Task-1

Sentiment Analysis on Customer Reviews

Abstract

Sentiment analysis, also known as opinion mining, is a technique used to determine the sentiment of a given text. This report explores how sentiment analysis can be applied to customer reviews using Natural Language Processing (NLP) techniques. The implementation involves classifying reviews into positive, negative, or neutral sentiments.

Introduction

In today's digital world, businesses receive a large volume of customer feedback through reviews and social media. Sentiment analysis helps companies understand customer opinions and improve their products or services accordingly. By applying machine learning and NLP techniques, sentiment analysis automates the process of extracting insights from customer reviews.

Importance & Applications

Sentiment analysis is widely used in:

- **E-commerce**: Understanding customer satisfaction.
- **Social Media Monitoring**: Tracking brand perception.
- **Market Research**: Analyzing trends and customer preferences.
- **Customer Support**: Improving service based on feedback.

Methodology

Data Collection

For this project, customer reviews were used as the dataset. Each review contained text that expressed customer opinions about a product or service.

Preprocessing Steps

1. **Text Cleaning**: Removing special characters, punctuation, and stopwords.
2. **Tokenization**: Splitting text into individual words.
3. **Stemming & Lemmatization**: Reducing words to their base form.

4. **Vectorization**: Converting text into numerical format using TF-IDF or CountVectorizer.

Sentiment Classification

Using **TextBlob**, each review's polarity score is analyzed:

- **Polarity > 0** → Positive sentiment
- **Polarity < 0** → Negative sentiment
- **Polarity = 0** → Neutral sentiment

Results & Discussion

The analysis categorized customer reviews into three sentiment classes:

- **Positive Sentiment (e.g., "Amazing! I love it.")**
- **Negative Sentiment (e.g., "Worst experience ever.")**
- **Neutral Sentiment (e.g., "It is an average product.")**

Visualizations such as bar graphs and pie charts were used to illustrate sentiment distribution. The results showed a mix of customer opinions, highlighting areas for business improvement.

Conclusion & Future Work

Sentiment analysis provides valuable insights into customer feedback. Future enhancements may include:

- **Expanding dataset size** for better accuracy.
- **Using advanced NLP models** such as BERT or LSTM.
- **Integrating multilingual support** for analyzing global reviews.

