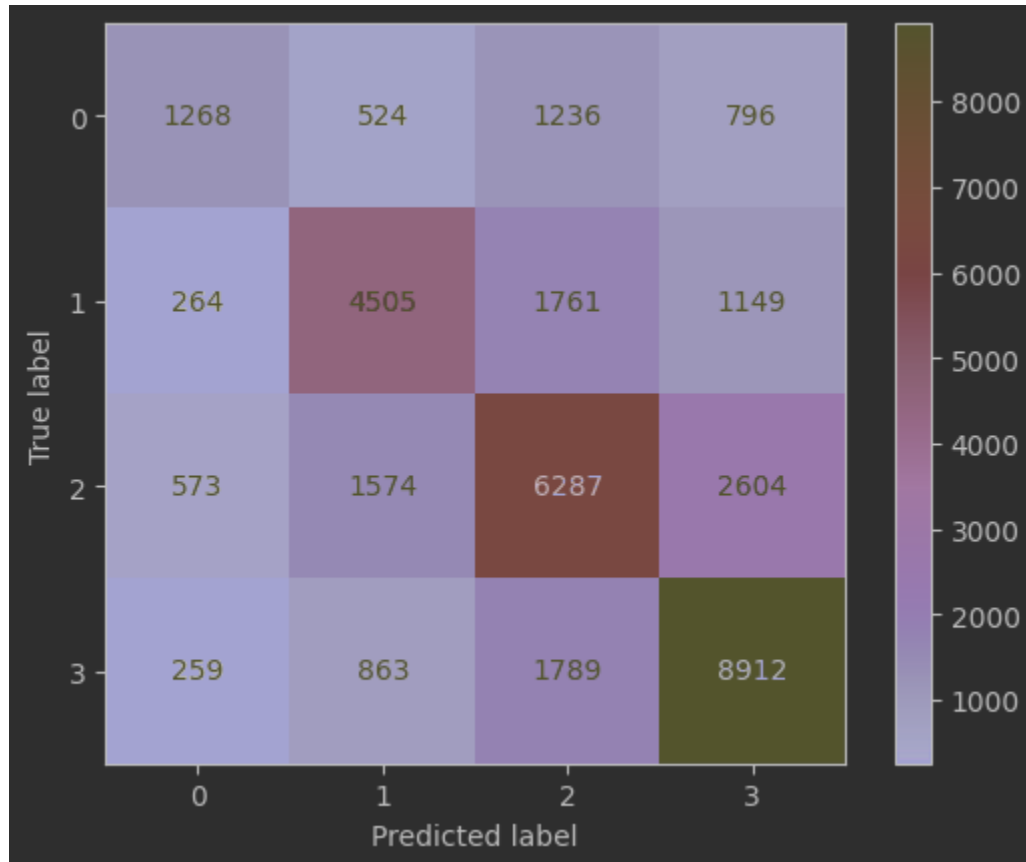
DT (Grid Search CV)

Hyper-parameters:

"criterion":("gini","entropy"),"max_depth":(100,3),"min_samples_split":(12,5,30)

Emotion

Best estimator (Emotion): DecisionTreeClassifier(max_depth=100, min_samples_split=30)
Best Score: 0.4044639513068846
Accuracy for Emotion: 0.5089628681177977
Precision (Weighted) for Emotion: 0.5139248586697427
F1 Score (Weighted) for Emotion: 0.4676219536378908
F1 Score (Macro) for Emotion: 0.37062609486706116

	precision	recall	f1-score	support
0	0.58	0.55	0.57	2111
1	0.60	0.68	0.64	1213
2	0.50	0.36	0.42	1035

	precision	recall	f1-score	support
3	0.40	0.20	0.27	1684
4	0.42	0.19	0.26	2158
5	0.44	0.20	0.28	681
6	0.46	0.25	0.32	1025
7	0.51	0.25	0.34	1172
8	0.54	0.31	0.40	423
9	0.44	0.15	0.23	919
10	0.44	0.21	0.29	1576
11	0.62	0.27	0.37	588
12	0.41	0.15	0.22	276
13	0.51	0.18	0.27	583
14	0.59	0.35	0.44	338
15	0.85	0.79	0.82	1408
16	0.38	0.11	0.17	81
17	0.60	0.37	0.46	910
18	0.71	0.66	0.68	1000
19	0.53	0.13	0.21	180
20	0.47	0.86	0.61	11089
21	0.63	0.31	0.42	903
22	0.70	0.05	0.09	141
23	0.46	0.09	0.15	981
24	0.49	0.12	0.19	154
25	0.58	0.50	0.54	299
26	0.57	0.26	0.36	743
27	0.51	0.31	0.39	693
accuracy			0.51	34364
macro_avg	0.53	0.32	0.37	34364
weighted_avg	0.51	0.51	0.47	34364

Confusion Matrix

True\Pred	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
0	1176	22	5	10	31	9	3	17	3	4	5	6	1	12	0	27	0	38	40	0	618	15	2	1	0	2	2	24
1	36	837	3	7	14	2	3	5	1	2	8	5	0	3	0	3	1	18	9	0	275	3	0	4	0	2	1	8
2	13	14	322	50	10	4	8	7	3	9	14	7	3	0	4	1	0	2	2	1	511	2	0	4	0	1	3	2
3	34	38	68	351	39	7	14	14	5	14	38	15	5	4	2	8	0	2	9	1	963	7	0	4	0	4	5	9
4	107	31	19	41	449	19	11	11	10	15	35	7	3	5	8	12	1	16	22	1	1413	15	0	8	7	3	5	9
5	21	7	7	9	17	142	2	8	6	9	7	1	0	1	3	8	0	8	10	0	428	13	0	1	2	6	4	1
6	15	17	4	24	16	0	246	36	0	7	13	1	1	2	3	1	0	2	5	1	548	6	0	1	0	3	1	8
7	19	16	11	17	15	7	39	278	0	4	5	2	0	7	1	2	0	0	9	0	757	2	0	6	0	1	3	16
8	7	6	4	3	13	6	1	5	141	2	4	1	0	0	1	2	0	2	7	0	224	18	0	2	0	0	1	0
9	19	7	18	30	21	8	5	9	6	132	25	7	5	1	4	4	0	1	4	0	546	5	0	6	1	13	25	9
10	30	29	32	57	38	7	21	10	7	16	346	6	4	1	4	5	0	3	8	1	915	3	0	8	0	7	6	11
11	9	6	28	36	13	1	11	4	2	9	10	144	5	1	3	1	0	3	2	0	301	2	0	3	0	0	1	3
12	3	4	7	12	3	0	1	2	2	8	9	2	38	0	2	3	0	1	1	1	146	1	0	0	0	5	2	3
13	59	10	8	8	9	3	1	13	4	3	8	1	0	114	0	6	0	20	14	1	297	6	0	1	0	0	2	23
14	4	3	5	9	5	2	3	3	1	2	4	3	0	0	133	0	0	2	1	3	162	0	0	0	0	0	1	4
15	75	9	2	4	11	14	4	3	2	3	3	0	1	8	0	1110	0	18	10	0	110	12	0	0	0	11	4	0
16	3	1	0	0	1	1	0	0	1	1	1	0	2	0	1	1	4	1	0	46	0	0	0	0	0	1	4	1
17	60	112	2	10	13	11	1	5	0	2	7	2	0	11	2	20	0	266	31	0	299	4	0	6	0	0	1	5
18	50	8	3	9	10	10	3	3	6	0	7	2	1	7	0	5	0	13	677	0	167	2	0	2	0	2	1	0
19	2	1	5	5	2	3	3	0	1	3	0	3	3	1	5	0	0	0	1	23	100	1	0	1	1	1	3	0
20	185	168	78	120	183	54	108	103	40	49	141	32	13	15	24	42	1	47	71	2	9391	46	1	31	5	17	24	47
21	34	7	7	8	35	18	8	6	27	5	10	1	0	6	0	8	1	18	13	0	376	291	0	4	0	0	2	0
22	12	3	1	0	3	2	1	2	0	0	2	0	0	0	0	3	0	4	0	0	94	2	11	0	0	0	0	0
23	17	17	17	21	33	2	16	8	5	8	28	5	0	5	2	5	0	2	7	0	654	3	0	84	0	3	5	17
24	12	2	1	2	5	7	0	0	0	0	1	0	0	0	2	6	0	7	2	0	71	2	0	0	16	0	2	0
25	1	2	1	4	4	3	4	1	0	8	5	1	4	1	0	6	1	0	3	0	111	1	0	2	0	150	15	1
26	7	12	10	18	18	7	2	1	2	24	19	4	3	0	5	2	6	3	2	2	371	1	0	3	0	45	195	3
27	27	6	15	10	8	2	8	6	1	3	10	1	0	6	1	4	0	1	3	0	338	4	0	6	0	0	2	220

