Training on Fold 1

2024-04-20 02:32:10.914726: I tensorflow/core/platform/cpu\_feature\_guard.cc:182] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.

To enable the following instructions: SSE SSE2 SSE3 SSE4.1 SSE4.2 AVX AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.

Epoch 1/20

1282/1282 [==============================] - ETA: 0s - loss: 17.6113 - accuracy: 0.52452024-04-20 03:00:25.861205: W tensorflow/tsl/framework/cpu\_allocator\_impl.cc:83] Allocation of 21018624000 exceeds 10% of free system memory.

2024-04-20 03:01:26.541455: W tensorflow/tsl/framework/cpu\_allocator\_impl.cc:83] Allocation of 21018624000 exceeds 10% of free system memory.

2024-04-20 03:01:42.552801: W tensorflow/tsl/framework/cpu\_allocator\_impl.cc:83] Allocation of 3698856000 exceeds 10% of free system memory.

2024-04-20 03:01:43.950384: W tensorflow/tsl/framework/cpu\_allocator\_impl.cc:83] Allocation of 2463498240 exceeds 10% of free system memory.

1282/1282 [==============================] - 1774s 1s/step - loss: 17.6113 - accuracy: 0.5245 - val\_loss: 12.0367 - val\_accuracy: 0.6077 - lr: 1.0000e-05

Epoch 2/20

1282/1282 [==============================] - ETA: 0s - loss: 8.4629 - accuracy: 0.63442024-04-20 03:27:30.517937: W tensorflow/tsl/framework/cpu\_allocator\_impl.cc:83] Allocation of 21018624000 exceeds 10% of free system memory.

1282/1282 [==============================] - 1586s 1s/step - loss: 8.4629 - accuracy: 0.6344 - val\_loss: 5.6352 - val\_accuracy: 0.6644 - lr: 1.0000e-05

Epoch 3/20

1282/1282 [==============================] - 1695s 1s/step - loss: 3.9249 - accuracy: 0.7144 - val\_loss: 2.6426 - val\_accuracy: 0.6679 - lr: 1.0000e-05

Epoch 4/20

1282/1282 [==============================] - 1615s 1s/step - loss: 1.8476 - accuracy: 0.7659 - val\_loss: 1.3802 - val\_accuracy: 0.6617 - lr: 1.0000e-05

Epoch 5/20

1282/1282 [==============================] - 1645s 1s/step - loss: 0.9577 - accuracy: 0.8050 - val\_loss: 0.9027 - val\_accuracy: 0.6545 - lr: 1.0000e-05

Epoch 6/20

1282/1282 [==============================] - 1616s 1s/step - loss: 0.5853 - accuracy: 0.8329 - val\_loss: 0.7483 - val\_accuracy: 0.6483 - lr: 1.0000e-05

Epoch 7/20

1282/1282 [==============================] - 1523s 1s/step - loss: 0.4234 - accuracy: 0.8533 - val\_loss: 0.7201 - val\_accuracy: 0.6419 - lr: 1.0000e-05

Epoch 8/20

1282/1282 [==============================] - 1529s 1s/step - loss: 0.3472 - accuracy: 0.8705 - val\_loss: 0.7590 - val\_accuracy: 0.6383 - lr: 1.0000e-05

Epoch 9/20

1282/1282 [==============================] - 1523s 1s/step - loss: 0.3061 - accuracy: 0.8843 - val\_loss: 0.8194 - val\_accuracy: 0.6292 - lr: 1.0000e-05

Epoch 10/20

1282/1282 [==============================] - 1553s 1s/step - loss: 0.2780 - accuracy: 0.8973 - val\_loss: 0.8802 - val\_accuracy: 0.6267 - lr: 1.0000e-05

Epoch 11/20

1282/1282 [==============================] - 1527s 1s/step - loss: 0.2558 - accuracy: 0.9081 - val\_loss: 0.9547 - val\_accuracy: 0.6194 - lr: 1.0000e-05

Epoch 12/20

1282/1282 [==============================] - ETA: 0s - loss: 0.2366 - accuracy: 0.9184

Epoch 12: ReduceLROnPlateau reducing learning rate to 5.999999848427251e-06.

