```python
import os
import joblib
import json
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

from sklearn.metrics import (
    accuracy_score, classification_report, confusion_matrix
)

MODEL_DIR = "../src/models"
DATA_PATH = "../data/processed/cleaned_combined_data_utf8.csv"

df = pd.read_csv(DATA_PATH)

print(f"Dataset shape: {df.shape}")
print("Categories:", df['category'].value_counts())

X = df['combined_text']
y = df['category']
```

```
Dataset shape: (12471, 7)
Categories: category
anxiety       1987
psychosis     1841
addiction     1740
ptsd           994
bipolar        973
bpd            967
ocd            962
autism         902
suicide        827
depression     726
adhd           552
Name: count, dtype: int64
```

```python
log_reg = joblib.load(os.path.join(MODEL_DIR,
"baseline_logistic_regression.pkl"))
rand_forest = joblib.load(os.path.join(MODEL_DIR,
"baseline_random_forest.pkl"))
vectorizer = joblib.load(os.path.join(MODEL_DIR,
"tfidf_vectorizer.pkl"))

with open(os.path.join(MODEL_DIR, "baseline_results.json"), "r") as f:
    results_summary = json.load(f)

print("Saved training results:")
print(json.dumps(results_summary, indent=2))
```

```
Saved training results:
{
  "timestamp": "20250907_094642",
  "logistic_regression_accuracy": 0.7326653306613227,
  "random_forest_accuracy": 0.6949899799599198,
  "models_saved": [
    "baseline_logistic_regression.pkl",
    "baseline_random_forest.pkl"
  ],
  "vectorizer_saved": "tfidf_vectorizer.pkl"
}

from sklearn.model_selection import train_test_split

X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=0.2, random_state=42, stratify=y
)
X_test_tfidf = vectorizer.transform(X_test)

from sklearn.metrics import precision_score, recall_score, f1_score

lr_pred = log_reg.predict(X_test_tfidf)

print("Logistic Regression Report")
print(classification_report(y_test, lr_pred))

lr_acc = accuracy_score(y_test, lr_pred)
lr_prec_macro = precision_score(y_test, lr_pred, average="macro")
lr_recall_macro = recall_score(y_test, lr_pred, average="macro")
lr_f1_macro = f1_score(y_test, lr_pred, average="macro")

lr_prec_weighted = precision_score(y_test, lr_pred,
average="weighted")
lr_recall_weighted = recall_score(y_test, lr_pred, average="weighted")
lr_f1_weighted = f1_score(y_test, lr_pred, average="weighted")

print(f"\nLogistic Regression Metrics:")
print(f"Accuracy: {lr_acc:.4f}")
print(f"Precision (Macro): {lr_prec_macro:.4f}")