True label / Predicted label

Sentiment

Best estimator (Sentiment): DecisionTreeClassifier(max_depth=100, min_samples_split=5)
Best Score: 0.515219404662324
Accuracy for Emotion: 0.6230939355139099
Precision (Weighted) for Emotion: 0.6687341188723662
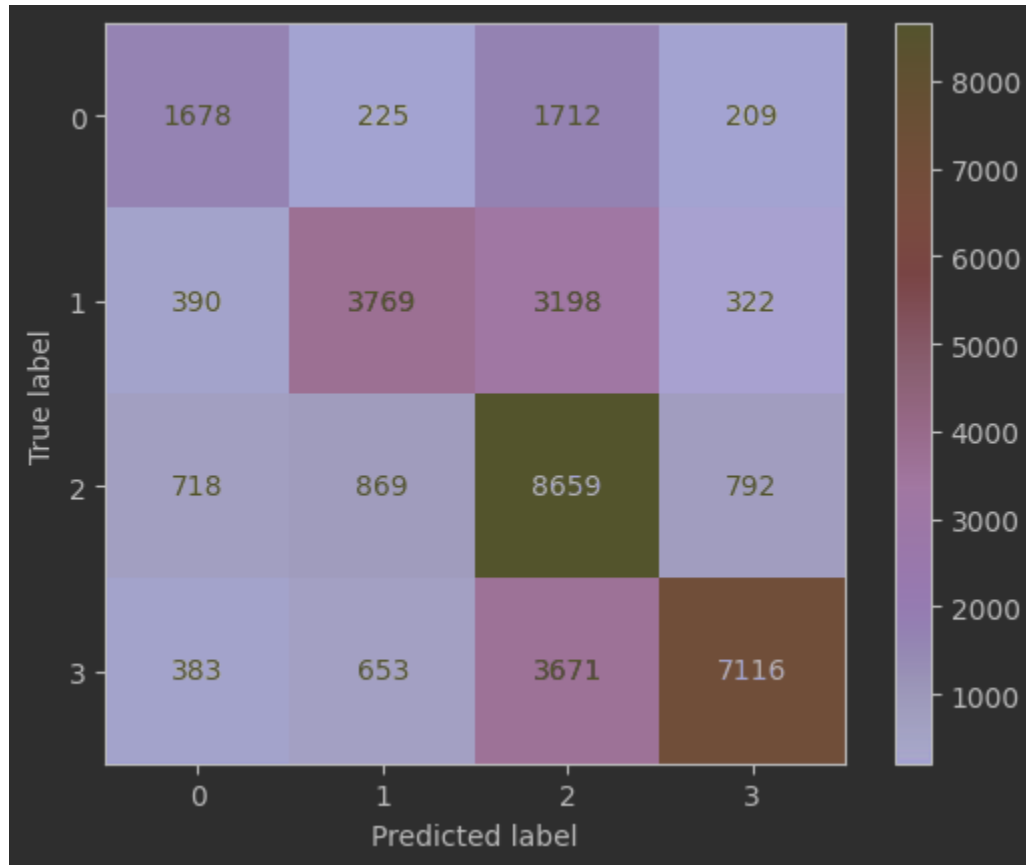F1 Score (Weighted) for Emotion: 0.6249230250322402
F1 Score (Macro) for Emotion: 0.5986613471716806

	precision	recall	f1-score	support
0	0.54	0.45	0.49	3871
1	0.69	0.50	0.58	7719

```
        2          0.51         0.79         0.62        11089
        3          0.85         0.60         0.70        11685

  accuracy                                   0.62        34364
 macro_avg          0.65         0.59         0.60        34364
weighted_avg        0.67         0.62         0.62        34364
```

Confusion Matrix

MLP (Grid Search CV)

Hyper-parameters:

"activation":("identity", "logistic", "tanh", "relu"),"hidden_layer_sizes":((5,5),(5,10)),
"solver":("adam","sgd")

Emotion

Unable to converge to a final model

Sentiment

Unable to converge to a final model

New Training/Test Split

MNB

Hyper-parameters:

default

Emotion

```
Score for Emotion: 0.39273658479804446
Accuracy for Emotion: 0.39273658479804446
Precision (Weighted) for Emotion: 0.3790727928793306
F1 Score (Weighted) for Emotion: 0.3214243457337185
F1 Score (Macro) for Emotion: 0.18140672572768532
              precision    recall  f1-score   support

           0       0.50      0.48      0.49       550
           1       0.46      0.30      0.37       301
           2       0.42      0.16      0.23       261
           3       0.17      0.06      0.09       420
           4       0.25      0.10      0.15       555
           5       0.26      0.06      0.10       155
           6       0.30      0.07      0.11       239
           7       0.37      0.12      0.18       305
           8       0.46      0.05      0.09       115
           9       0.20      0.04      0.07       228
          10       0.27      0.09      0.14       372
          11       0.42      0.11      0.17       136
          12       1.00      0.03      0.05        74
          13       0.36      0.05      0.09       175
          14       0.62      0.05      0.09       100
          15       0.70      0.71      0.70       347
          16       0.00      0.00      0.00        11
          17       0.44      0.14      0.21       216
          18       0.58      0.40      0.47       225
          19       0.00      0.00      0.00        46
          20       0.38      0.82      0.52      2792
          21       0.36      0.14      0.20       227
          22       0.00      0.00      0.00        23
          23       0.17      0.04      0.07       245
          24       0.00      0.00      0.00        33
          25       0.50      0.06      0.11        83
          26       0.44      0.12      0.19       187
          27       0.49      0.12      0.19       170

    accuracy                           0.39      8591
   macro_avg       0.36      0.15      0.18      8591
weighted_avg       0.38      0.39      0.32      8591
```
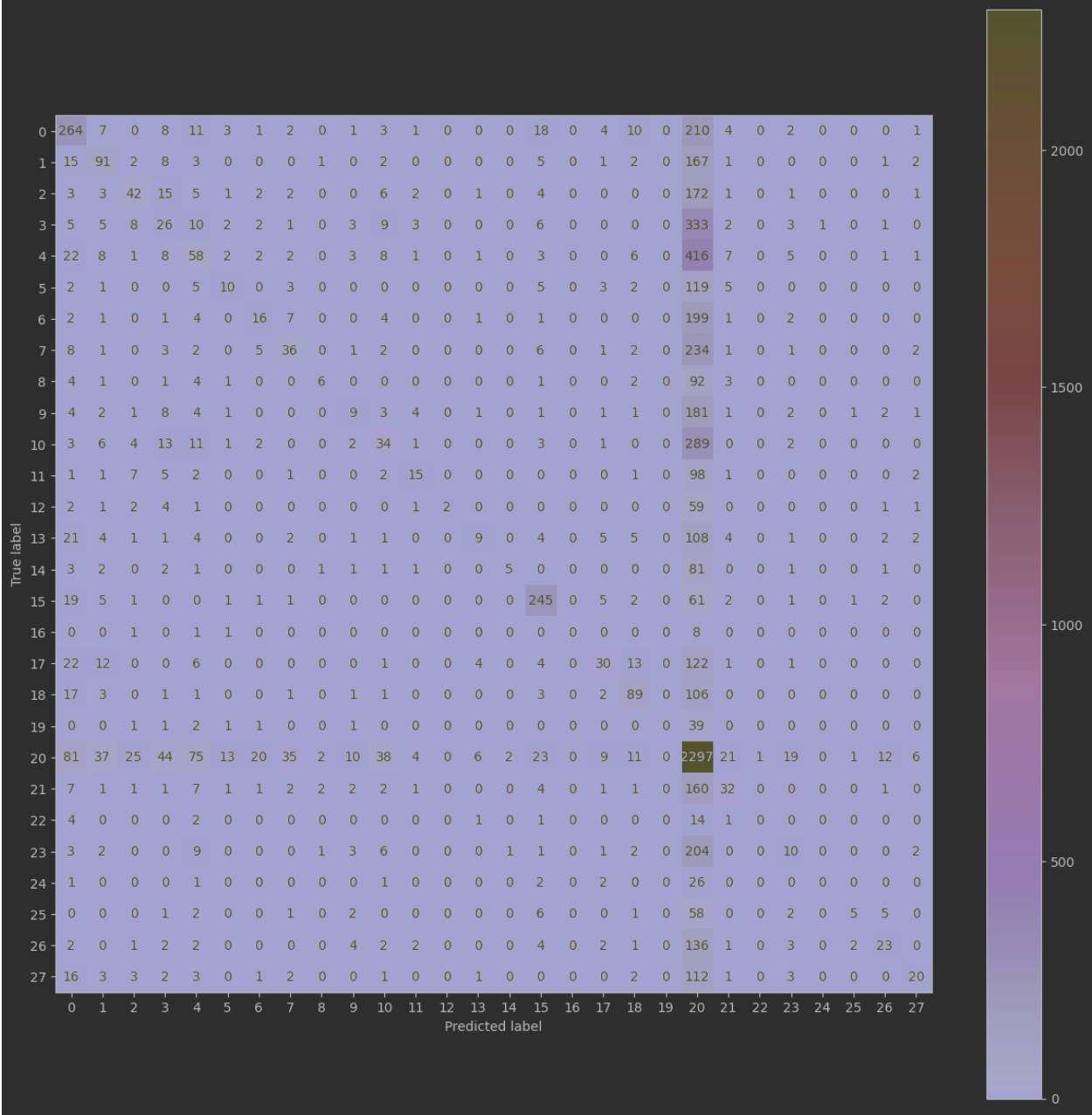
Confusion Matrix

