MINISTRY OF EDUCATION
IMAM ABDULRAHMAN BIN
FAISAL UNIVERSITY
COLLEGE OF COMPUTER SCIENCE
& INFORMATION TECHNOLOGY

وزارة التعليم
جامعة الإمام
عبد الرحمن بن فيصل
كلية علوم الحاسب
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جامعة الإمام عبد الرحمن بن فيصل
IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

Technical Report: Sentiment Analysis of Amazon Mobile Phone Reviews Using TextBlob

ARTI 402 – Programming for AI

Course Assignment Report

Imam Abdulrahman Bin Faisal University
College of Computer Science & Information Technology

Student Information

Group Members:

- Name: Fajr Abdulaziz Aldawsari Student ID: 2230005063
- Name: Mashael Saleh Almohammed Student ID: 2230005887
- Name: Fatimah Hassan Sowileh Student ID: 2220006563

1. Introduction

Sentiment analysis is a technique used to identify emotions expressed in text, such as positive, negative, or neutral opinions. On platforms like Amazon, thousands of customer reviews make it difficult for sellers to manually analyze feedback.

This project uses Python and the TextBlob library to automatically analyze the sentiment of Amazon product reviews. The goal is to help sellers quickly understand customer opinions and make better business decisions.

2. Problem Statement

Amazon sellers face challenges when trying to read and evaluate large numbers of customer reviews manually. This process is time-consuming, inconsistent, and makes it difficult to identify common problems or trends.

The main problem is the need for an automated system that can categorize each review into positive, negative, or neutral sentiment efficiently and accurately.

3. AI Solution

The proposed solution was developed using Python, Pandas, and the TextBlob library. A function called sentimentAnalyzer was implemented to analyze the sentiment of customer reviews by calculating the polarity score for each review using TextBlob.

Each review was classified based on predefined polarity thresholds as follows:

- Negative: polarity score less than −0.2
- Neutral: polarity score between −0.2 and 0.2
- Positive: polarity score greater than 0.2

The Amazon review dataset was loaded into a Pandas DataFrame and filtered to include one product with more than 1,000 reviews. The sentimentAnalyzer function was then applied to the review text, creating a new column indicating the sentiment classification for each review.

Finally, the analysis results were summarized and visualized using Matplotlib through bar charts, pie charts, and polarity distribution histograms. These visualizations provide a clear overview of customer sentiment and support further analysis of product performance.

4. Use Case: Product Analysis Results

The Selected Product : Apple iPhone 4s 8GB Unlocked Smartphone w/ 8MP Camera , White (Certified Refurbished)

The product was selected due to its large number of customer reviews, which ensures reliable sentiment analysis results.

Dataset Statistics

METRIC	VALUE
Total Reviews Analyzed	1,448
Number of Columns	9
Shortest Review	1 character
Longest Review	1,465 characters
Average Review Length	107.60 characters

