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 Fli pkart, offering i nsights i nto 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

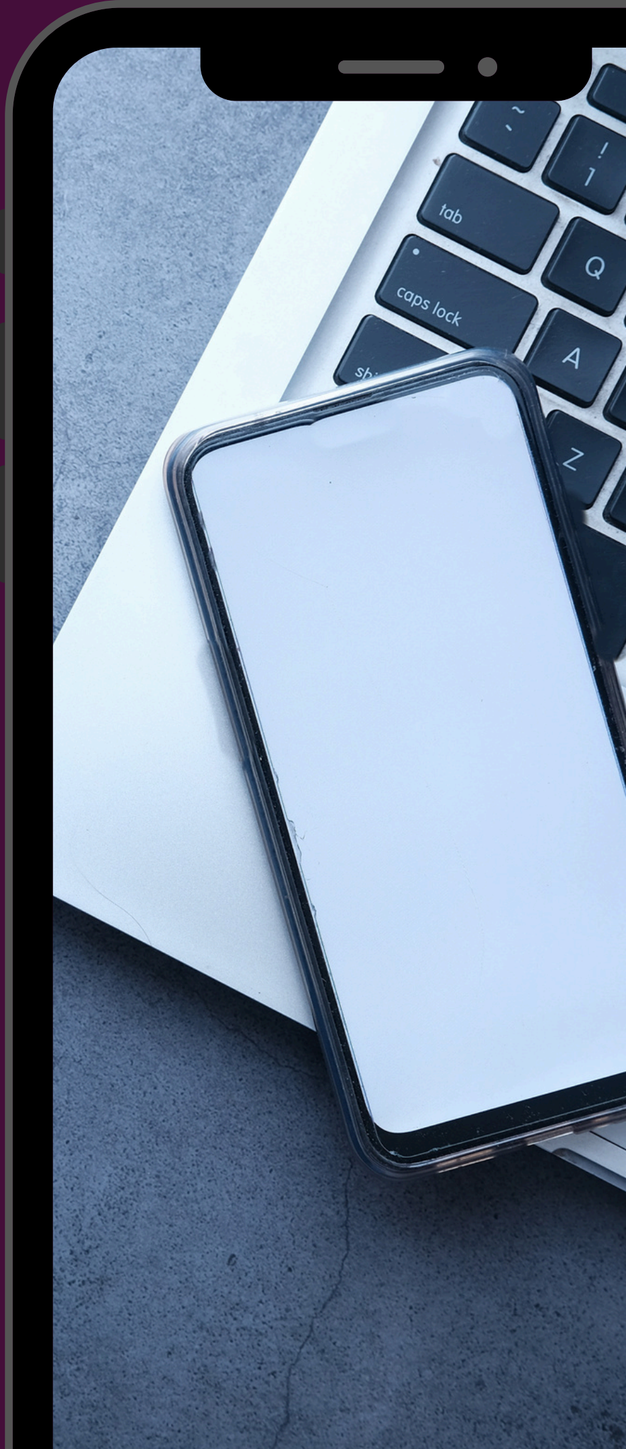
Inform Strategy

Provide actionable insights for product improvements and targeted marketing.

Our Tasks

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

- Data Collection: Extracted 300+ customer r eviews from Flipkart using Selenium and BeautifulSoup to ensure comprehensive user f eedback.
- 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 r eviews 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 t o 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

Step :-

- Set up Selenium to automate browser interactions, navigate to Flipkart's product page for i Phone 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

```
#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()
```