Sentiment

Score for Sentiment: 0.5509253870329415
Accuracy for Emotion: 0.5509253870329415
Precision (Weighted) for Emotion: 0.5407647987441085
F1 Score (Weighted) for Emotion: 0.5430198776222547
F1 Score (Macro) for Emotion: 0.5014829594840788

	precision	recall	f1-score	support
0	0.39	0.24	0.30	959
1	0.55	0.54	0.54	1918
2	0.50	0.50	0.50	2792

	precision	recall	f1-score	support
3	0.63	0.71	0.67	2922
accuracy			0.55	8591
macro_avg	0.52	0.50	0.50	8591
weighted_avg	0.54	0.55	0.54	8591

Confusion Matrix

DT
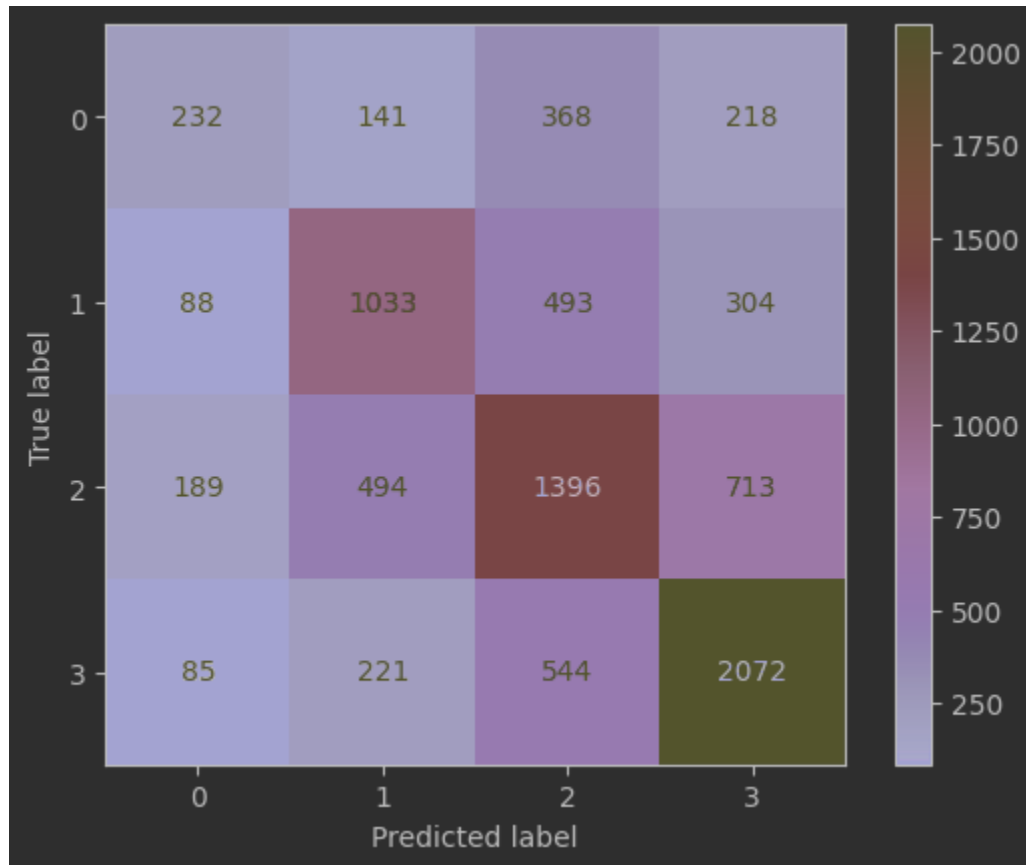
Hyper-parameters:

default

Emotion

Score for Emotion: 0.3620067512513095
Accuracy for Emotion: 0.3620067512513095
Precision (Weighted) for Emotion: 0.37844542808066867
F1 Score (Weighted) for Emotion: 0.3622201069186187
F1 Score (Macro) for Emotion: 0.28331844542697787

	precision	recall	f1-score	support
0	0.42	0.59	0.49	550
1	0.39	0.57	0.47	301
2	0.26	0.42	0.32	261
3	0.18	0.27	0.21	420
4	0.21	0.28	0.24	555
5	0.19	0.28	0.23	155

	precision	recall	f1-score	support
6	0.19	0.28	0.23	239
7	0.31	0.32	0.31	305
8	0.27	0.30	0.28	115
9	0.17	0.19	0.18	228
10	0.26	0.27	0.26	372
11	0.26	0.24	0.25	136
12	0.21	0.16	0.18	74
13	0.21	0.15	0.18	175
14	0.48	0.40	0.43	100
15	0.75	0.75	0.75	347
16	0.14	0.27	0.18	11
17	0.30	0.19	0.24	216
18	0.53	0.52	0.52	225
19	0.25	0.13	0.17	46
20	0.50	0.41	0.45	2792
21	0.39	0.23	0.29	227
22	0.00	0.00	0.00	23
23	0.23	0.09	0.13	245
24	0.07	0.03	0.04	33
25	0.43	0.31	0.36	83
26	0.32	0.17	0.22	187
27	0.43	0.24	0.31	170
accuracy			0.36	8591
macro_avg	0.30	0.29	0.28	8591
weighted_avg	0.38	0.36	0.36	8591

