

- **Transformer-Based Models: Fine-tune XLM-R for contextual understanding.**

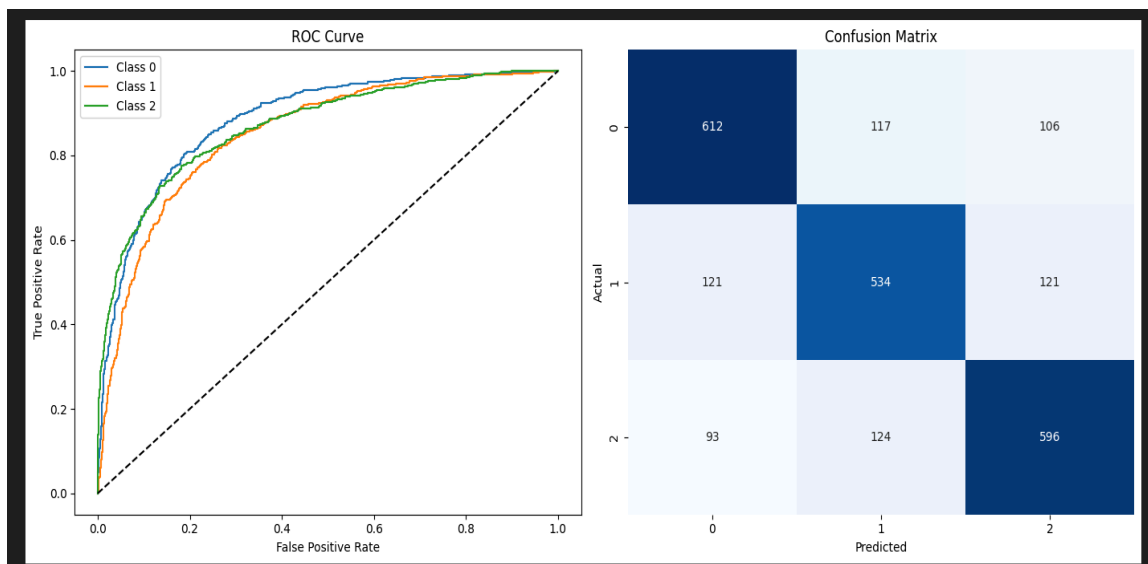
{'accuracy': 0.7186468646864687,

'precision': 0.7180440616024869,

'recall': 0.7180552641689143,

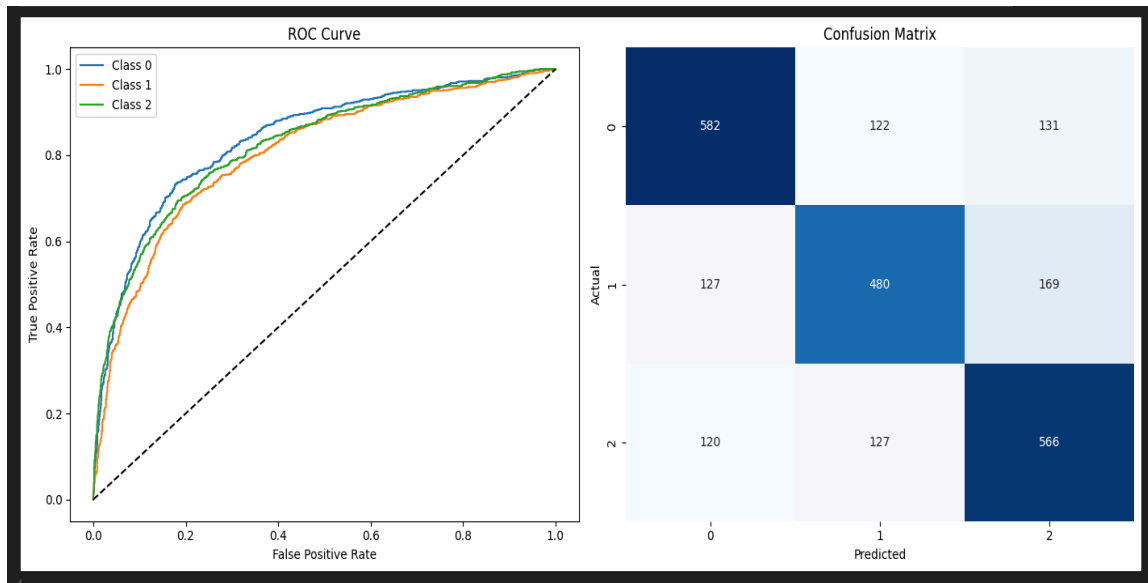
'f1': 0.7180332811108306,

'roc\_auc': 0.8688464643085227}



- **Transformer-Based Models: Fine-tune BERT for contextual understanding.**

{'accuracy': 0.6716171617161716, 'precision': 0.6713555180386915, 'recall': 0.6705832169748329, 'f1': 0.6705346082358804, 'roc\_auc': 0.8219229958420115}



- **Advanced Models:** Train LSTM/GRU models for sequence-based learning with google/mt5 pretrained transformer model.

