

ANALYTICS FOR STRATEGIC DECISIONS: A CASE STUDY ON IPHONE 15

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EXECUTIVE SUMMARY

This analysis delves into customer sentiment surrounding the iPhone 15 128GB model on Flipkart, offering insights into user perceptions and experiences. By leveraging data scraping, sentiment analysis, and statistical tools, the goal was to assess public opinion and highlight key product strengths and weaknesses.



OBJECTIVES

Analyze Customer Sentiment

Assess the overall sentiment of customer reviews for the iPhone 15 128GB model.

Extract Key Insights:

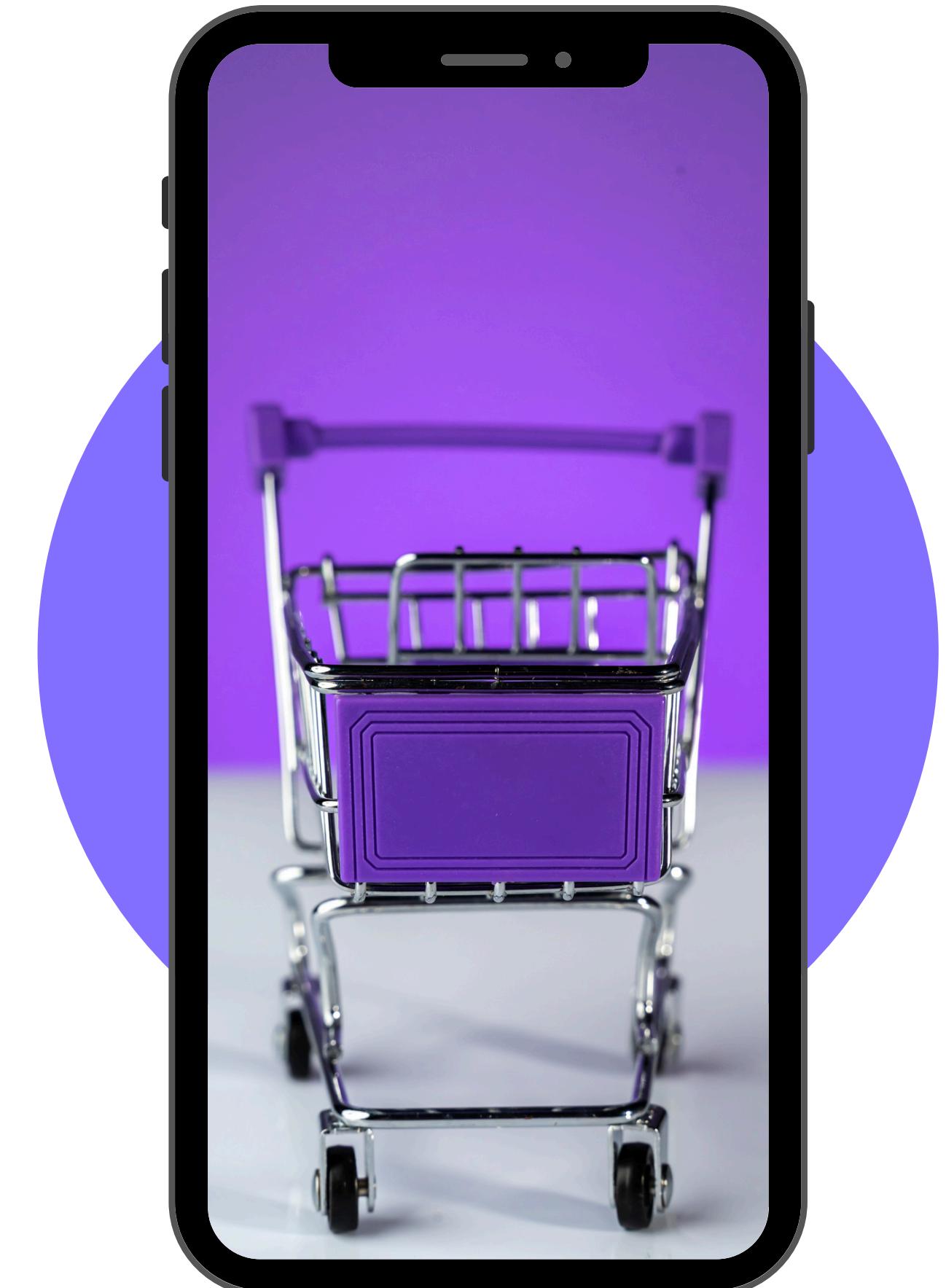
Identify strengths and weaknesses based on positive and negative feedback.