Confusion Matrix
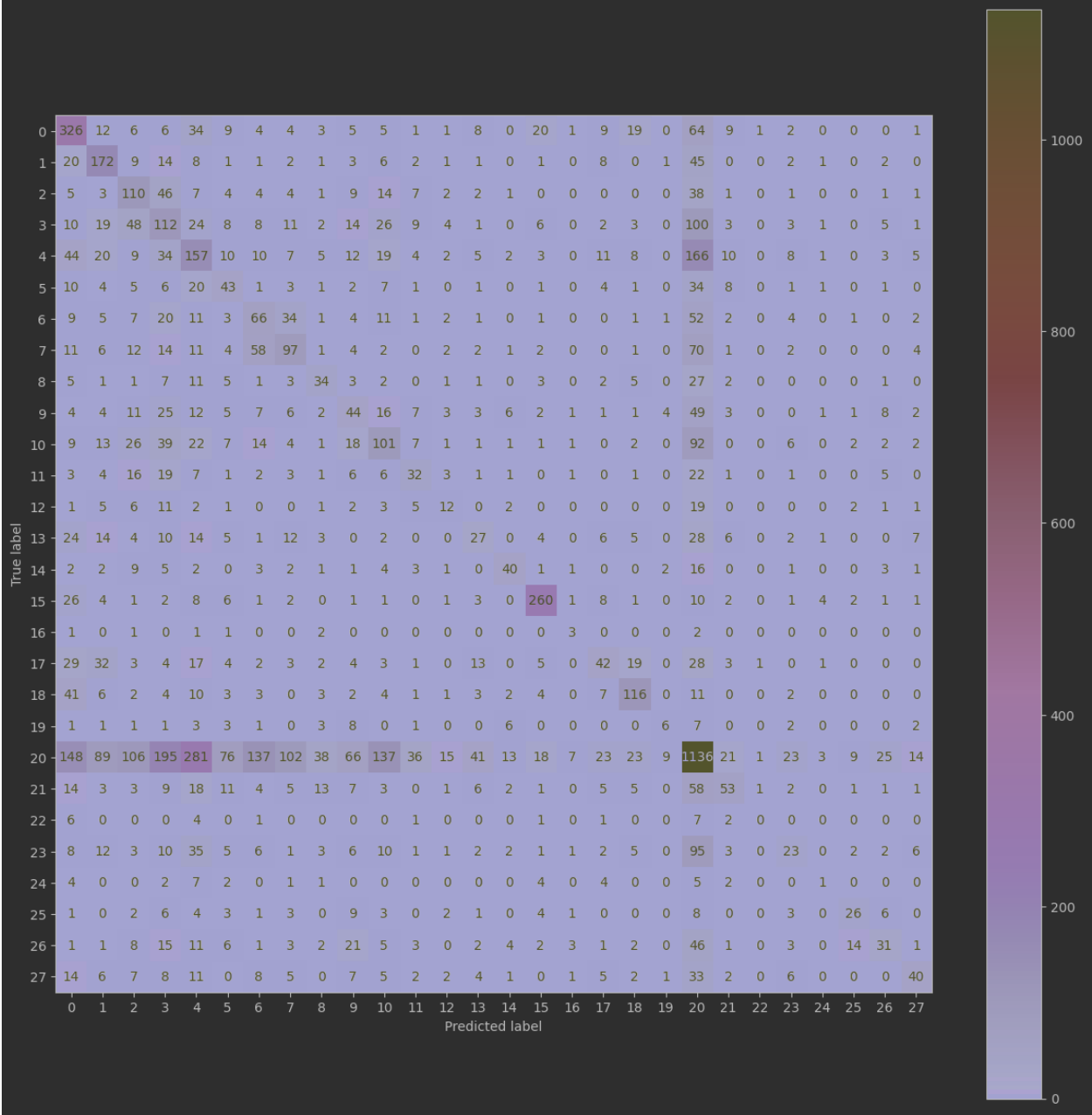
Sentiment

```
Score for Sentiment: 0.5504597834943545
Accuracy for Emotion: 0.5504597834943545
Precision (Weighted) for Emotion: 0.569542883739723
F1 Score (Weighted) for Emotion: 0.5548763766687818
F1 Score (Macro) for Emotion: 0.5324586761773381
```

	precision	recall	f1-score	support
0	0.36	0.51	0.42	959
1	0.51	0.62	0.56	1918
2	0.52	0.46	0.49	2792

	precision	recall	f1-score	support
3	0.72	0.60	0.66	2922
accuracy			0.55	8591
macro_avg	0.53	0.55	0.53	8591
weighted_avg	0.57	0.55	0.55	8591

Confusion Matrix

MLP
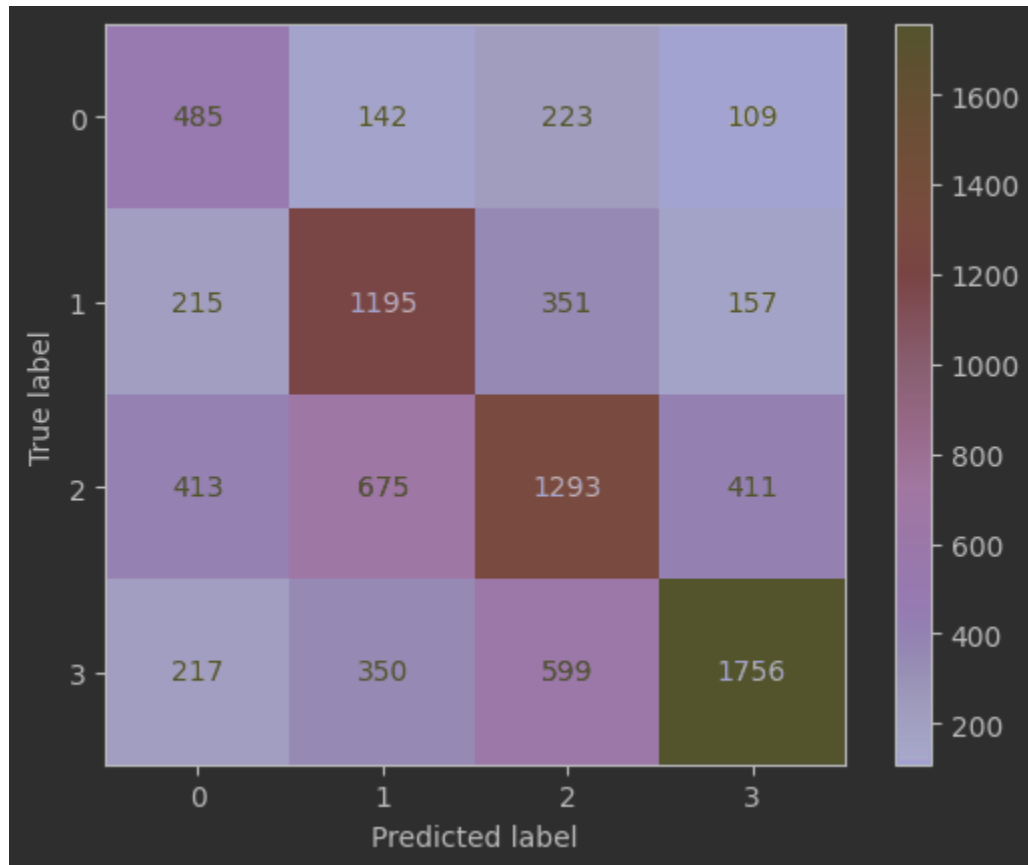
Hyper-parameters:

default

Emotion

Score for Emotion: 0.5971365382376906
Accuracy for Emotion: 0.5971365382376906
Precision (Weighted) for Emotion: 0.5888006332289856
F1 Score (Weighted) for Emotion: 0.588324768349283
F1 Score (Macro) for Emotion: 0.5227948773878628

	precision	recall	f1-score	support
0	0.64	0.72	0.68	5237
1	0.65	0.70	0.67	3015
2	0.61	0.48	0.54	2615
3	0.48	0.40	0.44	4202
4	0.54	0.37	0.44	5652
5	0.52	0.46	0.49	1781