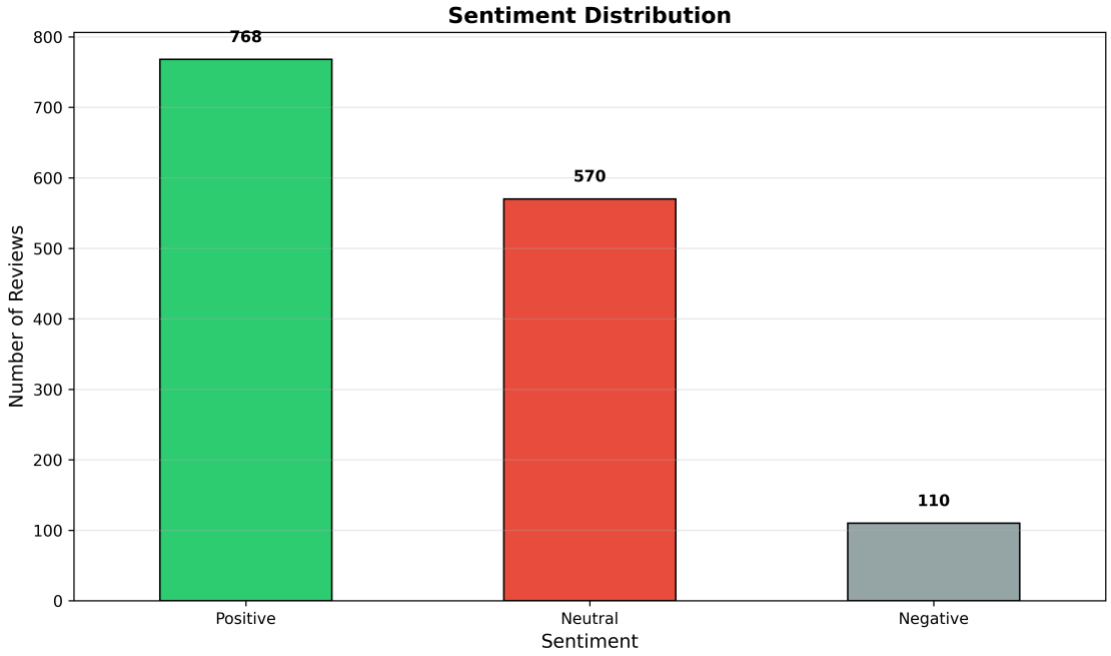
Sentiment Distribution Results

Overall Sentiment Breakdown:

SENTIMENT	COUNT	PERCENTAGE
Positive	768	53.04%
Neutral	570	39.36%
Negative	110	7.60%

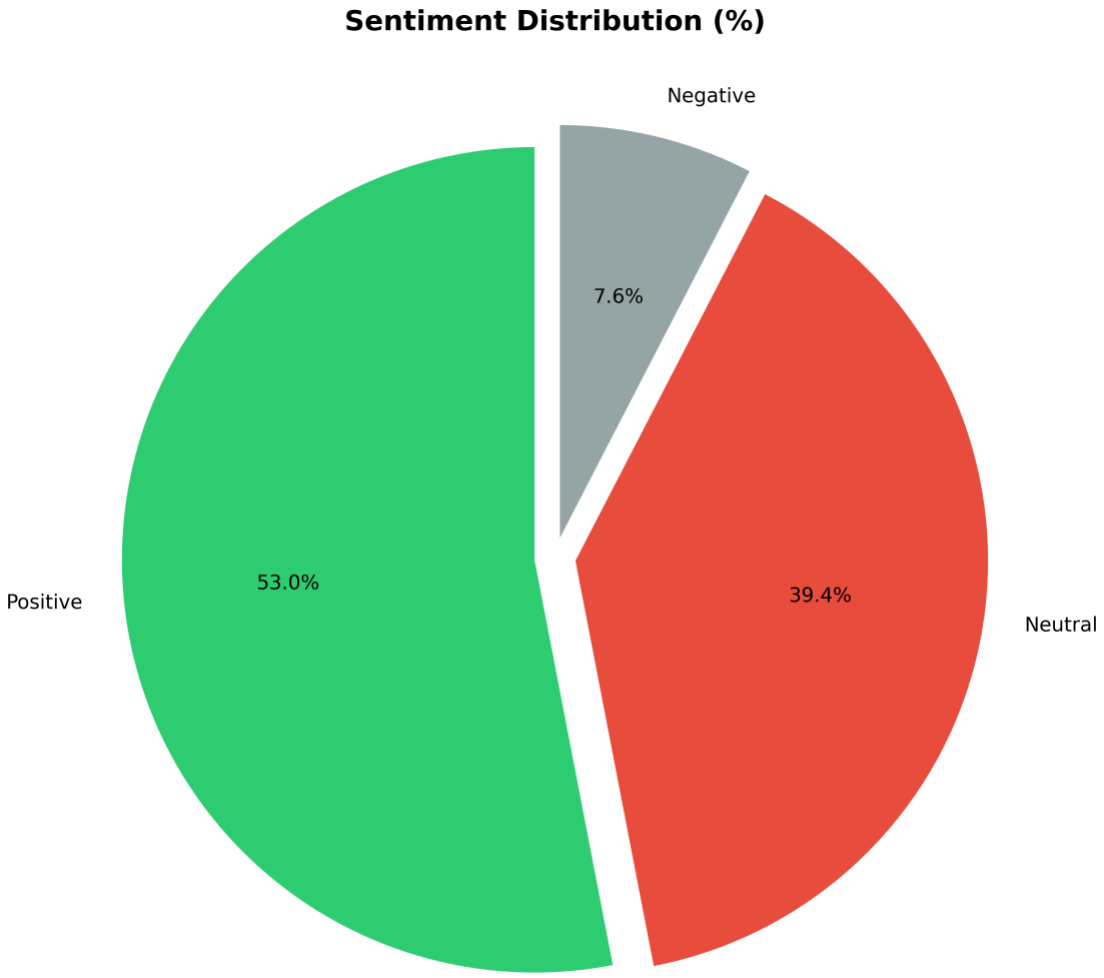
Key Finding : The product shows a **majority positive sentiment** (53%) , indicating overall customer satisfaction , though a significant portion (39%) remains neutral .

