```
import pandas as pd
from google.colab import drive


drive.mount('/content/drive')


df_fake = pd.read_csv('/content/drive/MyDrive/Fake.csv')
df_real = pd.read_csv('/content/drive/MyDrive/True.csv')
```

```
Drive already mounted at /content/drive; to attempt to forcibly
remount, call drive.mount("/content/drive", force_remount=True).
```

```
df_fake['label'] = 0
df_real['label'] = 1


df = pd.concat([df_fake, df_real], ignore_index=True)


df = df[['title', 'text', 'label']]


df.dropna(subset=['text'], inplace=True)
df.reset_index(drop=True, inplace=True)
print("□ Dataset loaded! Shape:", df.shape)
```

```
□ Dataset loaded! Shape: (44898, 3)
```

```
import re
import nltk
from nltk.corpus import stopwords
from nltk.stem import WordNetLemmatizer


nltk.download('stopwords')
nltk.download('wordnet')
stop_words = set(stopwords.words('english'))
lemmatizer = WordNetLemmatizer()


def clean_text(text):
    if isinstance(text, str):
        text = text.lower()
        text = re.sub(r'http\S+|www\S+|https\S+', '', text)
        text = re.sub(r'@\w+|#\w+', '', text)
        text = re.sub(r'[^a-zA-Z\s]', '', text)

        words = text.split()
        words = [lemmatizer.lemmatize(word) for word in words if word
not in stop_words]
        return ' '.join(words)
```

```
    else:
        return ""


df['cleaned_text'] = df['text'].apply(clean_text)


print(df[['text', 'cleaned_text']].head(5))
```

```
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Package stopwords is already up-to-date!
[nltk_data] Downloading package wordnet to /root/nltk_data...
[nltk_data]   Package wordnet is already up-to-date!
```

```
df.to_csv('/content/drive/MyDrive/cleaned_fake_news_dataset.csv',
index=False)

print("□ Cleaned dataset saved successfully!")
```

```
□ Cleaned dataset saved successfully!
```

```
import pandas as pd

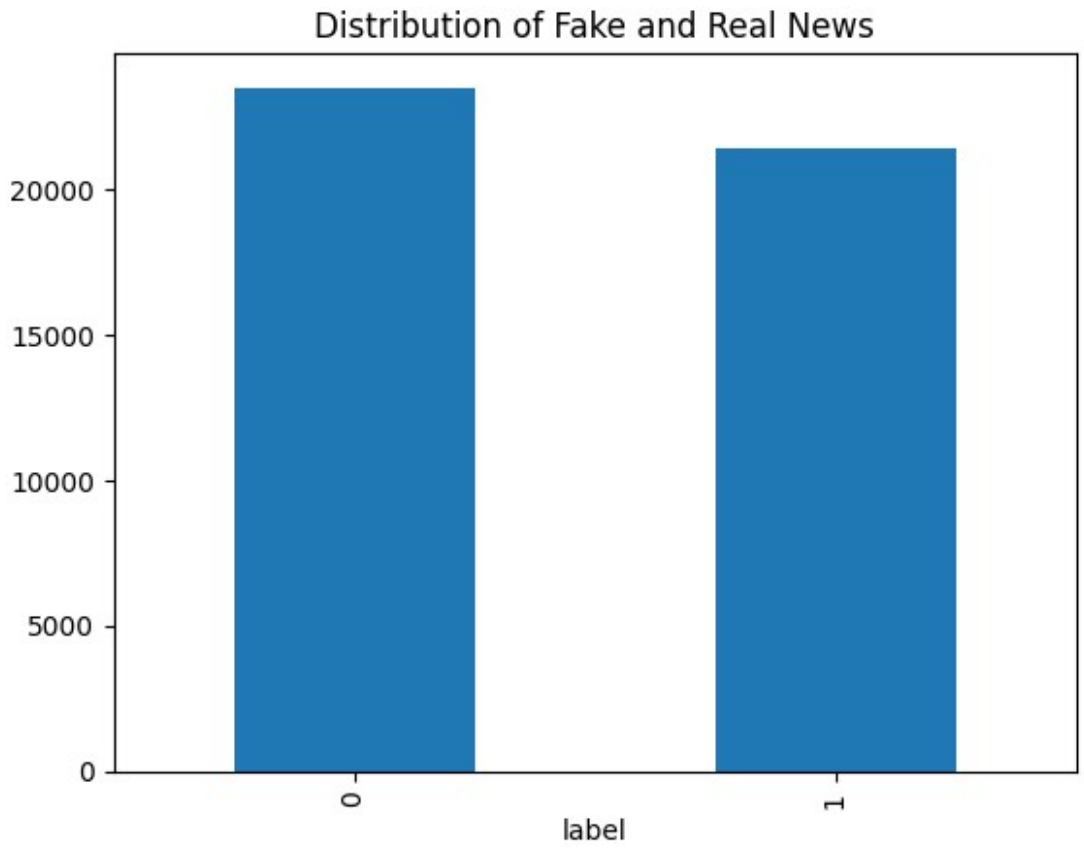
label_counts = df['label'].value_counts()
print("Label Distribution:\n", label_counts)


imbalance_percentage = (label_counts[0] / label_counts.sum()) * 100
print(f"Imbalance Percentage: {imbalance_percentage:.2f}%")


df['label'].value_counts().plot(kind='bar', title='Distribution of
Fake and Real News')
```

```
Label Distribution:
 label
0    23481
1    21417
Name: count, dtype: int64
Imbalance Percentage: 52.30%
```

```
<Axes: title={'center': 'Distribution of Fake and Real News'},
xlabel='label'>
```




```
df['text_length'] = df['text'].apply(len)

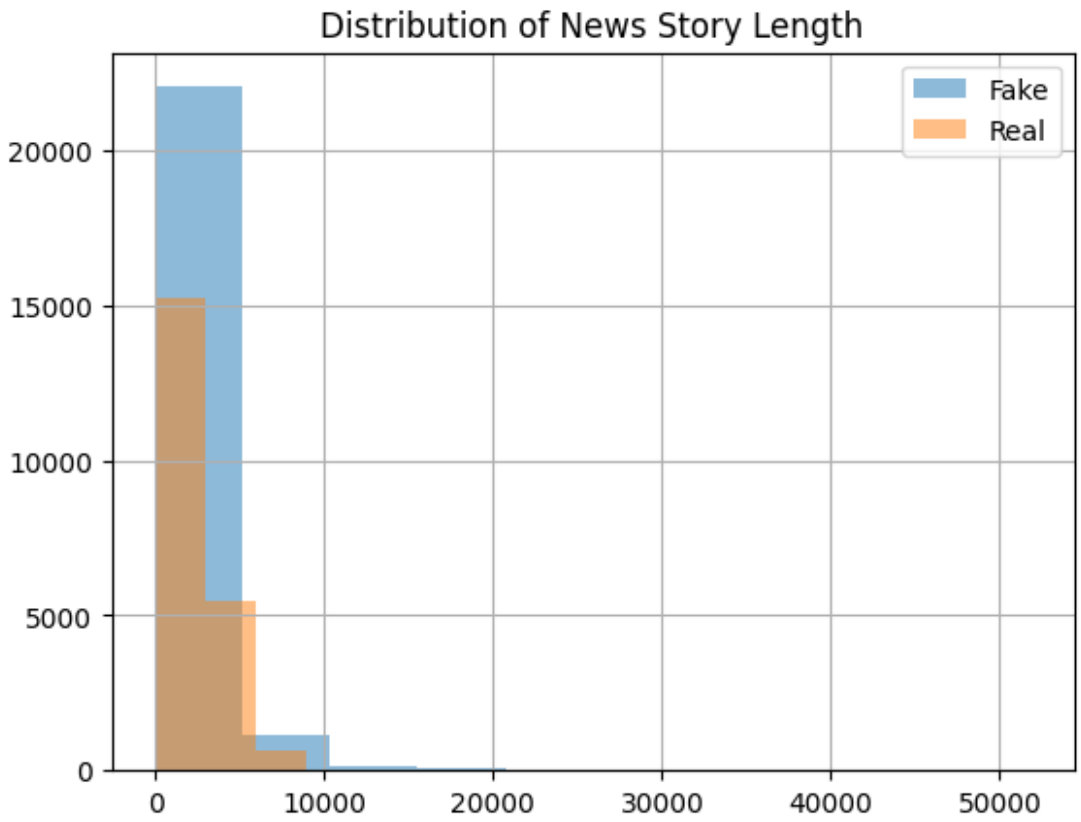

print("Average text length for fake news:", df[df['label'] == 0]
['text_length'].mean())
print("Average text length for real news:", df[df['label'] == 1]
['text_length'].mean())


import matplotlib.pyplot as plt

df[df['label'] == 0]['text_length'].hist(alpha=0.5, label='Fake')
df[df['label'] == 1]['text_length'].hist(alpha=0.5, label='Real')