6	0.56	0.40	0.47	2490
7	0.58	0.56	0.57	2907
8	0.47	0.54	0.50	1049
9	0.48	0.34	0.40	2369
10	0.53	0.47	0.50	3918
11	0.52	0.48	0.50	1484
12	0.41	0.51	0.45	725
13	0.49	0.43	0.45	1458
14	0.61	0.59	0.60	902
15	0.83	0.85	0.84	3520
16	0.42	0.41	0.42	178
17	0.54	0.51	0.53	2113
18	0.66	0.80	0.73	2428
19	0.45	0.41	0.43	406
20	0.64	0.75	0.69	27720
21	0.53	0.52	0.52	2217
22	0.44	0.27	0.34	354
23	0.47	0.33	0.39	2398
24	0.41	0.46	0.43	380
25	0.62	0.56	0.59	768
26	0.54	0.51	0.52	1920
27	0.53	0.51	0.52	1704
accuracy			0.60	85910
macro_avg	0.54	0.51	0.52	85910
weighted_avg	0.59	0.60	0.59	85910

Confusion Matrix

True \ Pred	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
0	3774	52	14	26	108	26	4	25	23	14	20	9	5	57	6	98	5	101	199	3	495	61	18	25	11	2	7	49
1	81	2123	12	45	26	5	11	13	10	14	22	21	18	42	3	22	5	127	27	2	317	11	0	23	6	0	10	19
2	20	26	1266	247	40	15	21	34	8	31	93	77	18	8	14	14	3	14	5	4	573	11	1	21	1	3	24	23
3	61	87	183	1667	93	44	53	75	34	71	175	106	60	28	27	25	2	20	17	13	1156	43	0	54	7	7	51	43
4	290	73	34	115	2104	97	50	44	60	46	135	31	31	42	18	46	6	80	102	9	1855	127	22	107	28	11	45	44
5	49	14	9	27	71	826	11	10	21	17	21	2	4	7	9	27	1	40	25	10	440	66	3	10	8	15	35	3
6	32	48	27	49	47	20	993	236	19	22	59	14	15	17	10	8	2	8	14	7	731	25	3	25	2	4	10	43
7	41	25	15	29	38	9	115	1633	18	17	39	4	11	26	6	9	0	11	20	12	725	19	3	21	2	3	7	49
8	23	13	2	16	30	17	5	14	567	7	14	0	7	15	2	13	0	8	21	0	197	53	0	11	1	2	4	7
9	25	29	41	122	52	32	24	23	20	814	142	54	39	15	17	12	3	15	13	19	610	22	4	47	10	15	112	38
10	41	51	53	183	97	34	63	35	22	67	1837	47	39	16	26	20	7	12	17	5	1024	42	6	52	9	12	64	37
11	15	13	55	114	33	7	14	7	9	25	51	705	32	8	18	8	4	5	6	2	287	9	1	10	1	6	29	10
12	3	6	7	35	12	9	12	6	2	10	20	22	371	1	6	3	2	7	3	7	130	7	1	14	0	10	12	7
13	125	31	10	19	41	11	4	35	15	4	6	2	3	621	5	11	0	69	43	5	283	21	1	16	6	0	6	65
14	7	15	10	23	13	11	4	9	6	7	7	26	7	1	533	0	2	1	1	11	153	6	0	13	1	3	23	9
15	142	10	3	9	26	14	4	8	6	6	8	3	4	15	0	2983	1	44	21	2	103	39	2	2	17	27	15	6
16	3	0	3	7	1	1	2	0	3	6	2	2	5	0	3	1	73	1	1	0	39	1	0	1	0	3	18	2
17	124	155	3	13	37	14	5	11	19	17	10	3	8	62	5	45	0	1087	110	4	288	29	10	11	26	1	3	13
18	121	14	3	12	26	4	4	8	16	4	4	1	3	12	0	13	0	51	1951	2	143	11	1	6	3	1	2	2
19	5	4	2	13	15	21	6	3	2	19	11	3	5	5	17	1	1	1	0	165	77	3	0	2	3	1	15	6
20	643	388	249	483	676	236	286	464	212	254	555	157	142	179	104	140	22	207	263	57	20703	350	40	341	73	51	232	211
21	68	20	3	29	106	51	5	22	74	17	29	9	9	23	5	23	0	23	29	4	449	1159	3	23	7	6	8	13
22	53	2	5	5	9	3	3	1	4	7	5	1	0	9	1	11	1	17	3	0	92	16	97	4	2	0	3	0
23	55	41	22	54	112	15	38	31	25	42	98	20	23	14	14	10	5	24	23	8	796	36	2	793	9	13	26	49
24	20	2	2	3	27	13	2	1	1	2	4	0	2	2	0	13	0	13	2	1	77	9	1	4	174	1	3	1
25	2	6	4	15	10	13	4	3	8	28	16	1	17	6	3	16	5	0	5	3	80	8	0	18	1	430	64	2
26	13	21	20	58	25	27	7	19	10	110	39	29	18	7	11	12	17	17	11	7	350	10	0	22	7	66	977	10
27	79	15	26	33	33	3	27	67	2	11	29	12	12	39	8	6	6	19	7	1	350	8	0	24	6	4	5	872

Sentiment

Score for Sentiment: 0.7235362588755675
Accuracy for Emotion: 0.7235362588755675
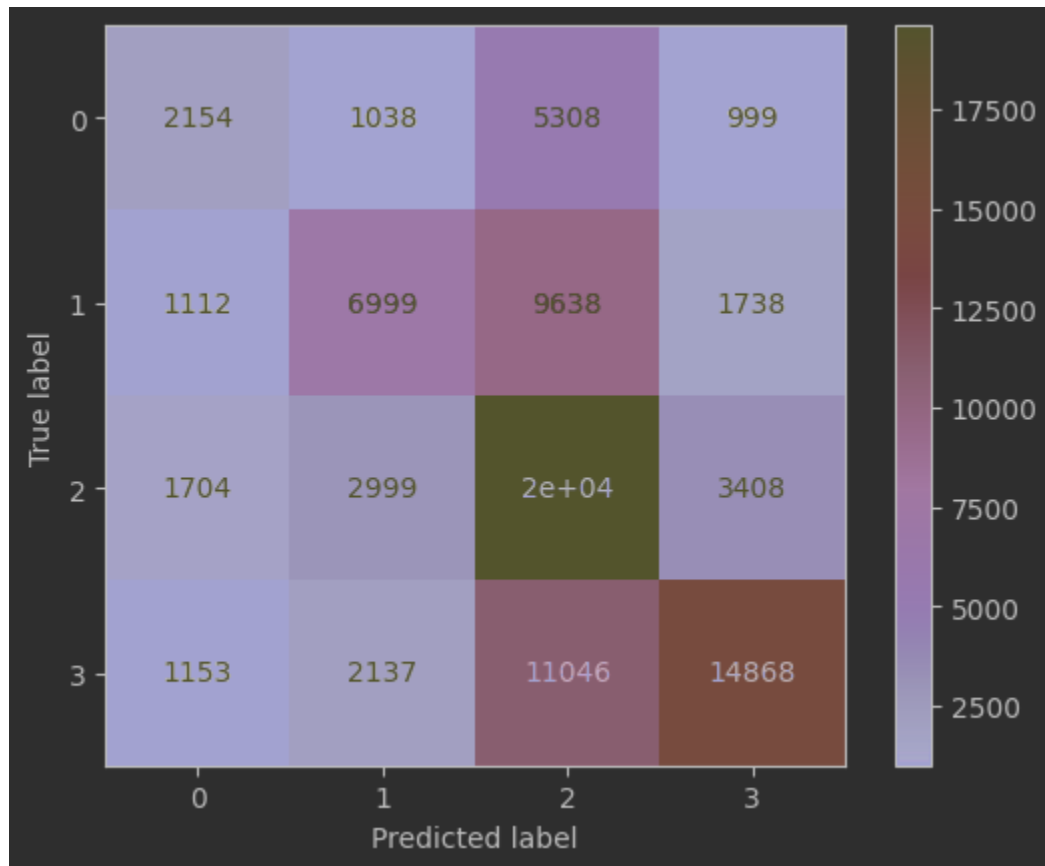Precision (Weighted) for Emotion: 0.7224575726620288
F1 Score (Weighted) for Emotion: 0.722729062462972
F1 Score (Macro) for Emotion: 0.702261625427746

	precision	recall	f1-score	support
0	0.64	0.57	0.60	9499
1	0.71	0.73	0.72	19487
2	0.69	0.70	0.70	27720
3	0.78	0.79	0.79	29204

```
     accuracy                           0.72      85910
    macro_avg        0.71      0.70     0.70      85910
 weighted_avg        0.72      0.72     0.72      85910
```