1282/1282 [==============================] - 1513s 1s/step - loss: 0.2366 - accuracy: 0.9184 - val\_loss: 1.0581 - val\_accuracy: 0.6173 - lr: 1.0000e-05

Training on Fold 2

Epoch 1/20

1282/1282 [==============================] - 1542s 1s/step - loss: 17.6000 - accuracy: 0.5184 - val\_loss: 12.0242 - val\_accuracy: 0.5737 - lr: 1.0000e-05

Epoch 2/20

1282/1282 [==============================] - 1488s 1s/step - loss: 8.4483 - accuracy: 0.6280 - val\_loss: 5.6194 - val\_accuracy: 0.6620 - lr: 1.0000e-05

Epoch 3/20

1282/1282 [==============================] - 1494s 1s/step - loss: 3.9103 - accuracy: 0.7144 - val\_loss: 2.6314 - val\_accuracy: 0.6651 - lr: 1.0000e-05

Epoch 4/20

1282/1282 [==============================] - 1565s 1s/step - loss: 1.8293 - accuracy: 0.7666 - val\_loss: 1.3664 - val\_accuracy: 0.6571 - lr: 1.0000e-05

Epoch 5/20

1282/1282 [==============================] - 1497s 1s/step - loss: 0.9455 - accuracy: 0.8057 - val\_loss: 0.8914 - val\_accuracy: 0.6554 - lr: 1.0000e-05

Epoch 6/20

1282/1282 [==============================] - 1523s 1s/step - loss: 0.5805 - accuracy: 0.8325 - val\_loss: 0.7477 - val\_accuracy: 0.6436 - lr: 1.0000e-05

Epoch 7/20

1282/1282 [==============================] - 1513s 1s/step - loss: 0.4218 - accuracy: 0.8540 - val\_loss: 0.7263 - val\_accuracy: 0.6403 - lr: 1.0000e-05

Epoch 8/20

1282/1282 [==============================] - 1499s 1s/step - loss: 0.3470 - accuracy: 0.8705 - val\_loss: 0.7552 - val\_accuracy: 0.6349 - lr: 1.0000e-05

Epoch 9/20

1282/1282 [==============================] - 1494s 1s/step - loss: 0.3068 - accuracy: 0.8845 - val\_loss: 0.8175 - val\_accuracy: 0.6279 - lr: 1.0000e-05

Epoch 10/20

1282/1282 [==============================] - 1506s 1s/step - loss: 0.2784 - accuracy: 0.8977 - val\_loss: 0.8892 - val\_accuracy: 0.6258 - lr: 1.0000e-05

Epoch 11/20

1282/1282 [==============================] - 1533s 1s/step - loss: 0.2569 - accuracy: 0.9087 - val\_loss: 0.9737 - val\_accuracy: 0.6186 - lr: 1.0000e-05

Epoch 12/20

1282/1282 [==============================] - ETA: 0s - loss: 0.2368 - accuracy: 0.9193

Epoch 12: ReduceLROnPlateau reducing learning rate to 5.999999848427251e-06.

1282/1282 [==============================] - 1574s 1s/step - loss: 0.2368 - accuracy: 0.9193 - val\_loss: 1.0388 - val\_accuracy: 0.6148 - lr: 1.0000e-05

Training on Fold 3

Epoch 1/20

1282/1282 [==============================] - 1595s 1s/step - loss: 17.6281 - accuracy: 0.5220 - val\_loss: 12.0511 - val\_accuracy: 0.6112 - lr: 1.0000e-05

Epoch 2/20

1282/1282 [==============================] - 1511s 1s/step - loss: 8.4799 - accuracy: 0.6237 - val\_loss: 5.6320 - val\_accuracy: 0.6629 - lr: 1.0000e-05

Epoch 3/20

1282/1282 [==============================] - 1530s 1s/step - loss: 3.9235 - accuracy: 0.7086 - val\_loss: 2.6334 - val\_accuracy: 0.6677 - lr: 1.0000e-05

Epoch 4/20

1282/1282 [==============================] - 1524s 1s/step - loss: 1.8377 - accuracy: 0.7611 - val\_loss: 1.3622 - val\_accuracy: 0.6612 - lr: 1.0000e-05

Epoch 5/20

1282/1282 [==============================] - 1514s 1s/step - loss: 0.9499 - accuracy: 0.8006 - val\_loss: 0.8849 - val\_accuracy: 0.6584 - lr: 1.0000e-05