plt.legend()
plt.title('Distribution of News Story Length')
```

```
Average text length for fake news: 2547.396235254035
Average text length for real news: 2383.278517065882

Text(0.5, 1.0, 'Distribution of News Story Length')
```




```
from collections import Counter

fake_text = ' '.join(df[df['label'] == 0]
['cleaned_text'].astype(str).tolist())
real_text = ' '.join(df[df['label'] == 1]
['cleaned_text'].astype(str).tolist())


fake_word_counts = Counter(fake_text.split())
real_word_counts = Counter(real_text.split())


top_fake_words = fake_word_counts.most_common(20)
top_real_words = real_word_counts.most_common(20)


print("Top 20 words in fake news:", top_fake_words)
print("Top 20 words in real news:", top_real_words)
```

```
Top 20 words in fake news: [('trump', 74113), ('said', 31020),
('president', 26181), ('people', 26054), ('one', 23756), ('would',
23427), ('u', 22334), ('state', 22005), ('clinton', 18647), ('like',
18165), ('obama', 17805), ('time', 17716), ('donald', 17221),
('republican', 16040), ('american', 16036), ('say', 15443), ('also',
15242), ('year', 15201), ('new', 14158), ('news', 14138)]
```

```
Top 20 words in real news: [('said', 99039), ('trump', 54346), ('u', 41170), ('state', 36395), ('would', 31520), ('reuters', 28404), ('president', 26997), ('republican', 22109), ('government', 19466), ('year', 19280), ('house', 16935), ('new', 16786), ('also', 15952), ('united', 15572), ('people', 15328), ('party', 14990), ('official', 14580), ('told', 14244), ('country', 14106), ('election', 13959)]
```

```
from sklearn.feature_extraction.text import TfidfVectorizer

vectorizer = TfidfVectorizer(max_features=5000)  # You can adjust max_features

vectorizer.fit(df['cleaned_text'])
```

```
TfidfVectorizer(max_features=5000)
```

```
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.naive_bayes import MultinomialNB
from sklearn.svm import SVC
from sklearn.metrics import accuracy_score, classification_report

from sklearn.feature_extraction.text import TfidfVectorizer


X = df_tfidf
y = df['label']

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

vectorizer = TfidfVectorizer(max_features=5000)
vectorizer.fit(df['cleaned_text'])


df_tfidf = vectorizer.transform(df['cleaned_text'])


X = df_tfidf
y = df['label']

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)


logreg_model = LogisticRegression()
logreg_model.fit(X_train, y_train)

y_pred_logreg = logreg_model.predict(X_test)


accuracy_logreg = accuracy_score(y_test, y_pred_logreg)
```

```
report_logreg = classification_report(y_test, y_pred_logreg)

print("Logistic Regression Accuracy:", accuracy_logreg)
print("Logistic Regression Classification Report:\n", report_logreg)
```

```
Logistic Regression Accuracy: 0.9879732739420936