Confusion Matrix

MNB (Grid Search CV)

Hyper-parameters:

"alpha": (0.5, 0, 0.36, 1)

Emotion

alpha_emotion = 0.5
Best estimator (Emotion): MultinomialNB(alpha=0.5), Best Score: 0.39059847
55012737
Accuracy for Emotion: 0.4847514841112792
Precision (Weighted) for Emotion: 0.4857895395369976
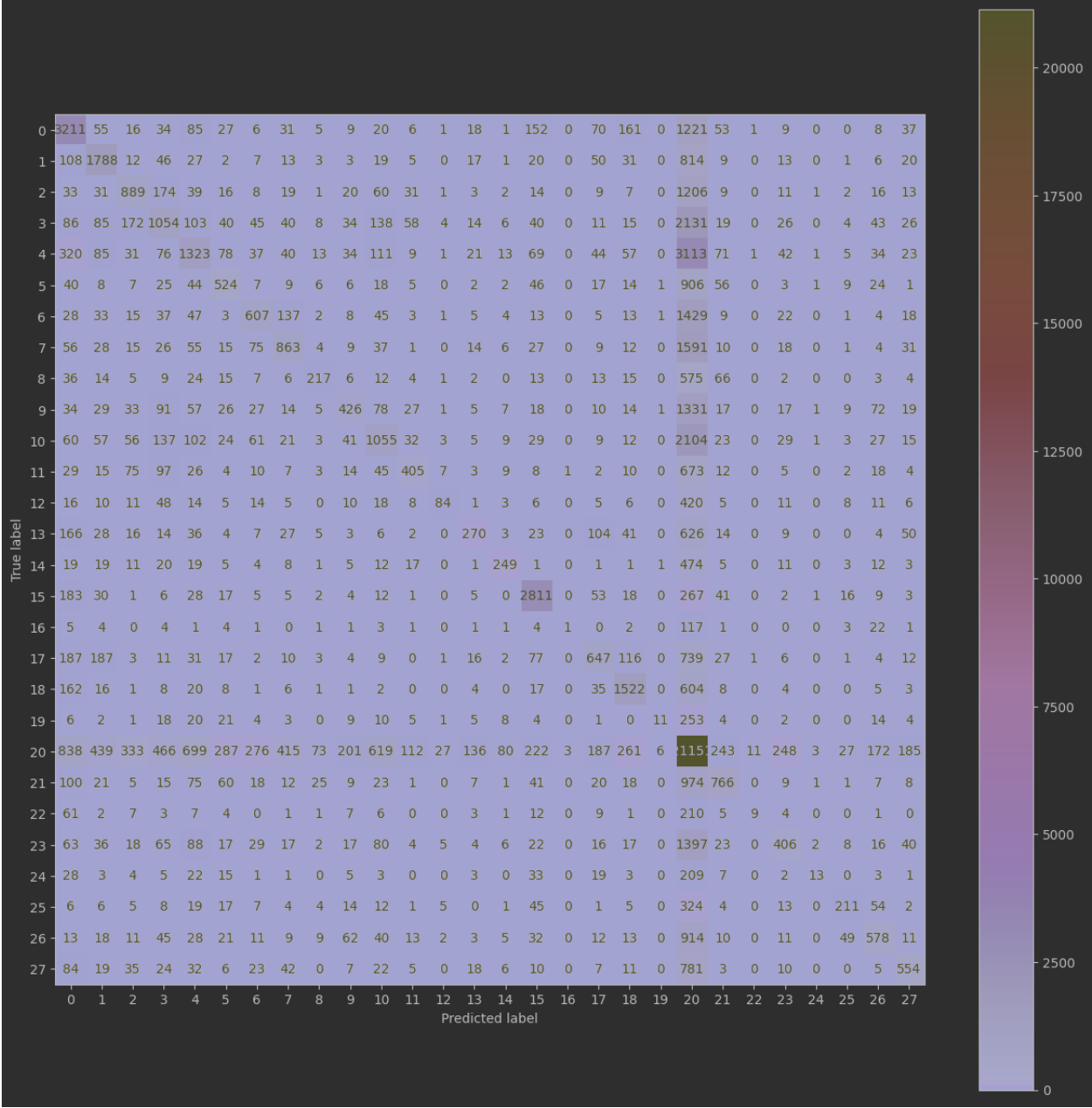F1 Score (Weighted) for Emotion: 0.45367634569944093
F1 Score (Macro) for Emotion: 0.34276040965248367

```
              precision    recall  f1-score    support

           0       0.54      0.61      0.57       5237
           1       0.58      0.59      0.59       3015
           2       0.50      0.34      0.40       2615
           3       0.41      0.25      0.31       4202
```

4	0.43	0.23	0.30	5652
5	0.41	0.29	0.34	1781
6	0.47	0.24	0.32	2490
7	0.49	0.30	0.37	2907
8	0.55	0.21	0.30	1049
9	0.44	0.18	0.26	2369
10	0.42	0.27	0.33	3918
11	0.54	0.27	0.36	1484
12	0.58	0.12	0.19	725
13	0.46	0.19	0.26	1458
14	0.58	0.28	0.38	902
15	0.74	0.80	0.77	3520
16	0.20	0.01	0.01	178
17	0.47	0.31	0.37	2113
18	0.64	0.63	0.63	2428
19	0.52	0.03	0.05	406
20	0.45	0.76	0.57	27720
21	0.50	0.35	0.41	2217
22	0.39	0.03	0.05	354
23	0.43	0.17	0.24	2398
24	0.52	0.03	0.06	380
25	0.58	0.27	0.37	768
26	0.49	0.30	0.37	1920
27	0.51	0.33	0.40	1704
accuracy			0.48	85910
macro_avg	0.49	0.30	0.34	85910
weighted_avg	0.49	0.48	0.45	85910