**Accuracy:** 71.25%

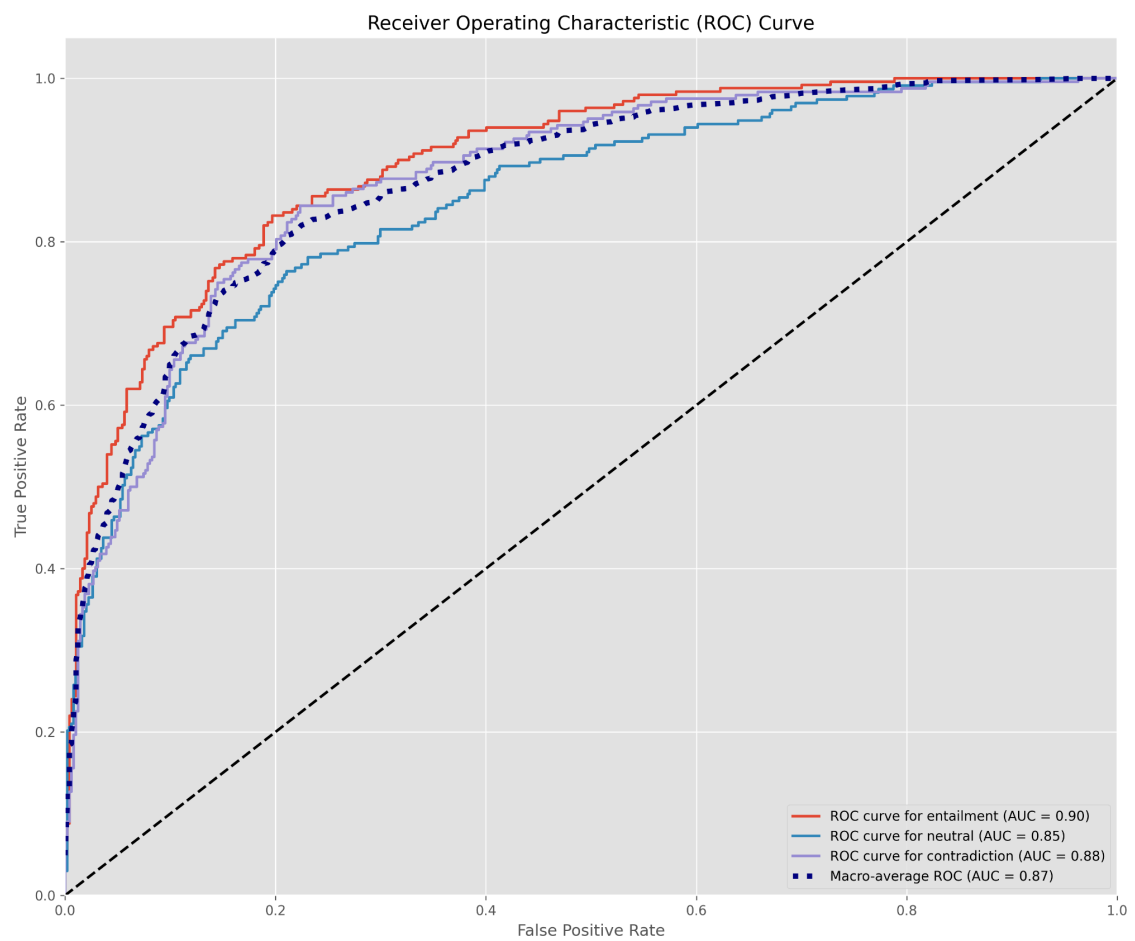
**Precision:** 71.19%

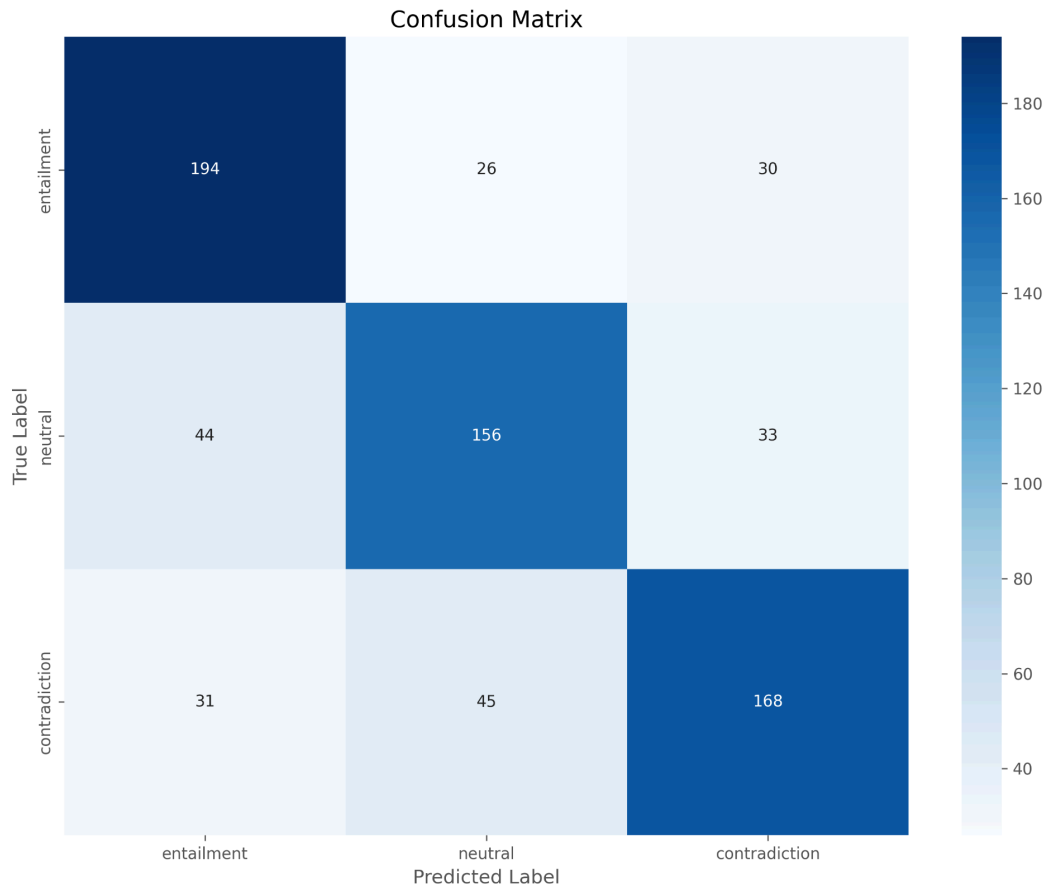
**Recall:** 71.13%

**F1-Score:** 71.11%

**Model Overall performance**

	precision	recall	f1-score	support
entailment	0.721190	0.776000	0.747592	250.000000
neutral	0.687225	0.669528	0.678261	233.000000
contradiction	0.727273	0.688525	0.707368	244.000000
accuracy	0.712517	0.712517	0.712517	0.712517
macro avg	0.711896	0.711351	0.711074	727.000000
weighted avg	0.712346	0.712517	0.711871	727.000000





- **Neural Networks:** Implement a Custom Artificial Neural Network (ANN).