Epoch 6/20

1282/1282 [==============================] - 1530s 1s/step - loss: 0.5834 - accuracy: 0.8296 - val\_loss: 0.7325 - val\_accuracy: 0.6488 - lr: 1.0000e-05

Epoch 7/20

1282/1282 [==============================] - 1755s 1s/step - loss: 0.4249 - accuracy: 0.8513 - val\_loss: 0.7191 - val\_accuracy: 0.6429 - lr: 1.0000e-05

Epoch 8/20

1282/1282 [==============================] - 1730s 1s/step - loss: 0.3504 - accuracy: 0.8682 - val\_loss: 0.7506 - val\_accuracy: 0.6398 - lr: 1.0000e-05

Epoch 9/20

1282/1282 [==============================] - 1749s 1s/step - loss: 0.3093 - accuracy: 0.8826 - val\_loss: 0.8143 - val\_accuracy: 0.6302 - lr: 1.0000e-05

Epoch 10/20

1282/1282 [==============================] - 1753s 1s/step - loss: 0.2820 - accuracy: 0.8948 - val\_loss: 0.8790 - val\_accuracy: 0.6266 - lr: 1.0000e-05

Epoch 11/20

1282/1282 [==============================] - 1876s 1s/step - loss: 0.2595 - accuracy: 0.9069 - val\_loss: 0.9583 - val\_accuracy: 0.6197 - lr: 1.0000e-05

Epoch 12/20

1282/1282 [==============================] - ETA: 0s - loss: 0.2400 - accuracy: 0.9173

Epoch 12: ReduceLROnPlateau reducing learning rate to 5.999999848427251e-06.

1282/1282 [==============================] - 1775s 1s/step - loss: 0.2400 - accuracy: 0.9173 - val\_loss: 1.0169 - val\_accuracy: 0.6177 - lr: 1.0000e-05

3844/3844 [==============================] - 54s 14ms/step

Test Metrics:

Precision: 0.6421

Recall: 0.6400

F1 Score: 0.6411

ROC AUC: 0.7597

PR AUC: 0.7974

MCC: 0.2833

y\_test\_pred = (test\_scores > 0.6).astype(int)

...: y\_test\_true = y\_test.astype(int)

...:

...: # Calculate and display evaluation metrics for the test set

...: precision\_test = precision\_score(y\_test\_true, y\_test\_pred)

...: recall\_test = recall\_score(y\_test\_true, y\_test\_pred)

...: f1\_test = f1\_score(y\_test\_true, y\_test\_pred)

...: roc\_auc\_test = roc\_auc\_score(y\_test\_true, test\_scores)

...: pr\_auc\_test = average\_precision\_score(y\_test\_true, test\_scores)

...: mcc\_test = matthews\_corrcoef(y\_test\_true, y\_test\_pred)

...:

...: print("\nTest Metrics:")

...: print(f'Precision: {precision\_test:.4f}')

...: print(f'Recall: {recall\_test:.4f}')

...: print(f'F1 Score: {f1\_test:.4f}')

...: print(f'ROC AUC: {roc\_auc\_test:.4f}')

...: print(f'PR AUC: {pr\_auc\_test:.4f}')

...: print(f'MCC: {mcc\_test:.4f}')

Test Metrics:

Precision: 0.6678

Recall: 0.5909

F1 Score: 0.6270

ROC AUC: 0.7597

PR AUC: 0.7974

MCC: 0.2990

In [5]: y\_test\_pred = (test\_scores > 0.7).astype(int)

...: y\_test\_true = y\_test.astype(int)

...:

...: # Calculate and display evaluation metrics for the test set

...: precision\_test = precision\_score(y\_test\_true, y\_test\_pred)

...: recall\_test = recall\_score(y\_test\_true, y\_test\_pred)

...: f1\_test = f1\_score(y\_test\_true, y\_test\_pred)

...: roc\_auc\_test = roc\_auc\_score(y\_test\_true, test\_scores)

...: pr\_auc\_test = average\_precision\_score(y\_test\_true, test\_scores)

...: mcc\_test = matthews\_corrcoef(y\_test\_true, y\_test\_pred)

...:

...: print("\nTest Metrics:")

...: print(f'Precision: {precision\_test:.4f}')

...: print(f'Recall: {recall\_test:.4f}')