Logistic Regression Classification Report:
               precision    recall  f1-score   support

           0       0.99      0.99      0.99      4733
           1       0.99      0.99      0.99      4247

    accuracy                           0.99      8980
   macro avg       0.99      0.99      0.99      8980
weighted avg       0.99      0.99      0.99      8980
```

```
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.naive_bayes import MultinomialNB
from sklearn.svm import SVC
from sklearn.metrics import accuracy_score


!pip install pandas
import pandas as pd
from google.colab import drive


drive.mount('/content/drive')


df_fake = pd.read_csv('/content/drive/MyDrive/Fake.csv')
df_real = pd.read_csv('/content/drive/MyDrive/True.csv')


df_fake['label'] = 0
df_real['label'] = 1

df = pd.concat([df_fake, df_real], ignore_index=True)


df = df[['title', 'text', 'label']]

df.dropna(subset=['text'], inplace=True)
df.reset_index(drop=True, inplace=True)
```

```
label_counts = df['label'].value_counts()
print("Label Distribution:\n", label_counts)
```

```
Requirement already satisfied: pandas in
/usr/local/lib/python3.11/dist-packages (2.2.2)
Requirement already satisfied: numpy>=1.23.2 in
/usr/local/lib/python3.11/dist-packages (from pandas) (2.0.2)
Requirement already satisfied: python-dateutil>=2.8.2 in
/usr/local/lib/python3.11/dist-packages (from pandas) (2.9.0.post0)
Requirement already satisfied: pytz>=2020.1 in
/usr/local/lib/python3.11/dist-packages (from pandas) (2025.2)
Requirement already satisfied: tzdata>=2022.7 in
/usr/local/lib/python3.11/dist-packages (from pandas) (2025.2)
Requirement already satisfied: six>=1.5 in
/usr/local/lib/python3.11/dist-packages (from python-dateutil>=2.8.2-
>pandas) (1.17.0)
Drive already mounted at /content/drive; to attempt to forcibly
remount, call drive.mount("/content/drive", force_remount=True).
Label Distribution:
 label
0    23481
1    21417
Name: count, dtype: int64
```

```
import pandas as pd
from google.colab import drive
import re
import nltk
from nltk.corpus import stopwords
from nltk.stem import WordNetLemmatizer
from collections import Counter
from sklearn.model_selection import train_test_split
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.linear_model import LogisticRegression
from sklearn.svm import SVC


drive.mount('/content/drive')
import pandas as pd
from google.colab import drive
import re
import nltk
from nltk.corpus import stopwords
from nltk.stem import WordNetLemmatizer
from collections import Counter
from sklearn.model_selection import train_test_split
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.linear_model import LogisticRegression
from sklearn.svm import SVC
```

```
drive.mount('/content/drive')
```

```
df_fake = pd.read_csv('/content/drive/MyDrive/Fake.csv')
```