Confusion Matrix

True\Pred	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
0	3211	55	16	34	85	27	6	31	5	9	20	6	1	18	1	152	0	70	161	0	1221	53	1	9	0	0	8	37
1	108	1788	12	46	27	2	7	13	3	3	19	5	0	17	1	20	0	50	31	0	814	9	0	13	0	1	6	20
2	33	31	889	174	39	16	8	19	1	20	60	31	1	3	2	14	0	9	7	0	1206	9	0	11	1	2	16	13
3	86	85	172	1054	103	40	45	40	8	34	138	58	4	14	6	40	0	11	15	0	2131	19	0	26	0	4	43	26
4	320	85	31	76	1323	78	37	40	13	34	111	9	1	21	13	69	0	44	57	0	3113	71	1	42	1	5	34	23
5	40	8	7	25	44	524	7	9	6	6	18	5	0	2	2	46	0	17	14	1	906	56	0	3	1	9	24	1
6	28	33	15	37	47	3	607	137	2	8	45	3	1	5	4	13	0	5	13	1	1429	9	0	22	0	1	4	18
7	56	28	15	26	55	15	75	863	4	9	37	1	0	14	6	27	0	9	12	0	1591	10	0	18	0	1	4	31
8	36	14	5	9	24	15	7	6	217	6	12	4	1	2	0	13	0	13	15	0	575	66	0	2	0	0	3	4
9	34	29	33	91	57	26	27	14	5	426	78	27	1	5	7	18	0	10	14	1	1331	17	0	17	1	9	72	19
10	60	57	56	137	102	24	61	21	3	41	1055	32	3	5	9	29	0	9	12	0	2104	23	0	29	1	3	27	15
11	29	15	75	97	26	4	10	7	3	14	45	405	7	3	9	8	1	2	10	0	673	12	0	5	0	2	18	4
12	16	10	11	48	14	5	14	5	0	10	18	8	84	1	3	6	0	5	6	0	420	5	0	11	0	8	11	6
13	166	28	16	14	36	4	7	27	5	3	6	2	0	270	3	23	0	104	41	0	626	14	0	9	0	0	4	50
14	19	19	11	20	19	5	4	8	1	5	12	17	0	1	249	1	0	1	1	1	474	5	0	11	0	3	12	3
15	183	30	1	6	28	17	5	5	2	4	12	1	0	5	0	2811	0	53	18	0	267	41	0	2	1	16	9	3
16	5	4	0	4	1	4	1	0	1	1	3	1	0	1	1	4	1	0	2	0	117	1	0	0	0	3	22	1
17	187	187	3	11	31	17	2	10	3	4	9	0	1	16	2	77	0	647	116	0	739	27	1	6	0	1	4	12
18	162	16	1	8	20	8	1	6	1	1	2	0	0	4	0	17	0	35	1522	0	604	8	0	4	0	0	5	3
19	6	2	1	18	20	21	4	3	0	9	10	5	1	5	8	4	0	1	0	11	253	4	0	2	0	0	14	4
20	838	439	333	466	699	287	276	415	73	201	619	112	27	136	80	222	3	187	261	6	21115	243	11	248	3	27	172	185
21	100	21	5	15	75	60	18	12	25	9	23	1	0	7	1	41	0	20	18	0	974	766	0	9	1	1	7	8
22	61	2	7	3	7	4	0	1	1	7	6	0	0	3	1	12	0	9	1	0	210	5	9	4	0	0	1	0
23	63	36	18	65	88	17	29	17	2	17	80	4	5	4	6	22	0	16	17	0	1397	23	0	406	2	8	16	40
24	28	3	4	5	22	15	1	1	0	5	3	0	0	3	0	33	0	19	3	0	209	7	0	2	13	0	3	1
25	6	6	5	8	19	17	7	4	4	14	12	1	5	0	1	45	0	1	5	0	324	4	0	13	0	211	54	2
26	13	18	11	45	28	21	11	9	9	62	40	13	2	3	5	32	0	12	13	0	914	10	0	11	0	49	578	11
27	84	19	35	24	32	6	23	42	0	7	22	5	0	18	6	10	0	7	11	0	781	3	0	10	0	0	5	554

Sentiment

### alpha_sentiment=1

```
Best estimator (Sentiment): MultinomialNB(alpha=1),
Best Score: 0.543696292227927
Accuracy for Emotion: 0.6173320917238971
Precision (Weighted) for Emotion: 0.6122283592212618
F1 Score (Weighted) for Emotion: 0.6113570497954467
F1 Score (Macro) for Emotion: 0.5795603043690769
```

	precision	recall	f1-score	support
0	0.55	0.35	0.42	9499
1	0.62	0.61	0.61	19487

```
            2           0.58        0.57        0.57        27720
            3           0.66        0.75        0.71        29204

     accuracy                                   0.62        85910
    macro_avg           0.60        0.57        0.58        85910
 weighted_avg           0.61        0.62        0.61        85910
```
Confusion Matrix
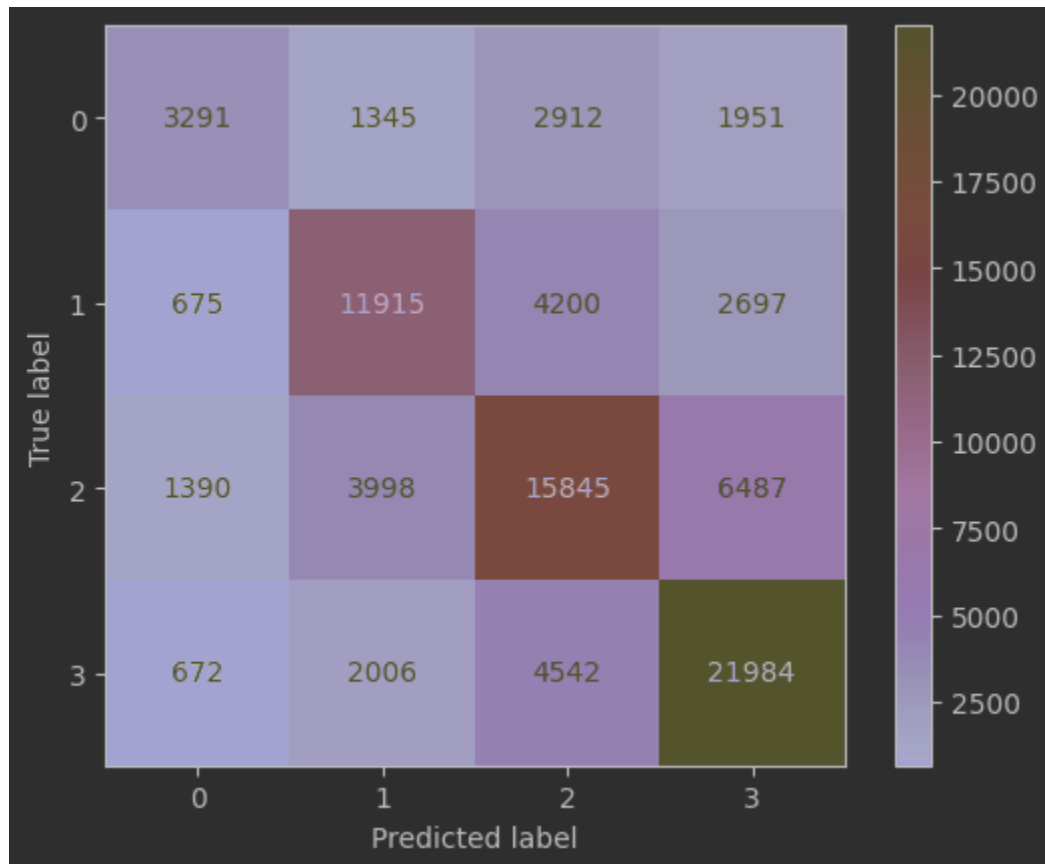
DT (Grid Search CV)

Hyper-parameters:

"criterion":("gini","entropy"),"max_depth":(100,3),"min_samples_split":(12,5,30)

Emotion
```
Best estimator (Emotion):
DecisionTreeClassifier(max_depth=100, min_samples_split=30),
Best Score: 0.3984285880572692
Accuracy for Emotion: 0.4020486555697823
Precision (Weighted) for Emotion: 0.35505674855784475
F1 Score (Weighted) for Emotion: 0.3474123156775421
F1 Score (Macro) for Emotion: 0.23204273599853362
             precision    recall   f1-score    support

           0      0.45        0.42        0.43        5237
           1      0.48        0.49        0.48        3015
```

2	0.31	0.19	0.23	2615
3	0.14	0.07	0.10	4202
4	0.18	0.08	0.11	5652
5	0.20	0.08	0.11	1781
6	0.27	0.13	0.18	2490
7	0.31	0.14	0.20	2907
8	0.30	0.18	0.22	1049
9	0.15	0.06	0.08	2369
10	0.17	0.08	0.11	3918
11	0.31	0.15	0.20	1484
12	0.22	0.05	0.09	725
13	0.25	0.13	0.17	1458
14	0.45	0.24	0.31	902
15	0.78	0.73	0.76	3520
16	0.04	0.01	0.01	178
17	0.33	0.20	0.25	2113
18	0.57	0.56	0.57	2428
19	0.29	0.04	0.07	406
20	0.41	0.78	0.54	27720
21	0.43	0.23	0.30	2217
22	0.20	0.03	0.05	354
23	0.17	0.03	0.05	2398
24	0.18	0.04	0.07	380
25	0.40	0.33	0.36	768
26	0.36	0.15	0.22	1920
27	0.37	0.18	0.25	1704
accuracy			0.40	85910
macro avg	0.31	0.21	0.23	85910
weighted avg	0.36	0.40	0.35	85910