Data Cleaning and Preprocessing

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

Step :-

Tools:-Pandas

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.

```
# 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-reviews/
itmbf14ef54f645d?pid=MOBGTAGPAQNVFZZY&lid=LSTMOBGTAGPAQNVFZZY7RHDU7&marketpla
#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

[21]:
```
df = pd.DataFrame({"CUSTOMER NAME" : name , "RATING" : rating , "REVIEW" : review})
df
```

[21]:

	CUSTOMER NAME	RATING	REVIEW
0	Neeraj Chouhan	5	Amezing camera and all over best phone 👌 READ MORE
1	bijaya mohanty	5	Just go for it.Amazing one.Beautiful camera wi...
2	Ajin V	5	High quality camera 😍 READ MORE
3	Mousam Guha Roy	4	Very niceREAD MORE
4	Flipkart Customer	5	Awesome photography experience. Battery backup...
5	Rishabh Jha	5	Awesome 🔥 🔥 😊 READ MORE
6	Prithivi Boruah	5	Camera Quality Is Improved Loving ItREAD MORE
7	Nikhil Kumar	5	Switch from OnePlus to iPhone I am stunned wit...
8	Akshay Meena	5	So beautiful, so elegant, just a vowww 😍 ❤️ READ ...
9	Arunji Govindaraju	5	Awesome product very happy to hold this. Bette...
10	Saurabh Gothwad	5	Simply premium.READ MORE
11	Sheetla Prasad Maurya	4	Best mobile phoneCamera quality is very nice B...
12	Rahul Shedge	5	Totally happy!Camera 5Battery 5 Display 5Desig...
13	Kriti Customer	5	Just loved the product , colour , design is wo...
14	Talim (sk)	5	I love this phone. The camera is amazing: its ...
15	mohit yadav	5	Nice ❤️ READ MORE
16	Afzol Hussain	5	Thanks Flipkart I m glad such a beautiful iPho...

🧹 Data Cleaning

[22]:
```
#DATA CLEANING
df["CUSTOMER NAME"] = df["CUSTOMER NAME"].str.title()
df["REVIEW"]= df["REVIEW"].str.replace("READ MORE" , "")
df
```

[22]:

	CUSTOMER NAME	RATING	REVIEW
0	Neeraj Chouhan	5	Amezing camera and all over best phone 👌
1	Bijaya Mohanty	5	Just go for it.Amazing one.Beautiful camera wi...
2	Ajin V	5	High quality camera 😍
3	Mousam Guha Roy	4	Very nice
4	Flipkart Customer	5	Awesome photography experience. Battery backup...
5	Rishabh Jha	5	Awesome 🔥 🔥 😊
6	Prithivi Boruah	5	Camera Quality Is Improved Loving It
7	Nikhil Kumar	5	Switch from OnePlus to iPhone I am stunned wit...
8	Akshay Meena	5	So beautiful, so elegant, just a vowww 😍 ❤️
9	Arunji Govindaraju	5	Awesome product very happy to hold this. Bette...
10	Saurabh Gothwad	5	Simply premium.
11	Sheetla Prasad Maurya	4	Best mobile phoneCamera quality is very nice B...
12	Rahul Shedge	5	Totally happy!Camera 5Battery 5 Display 5Design 5