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Drive already mounted at /content/drive; to attempt to forcibly
remount, call drive.mount("/content/drive", force_remount=True).
Drive already mounted at /content/drive; to attempt to forcibly
remount, call drive.mount("/content/drive", force_remount=True).
```

```
df.to_csv('/content/drive/MyDrive/cleaned_fake_news_dataset.csv',
index=False)

print("□ Cleaned dataset saved successfully!")
```

```
□ Cleaned dataset saved successfully!
```

```
import pandas as pd
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import classification_report, confusion_matrix,
accuracy_score


df =
pd.read_csv('/content/drive/MyDrive/cleaned_fake_news_dataset.csv')


X = df['cleaned_text']
y = df['label']


df.dropna(subset=['cleaned_text'], inplace=True)
df.reset_index(drop=True, inplace=True)
X = df['cleaned_text']
y = df['label']


vectorizer = TfidfVectorizer(max_features=5000)
X_vectorized = vectorizer.fit_transform(X)


X_train, X_test, y_train, y_test = train_test_split(X_vectorized, y,
test_size=0.2, random_state=42)
```

```
model = LogisticRegression(max_iter=1000)
model.fit(X_train, y_train)


y_pred = model.predict(X_test)


print("□ Model Evaluation Results:")
print("Accuracy:", accuracy_score(y_test, y_pred))
print("\nConfusion Matrix:\n", confusion_matrix(y_test, y_pred))
print("\nClassification Report:\n", classification_report(y_test,
y_pred))
```

```
□ Model Evaluation Results:
Accuracy: 0.9874391761910151

Confusion Matrix:
 [[4506   57]
 [  54 4220]]

Classification Report:
              precision    recall  f1-score   support

           0       0.99      0.99      0.99      4563
           1       0.99      0.99      0.99      4274

    accuracy                           0.99      8837
   macro avg       0.99      0.99      0.99      8837
weighted avg       0.99      0.99      0.99      8837
```

```
from sklearn.feature_extraction.text import ENGLISH_STOP_WORDS
from nltk.stem import PorterStemmer


def preprocess(text):

    text = text.lower()
    text = ''.join([char for char in text if char.isalnum() or
char.isspace()])
    words = text.split()
    stemmer = PorterStemmer()
    return ' '.join([stemmer.stem(word) for word in words if word not
in ENGLISH_STOP_WORDS])

df['cleaned_text'] = df['cleaned_text'].apply(preprocess)
```

```
from sklearn.model_selection import cross_val_score
scores = cross_val_score(model, X_vectorized, y, cv=5)
print("Cross-validation scores:", scores)
print("Average cross-validation score:", scores.mean())
```

```
Cross-validation scores: [0.9833654  0.97974426 0.96751924 0.97487551
0.98155274]
Average cross-validation score: 0.9774114280295926
```