Visualizations:



Sentiment Distribution Bar Chart

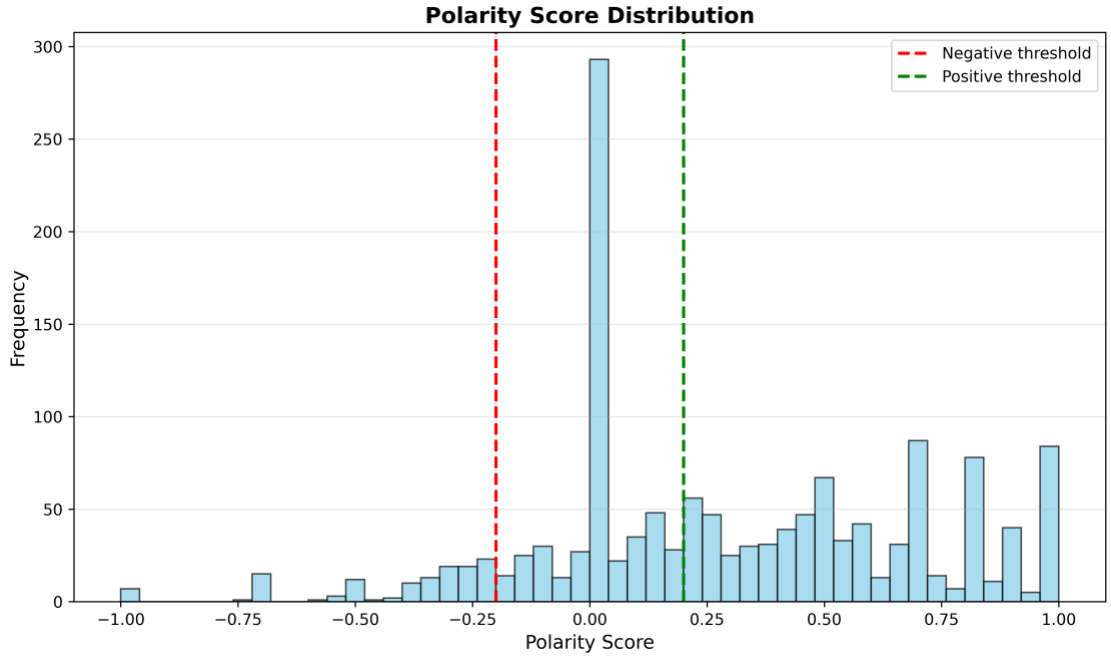
Figure 1: Distribution of sentiment classifications across all reviews



Sentiment Distribution Pie Chart

Figure 2 : Percentage breakdown of sentiment categories

Polarity Distribution Analysis



Polarity Distribution

Figure 3: a Histogram showing the distribution of polarity scores with classification thresholds

Example Reviews

Positive Sentiment Examples :

Example 1 :

- **Review :** "Great product!"
- **Polarity :** 1.0000
- **Rating :** 5 stars
- **Analysis :** Short, enthusiastic endorsement with maximum positive sentiment

Example 2 :

- **Review :** "Works real good"
- **Polarity :** 1.0000
- **Rating :** 5 stars
- **Analysis :** Simple positive feedback on functionality

Example 3 :

