Import Libraries

In [1]:
```
import pandas as pd
import numpy as np
import re
import string
import matplotlib.pyplot as plt
import seaborn as sns

from sklearn.model_selection import train_test_split
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.linear_model import LogisticRegression
from sklearn.naive_bayes import MultinomialNB
from sklearn.metrics import accuracy_score, classification_report, confusion_matrix
```

Load Dataset

In [4]:
```
# Column names (Sentiment140 dataset format)
columns = ['target','id','date','flag','user','text']

df = pd.read_csv("training.1600000.processed.noemoticon.csv",
                 encoding='latin-1',
                 names=columns)

print(df.head())
print(df.shape)
```

```
   target          id                          date      flag  \
0       0  1467810369  Mon Apr 06 22:19:45 PDT 2009  NO_QUERY
1       0  1467810672  Mon Apr 06 22:19:49 PDT 2009  NO_QUERY
2       0  1467810917  Mon Apr 06 22:19:53 PDT 2009  NO_QUERY
3       0  1467811184  Mon Apr 06 22:19:57 PDT 2009  NO_QUERY
4       0  1467811193  Mon Apr 06 22:19:57 PDT 2009  NO_QUERY

              user                                               text
0  _TheSpecialOne_  @switchfoot http://twitpic.com/2y1zl - Awww, t...
1    scotthamilton  is upset that he can't update his Facebook by ...
2         mattycus  @Kenichan I dived many times for the ball. Man...
3          ElleCTF    my whole body feels itchy and like its on fire
4           Karoli  @nationwideclass no, it's not behaving at all....
(1600000, 6)
```

In [8]:
```
df.head()
```

```
Out[8]:
```

	target	text
0	0	awww thats a bummer you shoulda got david ...
1	0	is upset that he cant update his facebook by t...
2	0	i dived many times for the ball managed to sa...
3	0	my whole body feels itchy and like its on fire
4	0	no its not behaving at all im mad why am i he...

```
In [6]:
# Required Columns
df = df[['target','text']]
df['target'] = df['target'].replace(4,1)
```

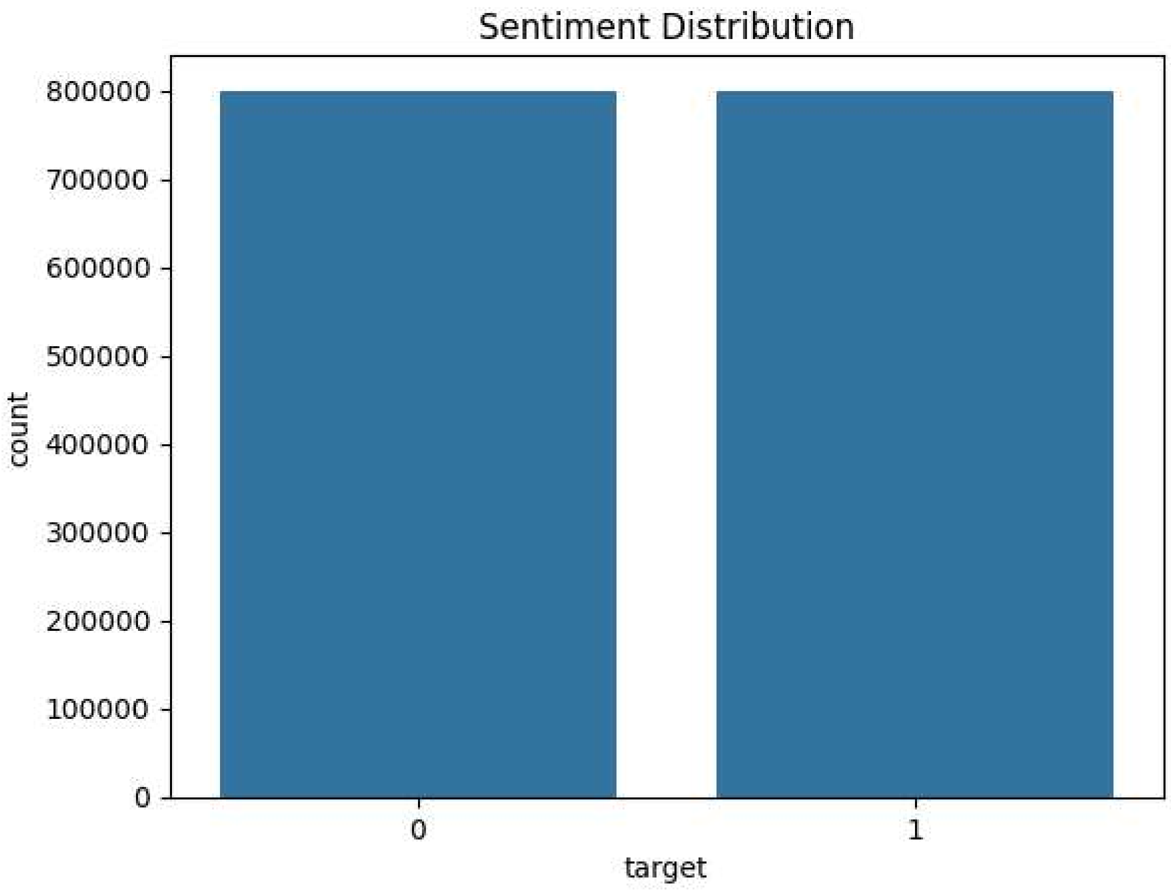
Data Cleaning Function

```
In [7]:
def clean_text(text):
    text = text.lower()
    text = re.sub(r'http\S+', '', text)
    text = re.sub(r'@\w+', '', text)
    text = re.sub(r'#', '', text)
    text = re.sub(r'[^a-zA-Z\s]', '', text)
    return text

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

EDA – Sentiment Distribution