print(f"Recall (Macro):    {lr_recall_macro:.4f}")
print(f"F1 Score (Macro):  {lr_f1_macro:.4f}")
print(f"Precision (Weighted): {lr_prec_weighted:.4f}")
print(f"Recall (Weighted):    {lr_recall_weighted:.4f}")
print(f"F1 Score (Weighted):  {lr_f1_weighted:.4f}")

Logistic Regression Report
              precision    recall  f1-score   support

   addiction       0.90      0.90      0.90       348
        adhd       0.68      0.69      0.68       110
     anxiety       0.78      0.75      0.77       398
```

```
      autism       0.59      0.72      0.65       180
     bipolar       0.71      0.64      0.67       195
         bpd       0.74      0.77      0.76       194
  depression       0.39      0.46      0.42       145
         ocd       0.83      0.82      0.83       193
   psychosis       0.85      0.71      0.77       368
        ptsd       0.75      0.72      0.74       199
     suicide       0.54      0.66      0.59       165

    accuracy                           0.73      2495
   macro avg       0.71      0.71      0.71      2495
weighted avg       0.74      0.73      0.74      2495


Logistic Regression Metrics:
Accuracy: 0.7327
Precision (Macro): 0.7065
Recall (Macro):    0.7120
F1 Score (Macro):  0.7070
Precision (Weighted): 0.7443
Recall (Weighted):    0.7327
F1 Score (Weighted):  0.7362
```

```
rf_pred = rand_forest.predict(X_test_tfidf)

print("Random Forest Report")
print(classification_report(y_test, rf_pred))

rf_acc = accuracy_score(y_test, rf_pred)
rf_prec_macro = precision_score(y_test, rf_pred, average="macro")
rf_recall_macro = recall_score(y_test, rf_pred, average="macro")
rf_f1_macro = f1_score(y_test, rf_pred, average="macro")

rf_prec_weighted = precision_score(y_test, rf_pred,
average="weighted")
rf_recall_weighted = recall_score(y_test, rf_pred, average="weighted")
rf_f1_weighted = f1_score(y_test, rf_pred, average="weighted")

print(f"\nRandom Forest Metrics:")
print(f"Accuracy: {rf_acc:.4f}")
print(f"Precision (Macro): {rf_prec_macro:.4f}")
print(f"Recall (Macro):    {rf_recall_macro:.4f}")
print(f"F1 Score (Macro):  {rf_f1_macro:.4f}")
print(f"Precision (Weighted): {rf_prec_weighted:.4f}")
print(f"Recall (Weighted):    {rf_recall_weighted:.4f}")
print(f"F1 Score (Weighted):  {rf_f1_weighted:.4f}")
```

```
Random Forest Report
              precision    recall  f1-score   support
```

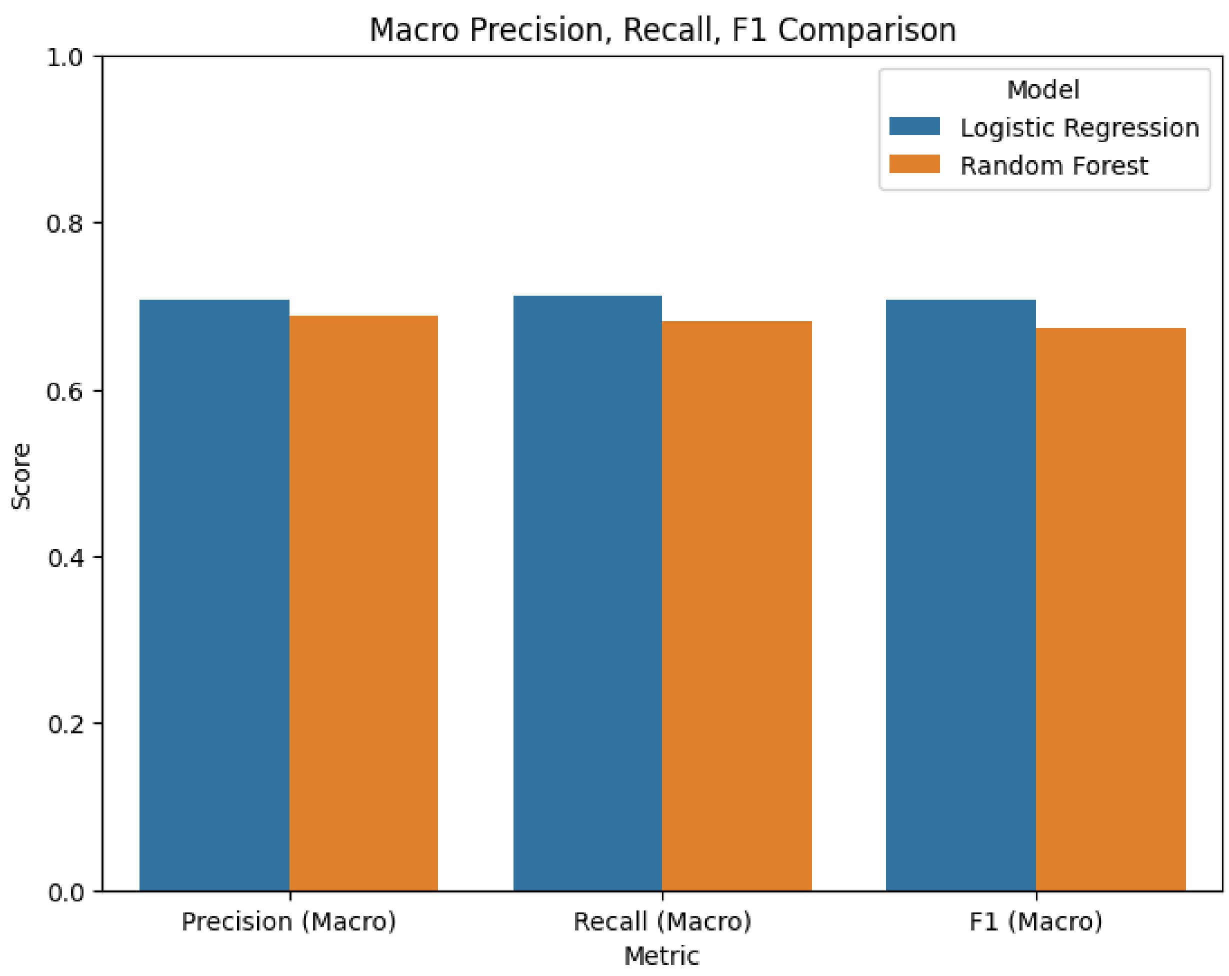
```