Correlate Ratings with Sentiment:

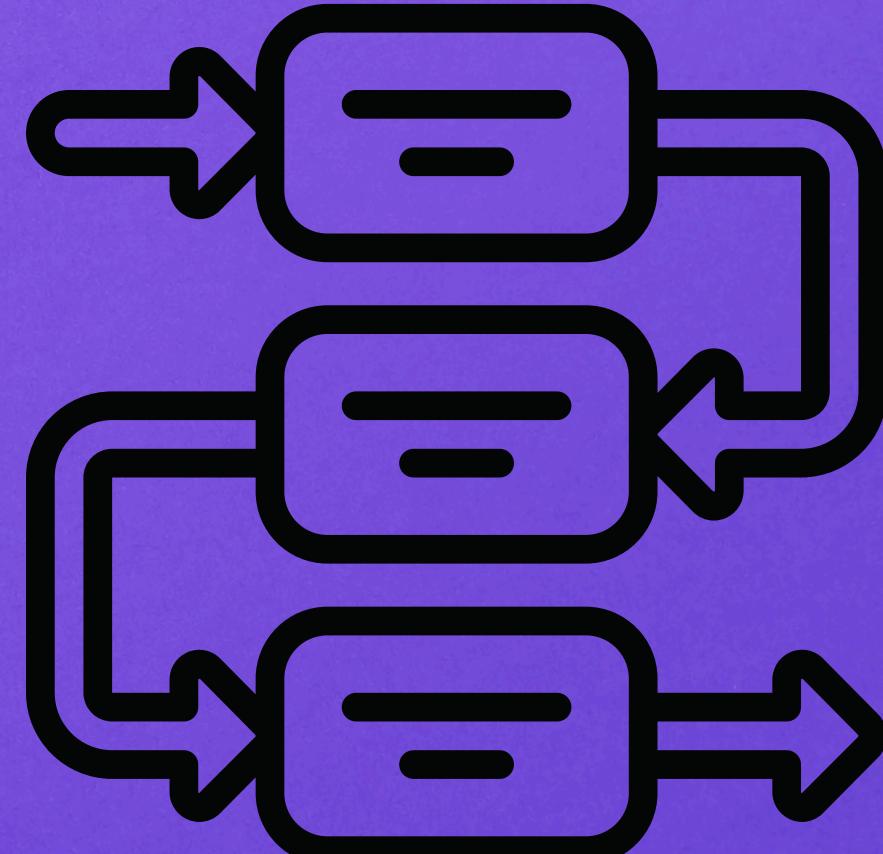
Determine if higher ratings align with positive sentiments and vice versa.

Inform Strategy:

Provide actionable insights for product improvements and targeted marketing.



METHODOLOGY



The following steps were undertaken to collect, process, and analyze the data:

- **Data Collection:** Extracted 300+ customer reviews from Flipkart using Selenium and BeautifulSoup to ensure comprehensive user feedback.
- **Data Cleaning:** Preprocessed raw data by removing duplicates, handling missing values, and applying text normalization techniques (lowercasing, tokenization, stopword removal, and lemmatization).
- **Sentiment Analysis:** Used TextBlob to classify reviews based on sentiment polarity, categorizing them into positive or negative based on predefined thresholds.
- **Data Visualization and Insights:** Conducted sentiment distribution analysis, created word clouds, and performed review length analysis to identify trends and highlight customer concerns.

Data Collection (Web Scrapping)

- Task - Scrape at least 300 customer reviews from Amazon product page for the iPhone 15 128GB model. Each review should include username, rating and review text

Steps -

- Set up Selenium to automate browser interactions, navigate to Flipkart's product page for iPhone 15 128GB, and extract the reviews.
- Use BeautifulSoup to parse the HTML of the reviews and extract the relevant details (username, rating, and review text).