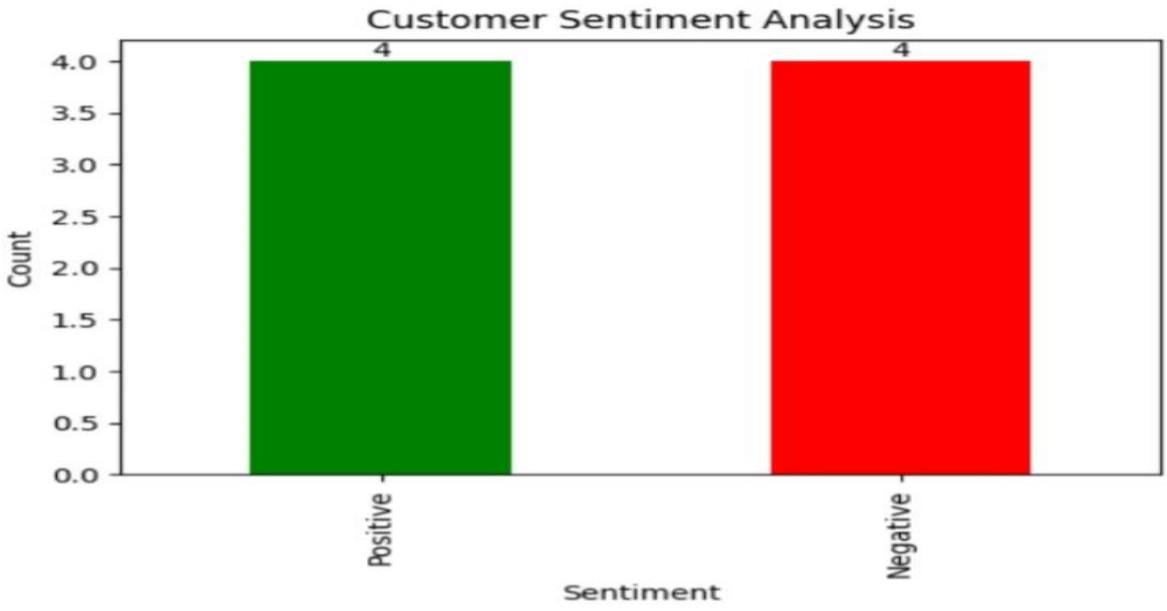
Code

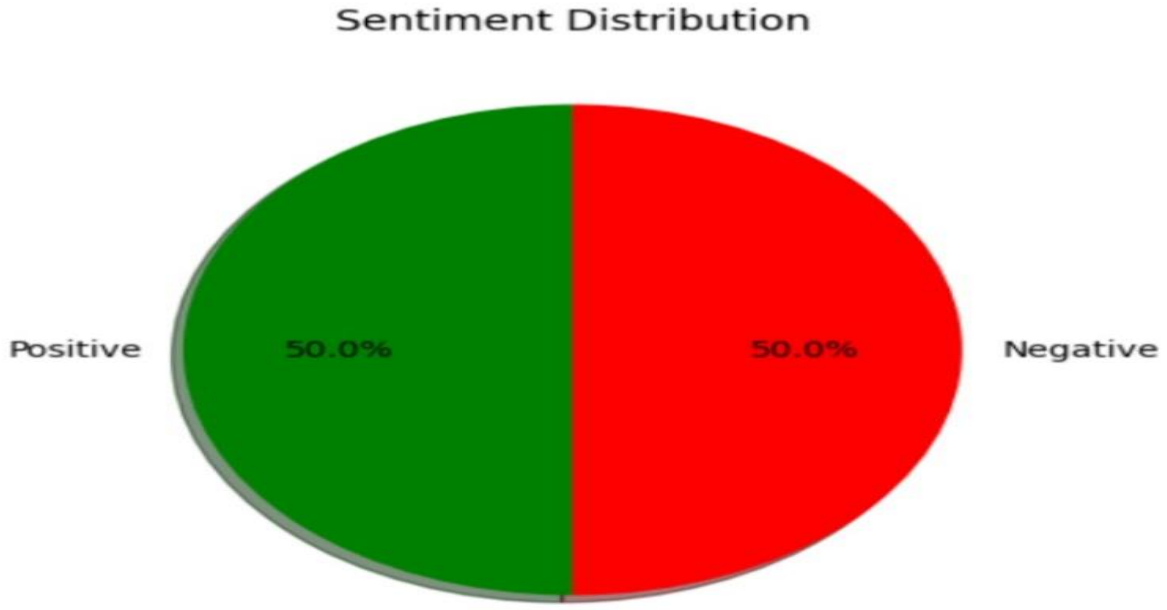
```
import nltk
from textblob import TextBlob
import matplotlib.pyplot as plt
import pandas as pd
from wordcloud import WordCloud

def get_sentiment(text):
    analysis = TextBlob(text)
    polarity = analysis.sentiment.polarity
    if polarity > 0:
        return "Positive"
    elif polarity < 0:
        return "Negative"
    else:
        return "Neutral"

data = [
    {'Review': 'This is a great phone!'},
    {'Review': 'The battery life is terrible.'},
    {'Review': 'It is an okay phone.'},
    {'Review': 'I love the camera quality!'},
    {'Review': 'Worst phone I have ever used.'},
    {'Review': 'The screen resolution is fantastic.'},
    {'Review': 'Not worth the price.'},
    {'Review': 'Battery lasts very long!'},
]
```

```
plt.figure(figsize=(6,4))
ax = sentiment_counts.plot(kind="bar", color=["green", "red", "blue"])
plt.title("Customer Sentiment Analysis")
plt.xlabel("Sentiment")
plt.ylabel("Count")

for i in ax.containers:
    ax.bar_label(i, label_type="edge")

plt.show()


plt.figure(figsize=(5,5))
sentiment_counts.plot.pie(autopct='%1.1f%%', colors=["green", "red", "blue"], startangle=90, shadow=True)
plt.title("Sentiment Distribution")
plt.ylabel("")
plt.show

all_words = " ".join(df["Review"])
wordcloud = WordCloud(width=500, height=300, background_color="white").generate(all_words)

plt.figure(figsize=(7,4))
plt.imshow(wordcloud, interpolation="bilinear")
plt.axis("off")
plt.title("Word Cloud of Reviews")
plt.show()
```

Output

```
                                  Review Sentiment
0                This is a great phone!  Positive
1          The battery life is terrible.  Negative
2                    It is an okay phone.  Positive
3             I love the camera quality!  Positive
4          Worst phone I have ever used.  Negative
5  The screen resolution is fantastic.  Positive
6                    Not worth the price.  Negative
7                 Battery lasts very long!  Negative
```






Word Cloud of Reviews
battery
worth
screen
camera
terrible
okay
life
price
lasts
resolution
phone
quality
great
long
love