  addiction       0.82      0.87      0.84       348
       adhd       0.69      0.67      0.68       110
    anxiety       0.81      0.72      0.76       398
     autism       0.41      0.76      0.53       180
    bipolar       0.69      0.63      0.66       195
        bpd       0.75      0.69      0.72       194
 depression       0.40      0.38      0.39       145
        ocd       0.79      0.80      0.80       193
  psychosis       0.90      0.59      0.71       368
       ptsd       0.81      0.70      0.75       199
    suicide       0.48      0.68      0.56       165

   accuracy                           0.69      2495
  macro avg       0.69      0.68      0.67      2495
weighted avg       0.73      0.69      0.70      2495


Random Forest Metrics:
Accuracy: 0.6950
Precision (Macro): 0.6869
Recall (Macro):    0.6805
F1 Score (Macro):  0.6736
Precision (Weighted): 0.7301
Recall (Weighted):    0.6950
F1 Score (Weighted):  0.7019
```

```
metrics_df = pd.DataFrame({
    "Model": ["Logistic Regression", "Logistic Regression", "Logistic 
Regression",
              "Random Forest", "Random Forest", "Random Forest"],
    "Metric": ["Precision (Macro)", "Recall (Macro)", "F1 (Macro)",
               "Precision (Macro)", "Recall (Macro)", "F1 (Macro)"],
    "Score": [lr_prec_macro, lr_recall_macro, lr_f1_macro,
              rf_prec_macro, rf_recall_macro, rf_f1_macro]
})

plt.figure(figsize=(8,6))
sns.barplot(x="Metric", y="Score", hue="Model", data=metrics_df)
plt.ylim(0,1)
plt.title("Macro Precision, Recall, F1 Comparison")
plt.show()
```



```
sample_df = pd.DataFrame({
    "Text": X_test.sample(5, random_state=42)
})

sample_df["Actual"] = y_test.loc[sample_df.index]
sample_df["LogReg_Pred"] =
log_reg.predict(vectorizer.transform(sample_df["Text"]))
sample_df["RF_Pred"] =
rand_forest.predict(vectorizer.transform(sample_df["Text"]))

sample_df
```

```
                                                     Text   Actual
LogReg_Pred  \
4093   Tell me what you're currently anxious about an...  anxiety
anxiety
10910  Feelings of re-experiencing are distressing af...     ptsd
ptsd
6152   App for us bipolars I want to build an app tha...  bipolar
bipolar
```

```
3930   23 and never had an actual job, feeling lost. ...  anxiety
depression
1962   Mallinkrodt Generic = worthless Does anyone el...     adhd
adhd

       RF_Pred
4093   anxiety
10910     ptsd
6152   bipolar
3930       bpd
1962      adhd
```