===== MODEL EVALUATION =====

Validation Loss: 1.0985

Accuracy: 0.3886

Macro F1 Score: 0.3805

===== PER-CLASS METRICS =====

Class: entailment

Precision: 0.4157

Recall: 0.3928

F1 Score: 0.4039

Class: neutral

Precision: 0.3729

Recall: 0.5348

F1 Score: 0.4394

Class: contradiction

Precision: 0.3812

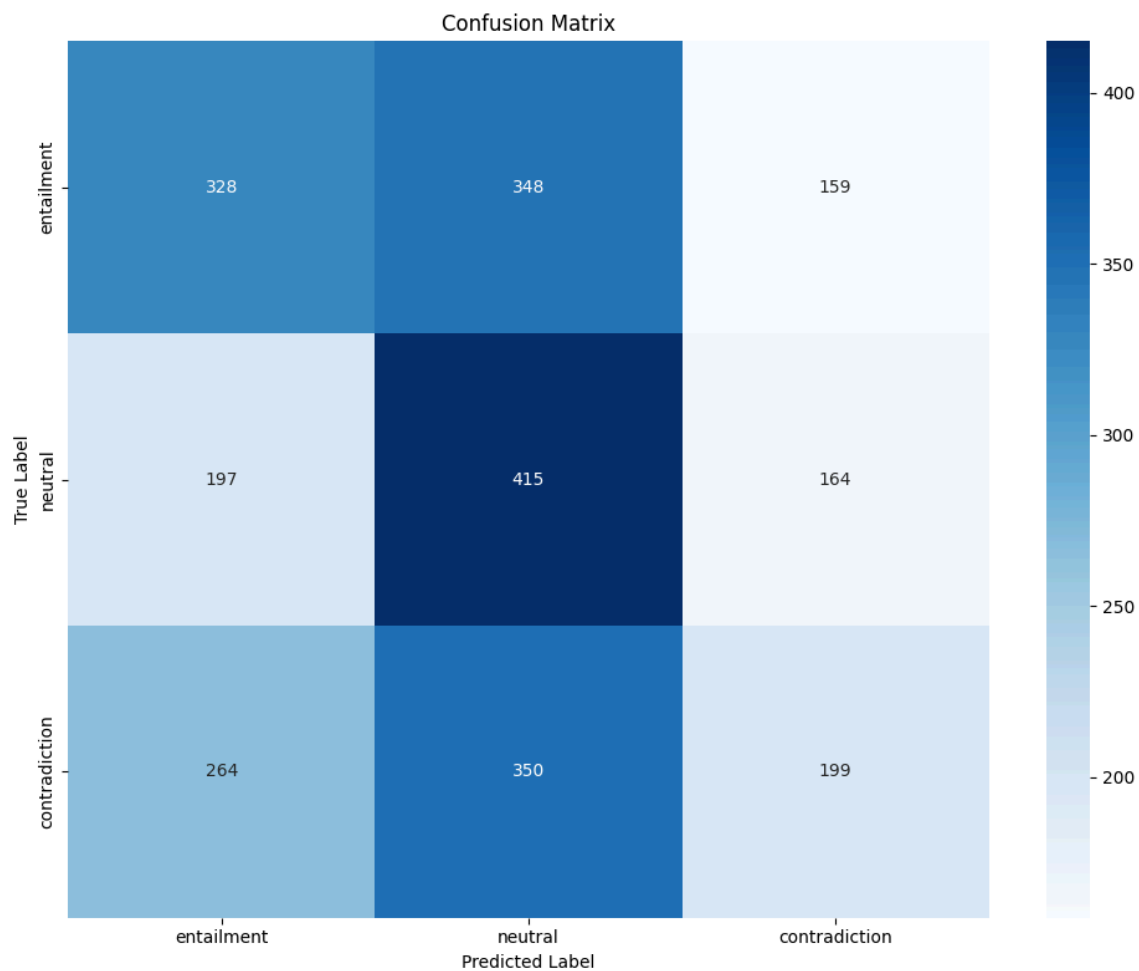
Recall: 0.2448

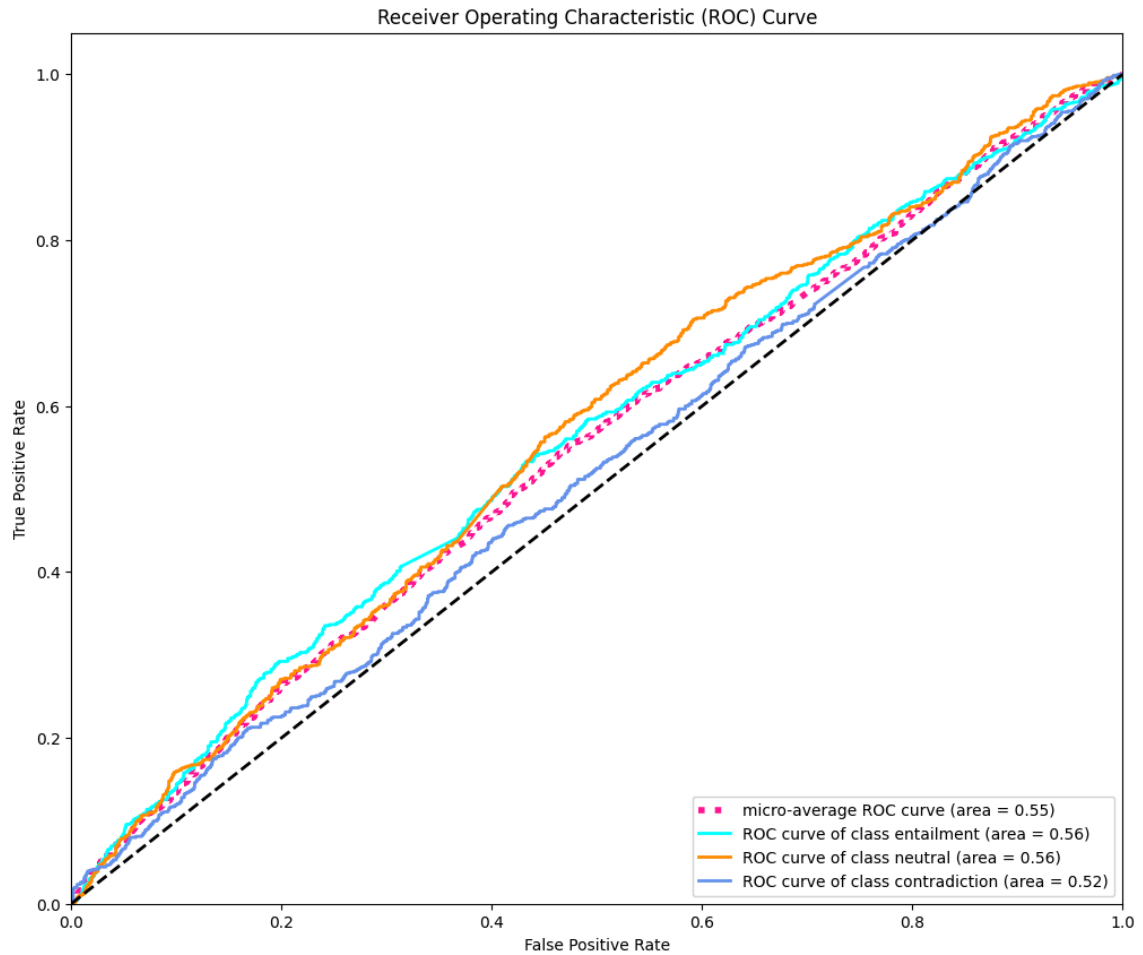
F1 Score: 0.2981

===== CLASSIFICATION REPORT =====

	precision	recall	f1-score	support
entailment	0.42	0.39	0.40	835
neutral	0.37	0.53	0.44	776
...				
weighted avg	0.39	0.39	0.38	2424

Class	Precision	Recall	F1 Score	Accuracy
Entailment	0.4157	0.3928	0.4039	0.3886
Neutral	0.3729	0.5348	0.4394	0.3886
Contradiction	0.3812	0.2448	0.2981	0.3886





- **Baseline Model:** Random Forest, Decision trees, XGB.