- Tools - Selenium & BeautifulSoup

```
#DATA COLLECTION (WEB SCRAPING)
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from selenium import webdriver
from bs4 import BeautifulSoup
from selenium.webdriver.common.by import By
from selenium.webdriver.common.keys import Keys
import time
import nltk
from textblob import TextBlob
import requests
import re

#START CHROME WEBDRIVER
driver = webdriver.Chrome()
```

Note:- Ensure that the scraper handles pagination to retrieve reviews from multiple pages if necessary.

Data Cleaning and Preprocessing

- Task - Clean and preprocess the scraped data for analysis.

Steps -

Remove Duplicates

- Action: Eliminate duplicate reviews to maintain data quality.

Handle Missing Values

- Action: Remove or fill in missing review text or ratings to avoid incomplete data.

Text Preprocessing

- Action: Clean review text for analysis:
- Lowercase: Standardize text.
- Remove Irrelevant Characters: Strip special characters and extra spaces.
- Tokenization: Split text into words.
- Remove Stopwords: Eliminate common, non-informative words.
- Lemmatization: Convert words to their base forms.

• Tool Used - Pandas

```
# INITIALIZE LISTS TO STORE DATA
name=[]
rating=[]
review=[]
City = []
#FLIPKART PRODUCT REVIEWS URL
url = """https://www.flipkart.com/apple-iphone-15-blue-128-gb/product-
#SCRAPE MULTIPLE PAGES
for i in range(1,5):
    new_url = url + "&page=" +str(i)
    r = requests.get(new_url)
    soup = BeautifulSoup(r.text , "html.parser")
#EXTRACTING NAMES
names = soup.find_all("p" , {"class" : "_2NsDsF AwS1CA"})
for i in names:
    name.append(i.text)
name
#EXTRACTING RATINGS
ratings = soup.find_all("div" , {"class" : "XQDdHH Ga3i8K"})
for i in ratings:
    rating.append(i.text)
rating
#EXTRACTING REVIEWS
reviews = soup.find_all("div" , {"class" : "ZmyHeo"})
for i in reviews:
    review.append(i.text)
review
print(len(name) , len(review) , len(rating))
```



Data Exploration

```
df = pd.DataFrame({"CUSTOMER NAME" : name , "RATING" : rating , "REVIEW" : review})  
df
```

	CUSTOMER NAME	RATING	REVIEW
0	bijaya mohanty	5	Just go for it.Amazing oneBeautiful camera wi...
1	Ajin V	5	High quality camera 😍READ MORE
2	Rahul Shedge	5	Totally happy!Camera 5Battery 5 Display 5Design...
3	Mousam Guha Roy	4	Very niceREAD MORE
4	Nikhil Kumar	5	Switch from OnePlus to iPhone I am stunned wit...
5	Prithivi Boruah	5	Camera Quality Is Improved Loving ItREAD MORE
6	Flipkart Customer	5	Awesome photography experience. Battery backup...
7	Rishabh Jha	5	Awesome 🔥 🔥 😊READ MORE
8	Akshay Meena	5	So beautiful, so elegant, just a wowwww 😍 ❤️ READ ...
9	Arunji Govindaraju	5	Awesome product very happy to hold this. Bette...
10	CHETAN TILWALIA	5	Nice 🌟 READ MORE
11	VinodKUMAR VinodKUMAR	4	Nice phone goodREAD MORE
12	Varsha Sadanand Salve	5	The iPhone 15 exceeded my expectations in ever...
13	Ankit Verma	4	Awesome camra quality superb camra 😊 READ MORE
14	Flipkart Customer	5	Using this Iphone 15 from 1month and it has be...



Data Cleaning

```
#DATA CLEANING  
df["CUSTOMER NAME"] = df["CUSTOMER NAME"].str.title()  
df["REVIEW"] = df["REVIEW"].str.replace("READ MORE" , "")  
df
```