...: print(f'F1 Score: {f1\_test:.4f}')

...: print(f'ROC AUC: {roc\_auc\_test:.4f}')

...: print(f'PR AUC: {pr\_auc\_test:.4f}')

...: print(f'MCC: {mcc\_test:.4f}')

Test Metrics:

Precision: 0.7030

Recall: 0.5430

F1 Score: 0.6127

ROC AUC: 0.7597

PR AUC: 0.7974

MCC: 0.3221

Εικόνα που περιέχει κείμενο, διάγραμμα, στιγμιότυπο οθόνης, γραμμή

Περιγραφή που δημιουργήθηκε αυτόματα

Εικόνα που περιέχει γράφημα, διάγραμμα, γραμμή, κείμενο

Περιγραφή που δημιουργήθηκε αυτόματα

Εικόνα που περιέχει κείμενο, στιγμιότυπο οθόνης, διάγραμμα, ορθογώνιο παραλληλόγραμμο

Περιγραφή που δημιουργήθηκε αυτόματα

Εικόνα που περιέχει κείμενο, γραμμή, γράφημα, διάγραμμα

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Περιγραφή που δημιουργήθηκε αυτόματα

Εικόνα που περιέχει κείμενο, στιγμιότυπο οθόνης, πολυχρωμία, διάγραμμα

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Περιγραφή που δημιουργήθηκε αυτόματα

Triplet 1 (Original):

Subject: https://ec.europa.eu/eurostat/NLP4StatRef/ontology/ei\_qna, Predicate: http://www.w3.org/1999/02/22-rdf-syntax-ns#type, Object: https://ec.europa.eu/eurostat/NLP4StatRef/ontology/StatisticalData

157/157 [==============================] - 2s 14ms/step

Intercept 0.25546493799477815

Prediction\_local [-0.06011795]

Right: 0.00012718728

Feature Importances (Coefficients):

Predicate: -0.23360103148710948

Object: -0.08282747459883212

Subject: 0.0008456173137770228

Triplet 2 (Original):

Subject: https://ec.europa.eu/eurostat/NLP4StatRef/knowledge/glossaryArticle118, Predicate: https://ec.europa.eu/eurostat/NLP4StatRef/ontology/hasReference, Object: https://ec.europa.eu/eurostat/NLP4StatRef/knowledge/referenceSource59

157/157 [==============================] - 2s 15ms/step

Intercept 0.17196890342622906

Prediction\_local [0.11998741]

Right: 0.107453234

Feature Importances (Coefficients):

Object: -0.0849405846126862

Predicate: 0.04165538180455216

Subject: -0.008696291978541522

Triplet 3 (Original):

Subject: https://ec.europa.eu/eurostat/NLP4StatRef/knowledge/hlth\_ehis\_aw1u, Predicate: https://ec.europa.eu/eurostat/NLP4StatRef/ontology/term, Object: hlth\_ehis\_aw1u

157/157 [==============================] - 2s 14ms/step

Intercept 0.1418757890338884

Prediction\_local [0.25049228]

Right: 0.48559365

Feature Importances (Coefficients):

Predicate: 0.22383286531055233

Object: -0.08571723088686808

Subject: -0.02949914048300638

Triplet 4 (Original):

Subject: https://ec.europa.eu/eurostat/NLP4StatRef/knowledge/paragraph9574\_3455, Predicate: http://www.w3.org/1999/02/22-rdf-syntax-ns#type, Object: https://ec.europa.eu/eurostat/NLP4StatRef/ontology/Paragraph

157/157 [==============================] - 2s 13ms/step

Intercept 0.233452635636577

Prediction\_local [0.02181339]

Right: 0.00025727245

Feature Importances (Coefficients):

Predicate: -0.2467190464181308

Subject: 0.01940139410940993

Object: 0.015678409440004232

Triplet 5 (Original):

Subject: https://ec.europa.eu/eurostat/NLP4StatRef/ontology/fats\_08, Predicate: https://ec.europa.eu/eurostat/NLP4StatRef/ontology/level, Object: 4

157/157 [==============================] - 2s 14ms/step

Intercept 0.07235766116982535

Prediction\_local [0.40120833]

Right: 0.1922201

Feature Importances (Coefficients):

Object: 0.2120563950281241

Predicate: 0.09105838924624617

Subject: 0.025735883340356234