## Random Forest:

Accuracy: 0.3787

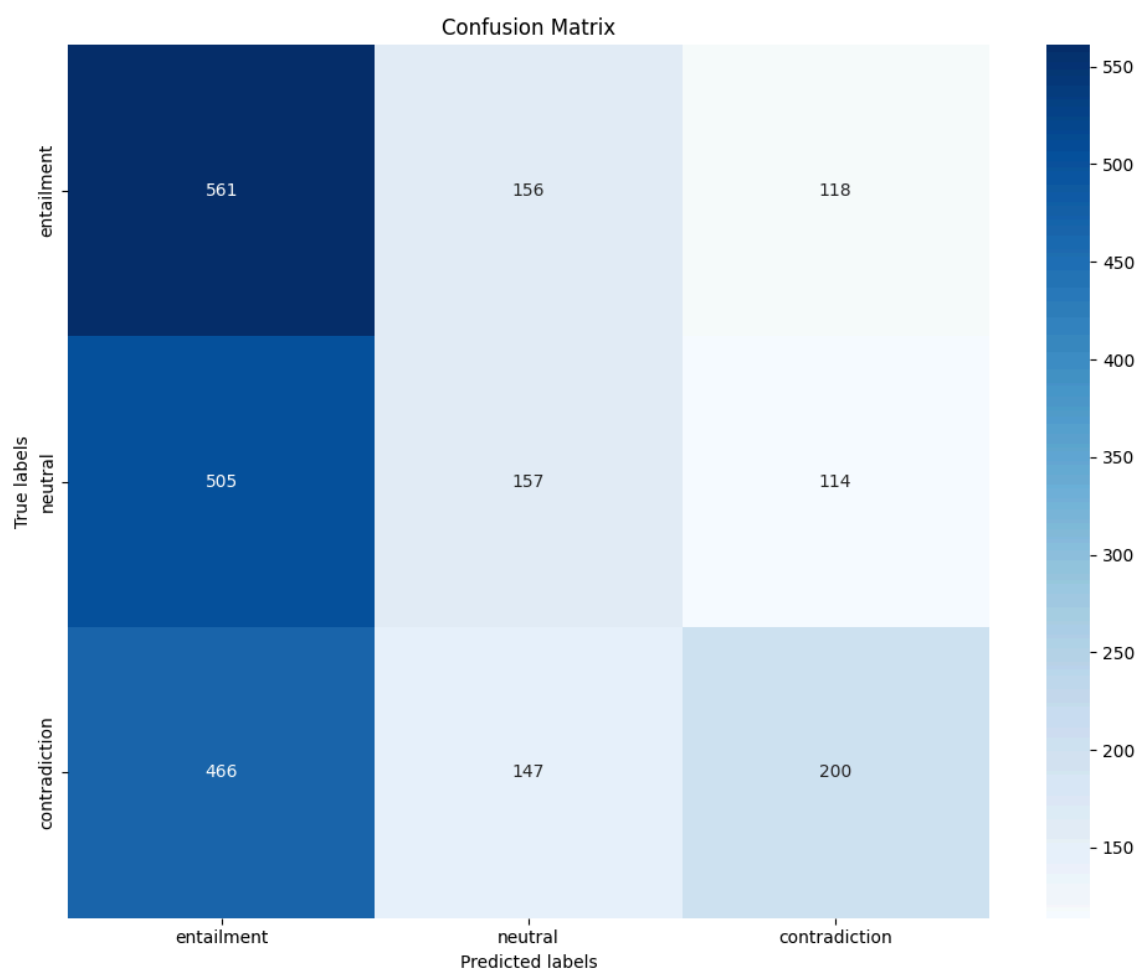
Precision: 0.3907

Recall: 0.3787

F1 Score: 0.3524

Detailed Classification Report:

	precision	recall	f1-score	support
entailment	0.37	0.67	0.47	835
neutral	0.34	0.20	0.25	776
contradiction	0.46	0.25	0.32	813
accuracy		0.38		2424
macro avg	0.39	0.37	0.35	2424
weighted avg	0.39	0.38	0.35	2424