	CUSTOMER NAME	RATING	REVIEW
0	Bijaya Mohanty	5	Just go for it.Amazing oneBeautiful camera wi...
1	Ajin V	5	High quality camera 😍
2	Rahul Shedge	5	Totally happy!Camera 5Battery 5 Display 5Design...
3	Mousam Guha Roy	4	Very nice
4	Nikhil Kumar	5	Switch from OnePlus to iPhone I am stunned wit...
5	Prithivi Boruah	5	Camera Quality Is Improved Loving It
6	Flipkart Customer	5	Awesome photography experience. Battery backup...
7	Rishabh Jha	5	Awesome 🔥 🔥 😊
8	Akshay Meena	5	So beautiful, so elegant, just a wowwww 😍 ❤️
9	Arunji Govindaraju	5	Awesome product very happy to hold this. Bette...
10	Chetan Tilwalia	5	Nice 🌟
11	Vinodkumar Vinodkumar	4	Nice phone good
12	Varsha Sadanand Salve	5	The iPhone 15 exceeded my expectations in ever...
13	Ankit Verma	4	Awesome camra quality superb camra 😊
14	Flipkart Customer	5	Using this Iphone 15 from 1month and it has be...



Text Preprocessing

```
def split_into_sentences(text):
    if not isinstance(text, str):
        return []
    return re.findall(r'[^.!?]+[.!?]', text)

# Apply the function
df["REVIEW1"] = df["REVIEW"].apply(split_into_sentences)
df
```

	CUSTOMER NAME	RATING	REVIEW	REVIEW1
0	Bijaya Mohanty	5	Just go for it. Amazing one. Beautiful camera wi...	[Just go for it., Amazing one.]
1	Ajin V	5	High quality camera 😍	[]
2	Rahul Shedge	5	Totally happy! Camera 5 Battery 5 Display 5 Design 5	[Totally happy!]
3	Mousam Guha Roy	4	Very nice	[]
4	Nikhil Kumar	5	Switch from OnePlus to iPhone I am stunned wit...	[Switch from OnePlus to iPhone I am stunned wi...
5	Prithivi Boruah	5	Camera Quality Is Improved Loving It	[]
6	Flipkart Customer	5	Awesome photography experience. Battery backup...	[Awesome photography experience., Battery bac...
7	Rishabh Jha	5	Awesome 🔥 🔥 😊	[]
8	Akshay Meena	5	So beautiful, so elegant, just a wowwww 😍 ❤️	[]
9	Arunji Govindaraju	5	Awesome product very happy to hold this. Bette...	[Awesome product very happy to hold this., Be...
10	Chetan Tilwalia	5	Nice 🌟	[]
11	Vinodkumar Vinodkumar	4	Nice phone good	[]

Sentiment Analysis

```

import pandas as pd
from textblob import blob
def get_polarity(sentences):
    return [TextBlob(sentence).sentiment.polarity for sentence in sentences]
df["Polarity"] = df["REVIEW1"].apply(get_polarity)
df
df["Subjectivity"] = df["REVIEW"].apply(lambda x : TextBlob(x).sentiment.subjectivity)
df

```

	CUSTOMER NAME	RATING	REVIEW	REVIEW1	Polarity	Subjectivity
0	Bijaya Mohanty	5	Just go for it. Amazing one. Beautiful camera wi...	[Just go for it., Amazing one.]	[0.0, 0.6000000000000001]	0.633333
1	Ajin V	5	High quality camera 😊	[]	[]	0.540000
2	Rahul Shedge	5	Totally happy! Camera 5 Battery 5 Display 5 Design 5	[Totally happy!]	[1.0]	0.750000
3	Mousam Guha Roy	4	Very nice	[]	[]	1.000000
4	Nikhil Kumar	5	Switch from OnePlus to iPhone I am stunned wit...	[Switch from OnePlus to iPhone I am stunned wi...	[0.0, 1.0]	1.000000
5	Prithivi Boruah	5	Camera Quality Is Improved Loving It	[]	[]	0.950000
6	Flipkart Customer	5	Awesome photography experience. Battery backup...	[Awesome photography experience., Battery bac...	[1.0, 0.7, 0.5]	0.700000
7	Rishabh Jha	5	Awesome 🔥🔥😊	[]	[]	1.000000
8	Akshay Meena	5	So beautiful, so elegant, just a wowwww 😍 ❤	[]	[]	1.000000

```

from statistics import mean
def calculate_average_polarity(polarities):
    return mean(polarities) if polarities else 0
df["Average_Polarity"] = df["Polarity"].apply(calculate_average_polarity)
df.head(10)

