Fake News Detection

Task 1

```
pip install colorama
```

```
Requirement already satisfied: colorama in c:\python310\lib\site-packages (0.4.6)
Note: you may need to restart the kernel to use updated packages.

[notice] A new release of pip is available: 23.0 -> 23.3.1
[notice] To update, run: python.exe -m pip install --upgrade pip
```

```
import pandas as pd
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestClassifier
from sklearn.svm import SVC
from sklearn.naive_bayes import MultinomialNB
from sklearn.model_selection import GridSearchCV
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score
```

```
# Load the datasets
fake_train = pd.read_csv('Fake_train.csv')
fake_dev = pd.read_csv('Fake_dev.csv')
```

```
# Vectorize the text using TF-IDF
vectorizer = TfidfVectorizer()
X_train = vectorizer.fit_transform(fake_train['text'])
y_train = fake_train['label']
```

```
X_dev = vectorizer.transform(fake_dev['text'])
y_dev = fake_dev['label']
```

Naive Bayes

```
# Initialize a Naive Bayes classifier
classifier_nb = MultinomialNB()
classifier_nb.fit(X_train, y_train)
```

```
MultinomialNB
MultinomialNB()
```

```
# Predict on the development set
predictions_nb = classifier_nb.predict(X_dev)
```

```
results_nb = pd.DataFrame({
    'Text': fake_dev['text'],
    'Actual': y_dev,
    'Predicted': predictions_nb
})
```

```
# Calculate the accuracy
accuracy_nb = accuracy_score(y_dev, predictions_nb)
print(f"Accuracy: {accuracy_nb}")
```

```
Accuracy: 0.7889570552147239
```

```
from colorama import Fore, Style

print("Actual  Predicted")
for actual, predicted in zip(results_nb['Actual'], results_nb['Predicted']):
    if actual == predicted:
        print(f"{actual:<8} {predicted:<10}")
    else:
        print(f"{Fore.RED}{actual:<8}{Style.RESET_ALL} {Fore.RED}{predicted:<10}{Style.RESET_ALL}")
```

```
Actual  Predicted
Fake     Fake
```

```
Fake     Fake
original Fake
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original Fake
Fake     Fake
original Fake
original Fake
original Fake
Fake     Fake
Fake     Fake
original Fake
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```

SVM

```
classifier_svm = SVC(kernel='rbf')
classifier_svm.fit(X_train, y_train)
```

SVC
SVC()

```
# Predict on the development set
predictions_svm = classifier_svm.predict(X_dev)
```

```
results_svm = pd.DataFrame({
    'Text': fake_dev['text'],
    'Actual': y_dev,
    'Predicted': predictions_svm
})
```

```
# Calculate the accuracy
accuracy_svm = accuracy_score(y_dev, predictions_svm)
print(f"Accuracy: {accuracy_svm}")
```

```
Accuracy: 0.7877300613496933
```

```
print("Actual  Predicted")
for actual, predicted in zip(results_svm['Actual'], results_svm['Predicted']):
    if actual == predicted:
        print(f"{actual:<8} {predicted:<10}")
    else:
        print(f"{Fore.RED}{actual:<8}{Style.RESET_ALL} {Fore.RED}{predicted:<10}{Style.RESET_ALL}")
```

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Random Forest

```
param_grid = {'n_estimators': [50, 100, 200],
              'max_depth': [None, 10, 20, 30],
              'min_samples_split': [2, 5, 10],
              'min_samples_leaf': [1, 2, 4]}
```

```
classifier = RandomForestClassifier(random_state=42)
grid_search = GridSearchCV(classifier, param_grid, cv=5, scoring='accuracy', n_jobs=-1)
grid_search.fit(X_train, y_train)
```

```
GridSearchCV
estimator: RandomForestClassifier
RandomForestClassifier
```

```
# Predict on the development set
best_classifier_rf = grid_search.best_estimator_
predictions_rf = best_classifier_rf.predict(X_dev)
```

```
results_rf = pd.DataFrame({
    'Text': fake_dev['text'],
    'Actual': y_dev,
    'Predicted': predictions_rf
})
```