```
In [9]:
sns.countplot(x='target', data=df)
plt.title("Sentiment Distribution")
plt.show()
```



Train Test Split

In [10]:
```
X = df['text']
y = df['target']

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

Convert Text to TF-IDF

In [11]:
```
vectorizer = TfidfVectorizer(max_features=5000)
X_train_vec = vectorizer.fit_transform(X_train)
X_test_vec = vectorizer.transform(X_test)
```

Train Model (Logistic Regression)

In [12]:
```
model = LogisticRegression()
model.fit(X_train_vec, y_train)
```

Out[12]:

```
▾ LogisticRegression
▶ Parameters
```

Prediction

In [13]:

```
y_pred = model.predict(X_test_vec)
```

Model Evaluation

In [14]:

```
print("Accuracy:", accuracy_score(y_test, y_pred))
```

```
Accuracy: 0.790290625
```

In [15]:

```
print(classification_report(y_test, y_pred))
```

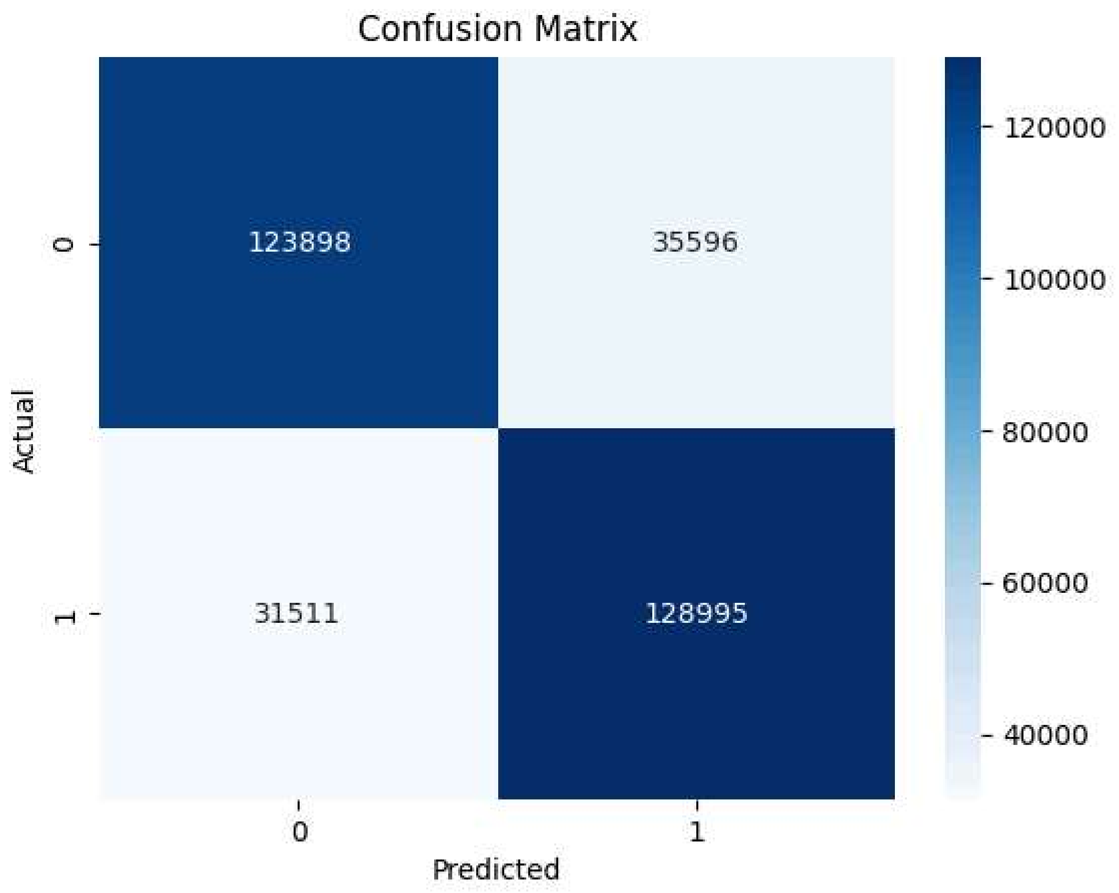
```
              precision    recall  f1-score   support

           0       0.80      0.78      0.79    159494
           1       0.78      0.80      0.79    160506

    accuracy                           0.79    320000
   macro avg       0.79      0.79      0.79    320000
weighted avg       0.79      0.79      0.79    320000
```

In [16]:

```
cm = confusion_matrix(y_test, y_pred)
sns.heatmap(cm, annot=True, fmt='d', cmap='Blues')
plt.xlabel("Predicted")
plt.ylabel("Actual")
plt.title("Confusion Matrix")
plt.show()
```



In [17]:
```python
def predict_sentiment(text):
    text = clean_text(text)
    text_vec = vectorizer.transform([text])
    prediction = model.predict(text_vec)

    if prediction[0] == 1:
        return "Positive "
    else:
        return "Negative "

print(predict_sentiment("I love this product"))
print(predict_sentiment("This is very bad service"))
```

```
Positive
Negative
```