## XGBoost:

Accuracy: 0.3853

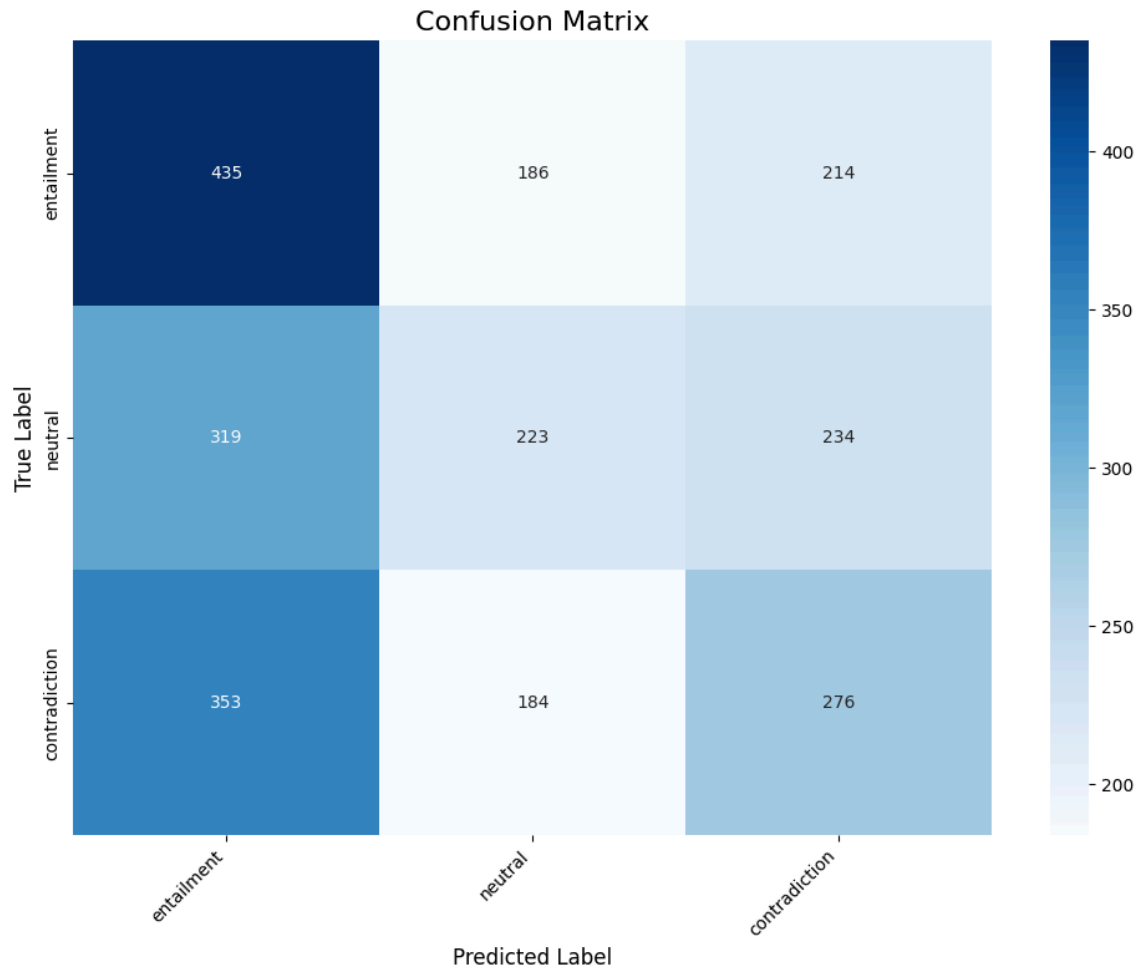
Precision: 0.3836

Recall: 0.3853

F1 Score: 0.3791

### Detailed Classification Report XGBoost:

	precision	recall	f1-score	support
entailment	0.39	0.52	0.45	835
neutral	0.38	0.29	0.33	776
contradiction	0.38	0.34	0.36	813
accuracy		0.39		2424
macro avg	0.38	0.38	0.38	2424
weighted avg	0.38	0.39	0.38	2424



## Decision Tree:

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## DECISION TREE PERFORMANCE (WORD2VEC)

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```

Accuracy: 0.3680

Precision: 0.3742

Recall: 0.3680

F1 Score: 0.3659