```
# Calculate the accuracy
accuracy_rf = accuracy_score(y_dev, predictions_rf)
print(f"Accuracy: {accuracy_rf}")
```

```
Accuracy: 0.7607361963190185
```

```
print("Actual  Predicted")
for actual, predicted in zip(results_rf['Actual'], results_rf['Predicted']):
    if actual == predicted:
        print(f"{actual:<8} {predicted:<10}")
    else:
        print(f"{Fore.RED}{actual:<8}{Style.RESET_ALL} {Fore.RED}{predicted:<10}{Style.RESET_ALL}")
```

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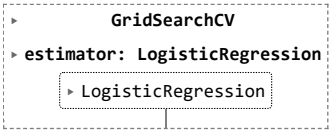
```

Logistic Regression

```
param_grid_lr = {'C': [0.001, 0.01, 0.1, 1, 10, 100],
              'solver': ['liblinear', 'lbfgs', 'newton-cg', 'sag', 'saga']}
```

```
classifier_lr = LogisticRegression(max_iter=1000, random_state=42)
grid_search_lr = GridSearchCV(classifier_lr, param_grid_lr, cv=5, scoring='accuracy', n_jobs=-1)
grid_search_lr.fit(X_train, y_train)
```




```
# Predict on the development set
best_classifier_lr = grid_search_lr.best_estimator_
predictions_lr = best_classifier_lr.predict(X_dev)
```

```
results_lr = pd.DataFrame({
    'Text': fake_dev['text'],
    'Actual': y_dev,
    'Predicted': predictions_lr
})
```

```
# Calculate the accuracy
accuracy_lr = accuracy_score(y_dev, predictions_lr)
print(f"Accuracy: {accuracy_lr}")
```

```
Accuracy: 0.7865030674846626
```

```
print("Actual  Predicted")
for actual, predicted in zip(results_lr['Actual'], results_lr['Predicted']):
    if actual == predicted:
        print(f"{actual:<8} {predicted:<10}")
    else:
        print(f"{Fore.RED}{actual:<8}{Style.RESET_ALL} {Fore.RED}{predicted:<10}{Style.RESET_ALL}")
```

```
Fake     Fake
original original
original original
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original Fake
```

Inference

```
print("NB Accuracy: ",accuracy_nb)
print("NB Accuracy: ",accuracy_svm)
print("NB Accuracy: ",accuracy_rf)
print("NB Accuracy: ",accuracy_lr)
```

```
NB Accuracy:  0.7889570552147239
NB Accuracy:  0.7877300613496933
NB Accuracy:  0.7607361963190185
NB Accuracy:  0.7865030674846626
```

Applying NB in test data which is without label.

```
test_without_label = pd.read_csv('Fake_test_without_labels.csv')
```

```
x = vectorizer.transform(test_without_label['text'])
```

```
predictions_without_label_nb = classifier_nb.predict(x)
```

```
results_without_label_nb = pd.DataFrame({
    'Text': test_without_label['text'],
    'Predicted': predictions_without_label_nb
})
```

```
results_without_label_nb
```

	Text	Predicted
0	5000 ഉള്ള പോൾ ലോഗ്ഡ്വൻ ഇപ്പോള് 250000 എന്താ...	Fake
1	ഓഷോ രജനീഷ് പറഞ്ഞപോലെ എനിക്കപ്പോൾ തോന്നിയത് അ...	original
2	ചേട്ടാ വാർത്ത വയ്ക്കുന്നത് കേരളത്തിലാണ് സം...	Fake
3	Shame for entire Woman&#39	Fake
4	135 code janaghal andhu wide business cheythal...	Fake
...	...	...
1014	Correct ...China cheitha ...weapon spread ing ...	Fake
1015	ഈ WHO പറയുന്നതനുസരിച്ചു ചികിത്സയും ലോക്ക് ഡൌൺ ...	Fake
1016	Mask illa aarkum😋 😋	original
1017	ഇയാളെ കൊറോണ. രോഗി കൾ കിടയിൽ. ഇടാമായിരുന്നു---!!	Fake
1018	Kulathrikalkku badilayiAlavilathikal ...	original

1019 rows × 2 columns

```
results_without_label_nb.to_csv('output_file_task1.csv', index=False)
```