```
import joblib
joblib.dump(model, 'fake_news_model.pkl')
```

```
['fake_news_model.pkl']
```

```
model = LogisticRegression(max_iter=1000, class_weight='balanced')
model.fit(X_train, y_train)
```

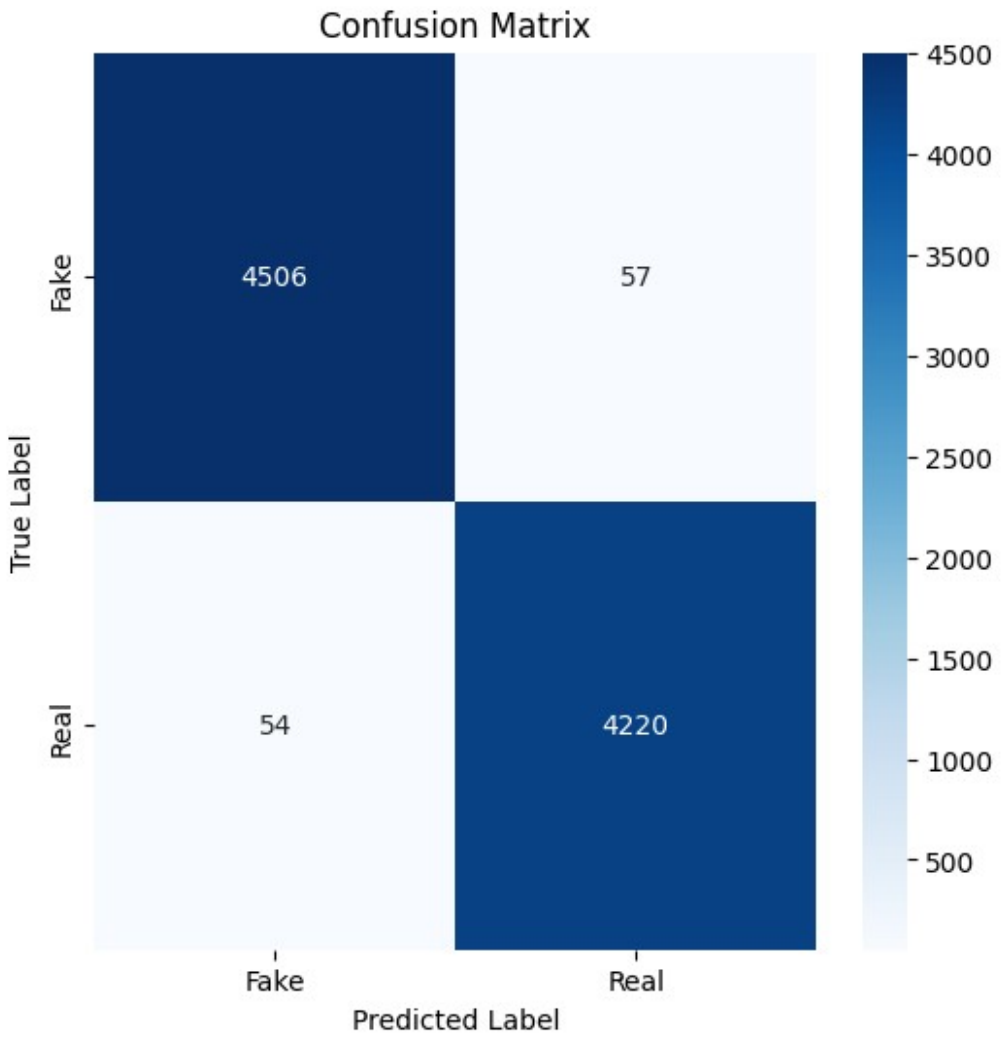
```
print(predict_fake_news("Example news text goes here."))
```

```
Fake
```

```
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.metrics import confusion_matrix

conf_matrix = confusion_matrix(y_test, y_pred)

plt.figure(figsize=(6, 6))
sns.heatmap(conf_matrix, annot=True, fmt='d', cmap='Blues',
xticklabels=["Fake", "Real"], yticklabels=["Fake", "Real"])
plt.xlabel('Predicted Label')
plt.ylabel('True Label')
plt.title('Confusion Matrix')
plt.show()
```




```
y_pred = model.predict(X_test)

from sklearn.metrics import accuracy_score, confusion_matrix,
classification_report

print("□ Model Testing Results:")
print(f"Accuracy: {accuracy_score(y_test, y_pred):.4f}")
print("\nConfusion Matrix:")
print(confusion_matrix(y_test, y_pred))
print("\nClassification Report:")
print(classification_report(y_test, y_pred))
```

```
□ Model Testing Results:
Accuracy: 0.9873
```

```
Confusion Matrix:
[[4504   59]
 [  53 4221]]

Classification Report:
              precision    recall  f1-score   support

           0       0.99      0.99      0.99      4563
           1       0.99      0.99      0.99      4274

    accuracy                           0.99      8837
   macro avg       0.99      0.99      0.99      8837
weighted avg       0.99      0.99      0.99      8837
```