Confusion Matrix
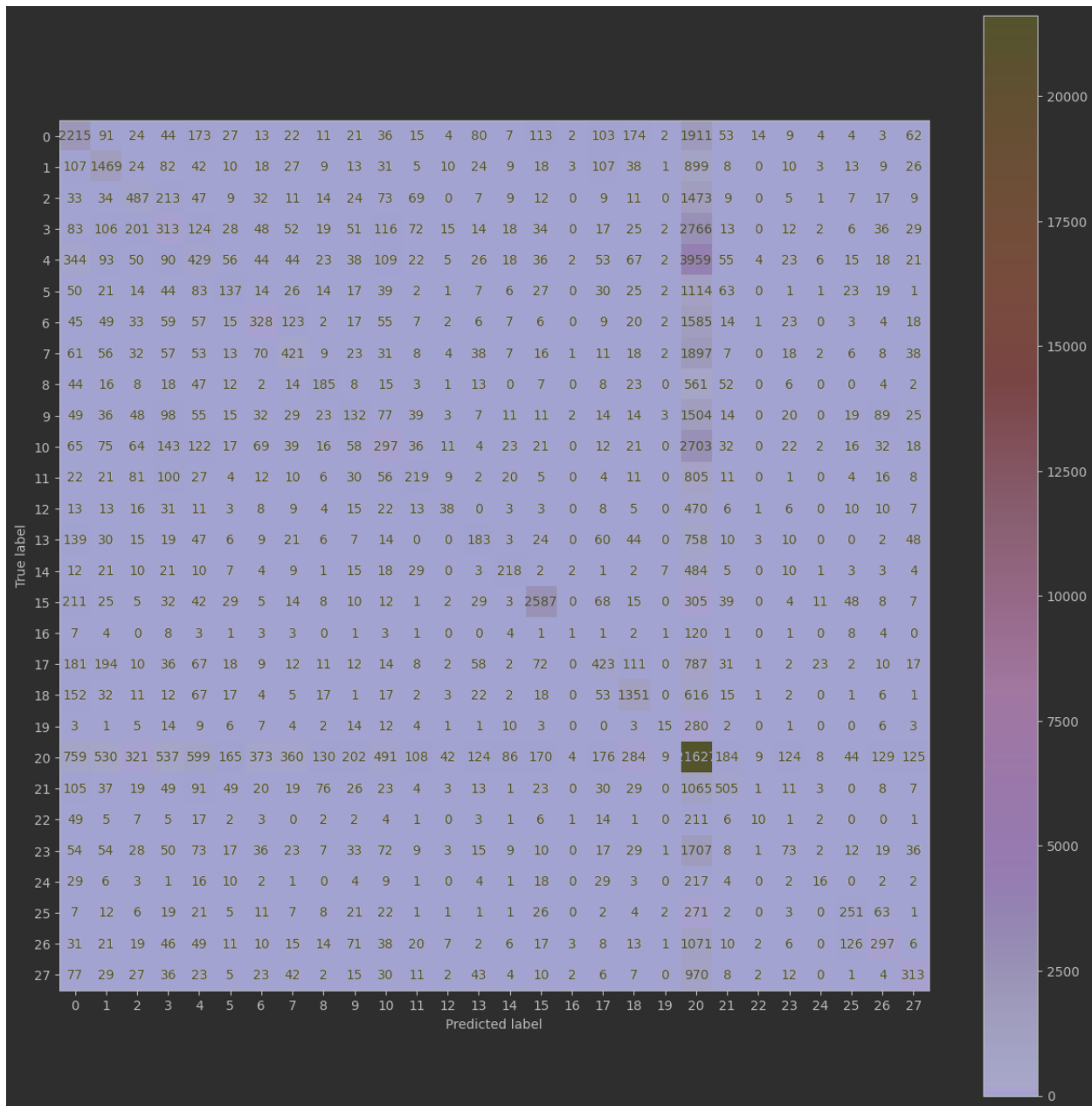
Sentiment

Best estimator (Sentiment):

DecisionTreeClassifier(max_depth=100, min_samples_split=5),
Best Score: 0.49976719823070653
Accuracy for Emotion: 0.5078570597136538
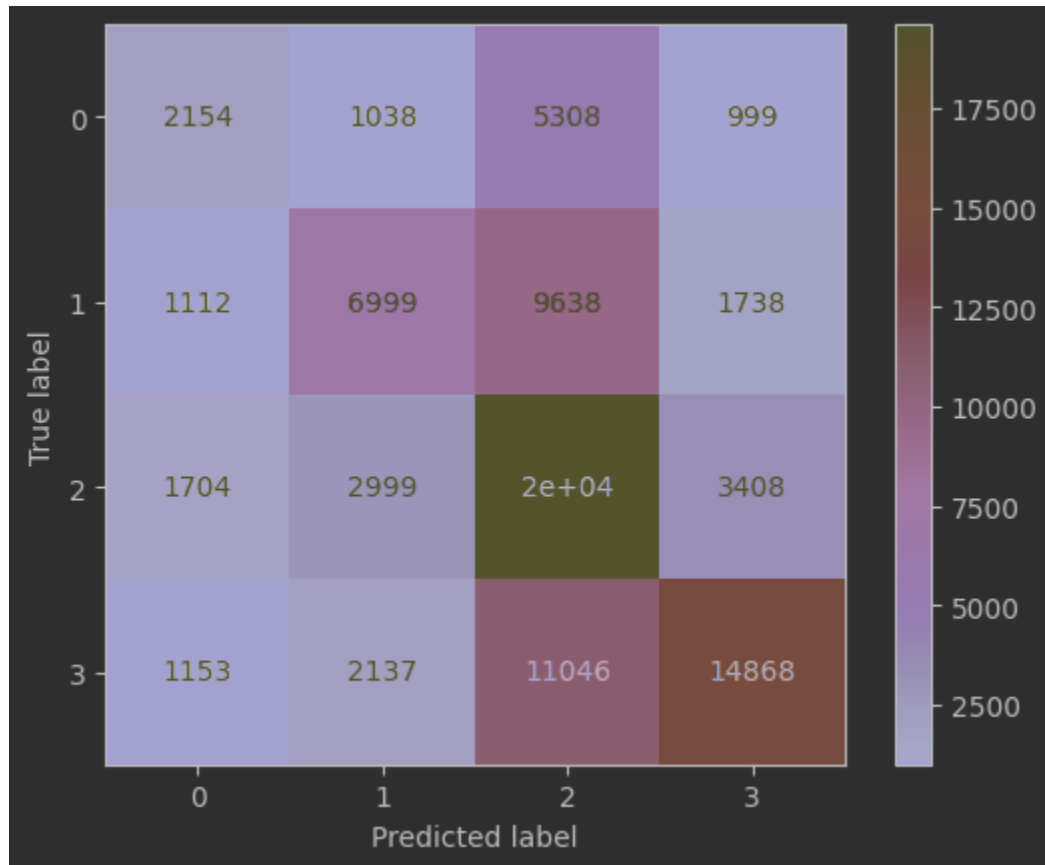Precision (Weighted) for Emotion: 0.5386909680913343
F1 Score (Weighted) for Emotion: 0.5015902957155978
F1 Score (Macro) for Emotion: 0.45784838872341016

```
              precision      recall   f1-score    support

         0        0.35        0.23       0.28        9499
```

```
        1           0.53          0.36          0.43          19487
        2           0.43          0.71          0.53          27720
        3           0.71          0.51          0.59          29204

  accuracy                                      0.51          85910
 macro avg           0.51          0.45          0.46          85910
weighted avg         0.54          0.51          0.50          85910
```

Confusion Matrix

MLP (Grid Search CV)

Hyper-parameters:

"activation":("identity", "logistic", "tanh", "relu"),"hidden_layer_sizes":((5,5),(5,10)),
"solver":("adam","sgd")

Emotion

Unable to converge to a final model

Sentiment

Unable to converge to a final model