- **Review :** "This iPhone was perfect for what I needed. Arrived in perfect condition, unlocked as said, and is working perfectly."
- **Polarity :** 1.0000
- **Rating :** 5 stars
- **Analysis :** Detailed positive review highlighting multiple satisfaction points

Negative Sentiment Examples :

Example 1 :

- **Review :** "Product was not unlocked as stated! Awful to find out the day before Christmas!!!"
- **Polarity :** -1.0000
- **Rating :** 1 star
- **Analysis :** Severe disappointment due to misleading product description

Example 2 :

- **Review :** "Awful, not unlocked"
- **Polarity :** -1.0000
- **Rating :** 1 star
- **Analysis :** Concise negative feedback on primary product failure

Example 3 :

- **Review :** "this is a 3G not a 4G as we thought and we cannot get on the internet outside of wifi very disappointed"
- **Polarity :** -0.9750
- **Rating :** 1 star
- **Analysis :** Technical specification mismatch causing significant disappointment

Neutral Sentiment Examples :

Example 1 :

- **Review :** "I bought and send to Africa the two are not working"
- **Polarity :** 0.0000

- **Rating :** 1 star
- **Analysis :** Factual statement without strong emotional language (potential misclassification)

Example 2 :

- **Review :** "Had difficulty connecting to wifi"
- **Polarity :** 0.0000
- **Rating :** 4 stars
- **Analysis :** Mentions an issue but lacks strong negative language

Potential Misclassifications

Low Ratings (1-2 stars) with Positive/Neutral Sentiment : 388 reviews

Example Misclassification :

- **Review :** "Do not buy this phone. it is used, no head phone, chip charger not original, no iPhone box"
- **Rating :** 1 star
- **Sentiment Classified :** Neutral
- **Polarity :** -0.1875

Why Misclassification Occurred :

1. **Threshold Proximity :** Polarity of -0.1875 falls just above the negative threshold (-0.2)
2. **Factual Language :** Review lists factual issues without strong emotional words
3. **Negation Complexity :** "Do not buy" contains negation that may not be fully captured
4. **Missing Context :** TextBlob lacks context about severity of listed issues

High Ratings (4-5 stars) with Negative Sentiment: 0 reviews

Finding: No high-rated reviews were classified as negative, indicating good alignment at the positive end of the spectrum.

5. Alignment Between AI Solution and Client's Needs

The developed sentiment analysis system directly supports the needs of an Amazon seller by providing fast, accurate, and automated insights into customer reviews. Instead of manually reading thousands of reviews, the system analyzes all 1,448 reviews within minutes and classifies each as Positive, Neutral, or Negative.

1. Understanding Customer Opinions Quickly

The system saves significant time by automating the classification process and offering consistent and immediate insights. Instead of manually reviewing for days, the seller can instantly see the sentiment distribution (53% positive, 39% neutral, 7.6% negative).

2. Identifying Product Issues

Negative reviews (110 reviews) are highlighted, making it easier for the seller to understand customer concerns. Common issues include unlocking problems, product condition, misleading descriptions, and missing accessories. This allows the seller to prioritize problems and take focused action.

3. Tracking Overall Product Performance

Visualizations and summary statistics clearly show overall customer satisfaction. The high positive sentiment indicates strong acceptance, while the neutral sentiment highlights opportunities to improve. This supports decisions related to pricing, marketing, and product quality.

4. Supporting Data-Driven Decisions

The system provides objective numerical metrics such as sentiment percentages, polarity values, and rating correlations. These insights help the seller make informed decisions about inventory, pricing strategy, marketing focus, and product improvements.

5. Improving Customer Satisfaction

Early detection of negative feedback enables quick responses to customer problems, reducing potential reputation damage. Sellers can contact unhappy customers, improve product descriptions, enhance quality control, and encourage neutral customers to convert to positive.

6. Conclusion

The project successfully created an automated sentiment analysis system using TextBlob. The results revealed that the selected product has mostly positive reviews, with a small number of negative comments that sellers can address to improve customer satisfaction.

This tool saves time, reduces manual effort, and gives sellers valuable insights to enhance product quality and customer experience.

7. References

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