```

	CUSTOMER NAME	RATING	REVIEW	REVIEW1	Polarity	Subjectivity	Average_Polarity
0	Bijaya Mohanty	5	Just go for it.Amazing oneBeautiful camera wi...	[Just go for it., Amazing one.]	[0.0, 0.6000000000000001]	0.633333	0.300000
1	Ajin V	5	High quality camera 🎉	[]	[]	0.540000	0.000000
2	Rahul Shedge	5	Totally happy!Camera 5Battery 5 Display 5Design 5	[Totally happy!]	[1.0]	0.750000	1.000000
3	Mousam Guha Roy	4	Very nice	[]	[]	1.000000	0.000000
4	Nikhil Kumar	5	Switch from OnePlus to iPhone I am stunned wit...	[Switch from OnePlus to iPhone I am stunned wi...	[0.0, 1.0]	1.000000	0.500000
5	Prithivi Boruah	5	Camera Quality Is Improved Loving It	[]	[]	0.950000	0.000000
6	Flipkart Customer	5	Awesome photography experience. Battery backup...	[Awesome photography experience., Battery bac...	[1.0, 0.7, 0.5]	0.700000	0.733333
7	Rishabh Jha	5	Awesome 🔥🔥😊	[]	[]	1.000000	0.000000
8	Akshay Meena	5	So beautiful, so elegant, just a wowww 😍 ❤️	[]	[]	1.000000	0.000000
9	Arunji Govindaraju	5	Awesome product very happy to hold this. Bette...	[Awesome product very happy to hold this., Be...	[1.0, 0.5, 0.5, 0.0, -0.1, 0.6666666666666666]	0.557407	0.427778

```

def sentiment(pol):
    if pol >= 0.75:
        return "Extremely Positive"
    elif pol > 0:
        return "Positive"
    elif pol == 0:
        return "Neutral"
    elif pol <= -0.75:
        return "Negative"
    else :
        return "Extremely Negative"
df["Sentiment"] = df["Average_Polarity"].apply(sentiment)
df

```

	CUSTOMER NAME	RATING	REVIEW	REVIEW1	Polarity	Subjectivity	Average_Polarity	Sentiment
0	Bijaya Mohanty	5	Just go for it.Amazing one.Beautiful camera wi...	[Just go for it., Amazing one.]	[0.0, 0.6000000000000001]	0.633333	0.300000	Positive
1	Ajin V	5	High quality camera 😊	[]	[]	0.540000	0.000000	Neutral
2	Rahul Shedge	5	Totally happy!Camera 5Battery 5 Display 5Design 5	[Totally happy!]	[1.0]	0.750000	1.000000	Extremely Positive
3	Mousam Guha Roy	4	Very nice	[]	[]	1.000000	0.000000	Neutral
4	Nikhil Kumar	5	Switch from OnePlus to iPhone I am stunned wit...	[Switch from OnePlus to iPhone I am stunned wi...	[0.0, 1.0]	1.000000	0.500000	Positive
5	Prithivi Boruah	5	Camera Quality Is Improved Loving It	[]	[]	0.950000	0.000000	Neutral
6	Flinkart Customer	5	Awesome photography	[Awesome photography]	[1.0, 0.7, 0.5]	0.700000	0.733333	Positive

```
pol = df["Average_Polarity"].mean()

if pol <= -0.6:
    print("Extremely Negative")
elif pol <= -0.2:
    print("Negative")
elif pol < 0.2:
    print("Neutral")
elif pol <= 0.6:
    print("Positive")
else:
    print("Extremely Positive")
```

Neutral

CONCLUSION

- Comprehensive Analysis: The sentiment analysis of 300+ customer reviews for the iPhone 15 128GB model provided valuable insights into user perceptions.
- Key Findings:
- Positive Sentiments: Customers praised the camera, performance, and display.
- Negative Sentiments: Common complaints focused on battery life, overheating, and pricing.
- Actionable Insights:
- Product Improvement: Focus on enhancing battery performance and thermal management.
- Marketing Strategy: Highlight strengths like the camera and display in campaigns.
- Next Steps: Use these insights to guide product improvements, refine marketing strategies, and enhance the customer experience for future iterations of the iPhone.



GET IN TOUCH !

If you have any questions,
suggestions, or need assistance,
please don't hesitate to reach out to
us.

THANK YOU!



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