13	Kriti Customer	5	Just loved the product , colour , design is wo...
14	Talim (Sk)	5	I love this phone. The camera is amazing: its ...

Text Preprocessing

[23]:
```
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
```

[23]:

	CUSTOMER NAME	RATING	REVIEW	REVIEW1
0	Neeraj Chouhan	5	Amezing camera and all over best phone 👌	[]
1	Bijaya Mohanty	5	Just go for it.Amazing one.Beautiful camera wi...	[Just go for it., Amazing one.]
2	Ajin V	5	High quality camera😍	[]
3	Mousam Guha Roy	4	Very nice	[]
4	Flipkart Customer	5	Awesome photography experience. Battery backup...	[Awesome photography experience., Battery bac...
5	Rishabh Jha	5	Awesome 🔥🔥😊	[]
6	Prithivi Boruah	5	Camera Quality Is Improved Loving It	[]
7	Nikhil Kumar	5	Switch from OnePlus to iPhone I am stunned wit...	[Switch from OnePlus to iPhone I am stunned wi...
8	Akshay Meena	5	So beautiful, so elegant, just a vowww😍❤️	[]
9	Arunji Govindaraju	5	Awesome product very happy to hold this. Bette...	[Awesome product very happy to hold this., Be...
10	Saurabh Gothwad	5	Simply premium.	[Simply premium.]
11	Sheetla Prasad Maurya	4	Best mobile phoneCamera quality is very nice B...	[Best mobile phoneCamera quality is very nice ...

🧠 Sentiment Analysis

[24]:
```
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
```

[24]:

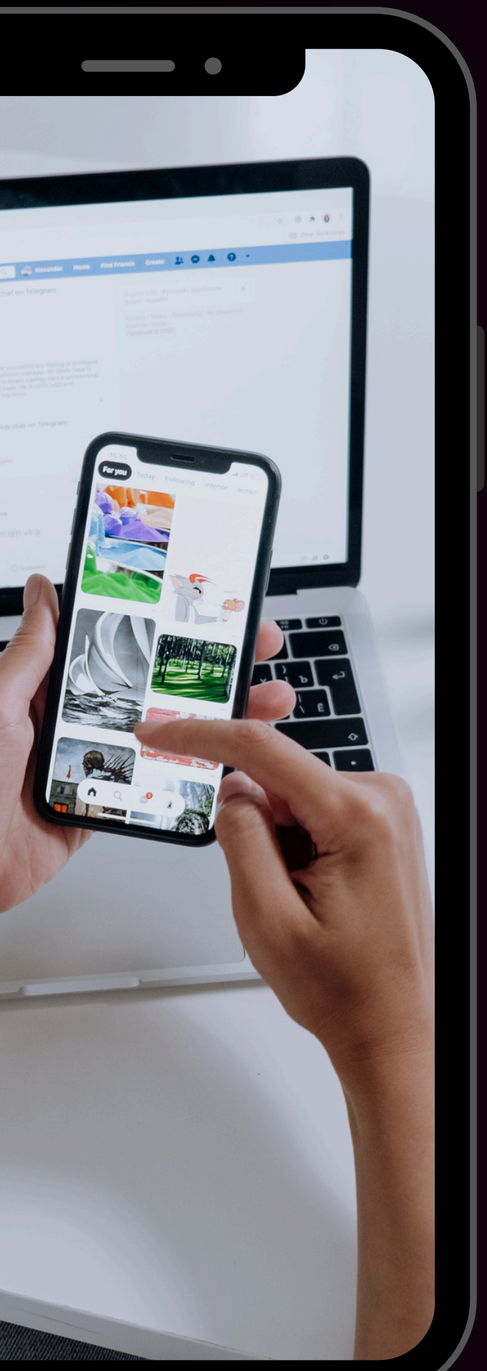
	CUSTOMER NAME	RATING	REVIEW	REVIEW1	Polarity	Subjectivity
0	Neeraj Chouhan	5	Amezing camera and all over best phone 👌	[]	[]	0.300000
1	Bijaya Mohanty	5	Just go for it.Amazing one.Beautiful camera wi...	[Just go for it., Amazing one.]	[0.0, 0.6000000000000001]	0.633333
2	Ajin V	5	High quality camera😍	[]	[]	0.540000
3	Mousam Guha Roy	4	Very nice	[]	[]	1.000000
4	Flipkart Customer	5	Awesome photography experience. Battery backup...	[Awesome photography experience., Battery bac...	[1.0, 0.7, 0.5]	0.700000
5	Rishabh Jha	5	Awesome 🔥🔥😊	[]	[]	1.000000
6	Prithivi Boruah	5	Camera Quality Is Improved Loving It	[]	[]	0.950000

```
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	Neeraj Chouhan	5	Amezing camera and all over best phone 👌	[]	[]	0.300000	0.000000
1	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
2	Ajin V	5	High quality camera😍	[]	[]	0.540000	0.000000
3	Mousam Guha Roy	4	Very nice	[]	[]	1.000000	0.000000
4	Flipkart Customer	5	Awesome photography experience. Battery backup...	[Awesome photography experience., Battery bac...	[1.0, 0.7, 0.5]	0.700000	0.733333
5	Rishabh Jha	5	Awesome 🔥🔥😊	[]	[]	1.000000	0.000000
6	Prithivi Boruah	5	Camera Quality Is Improved Loving It	[]	[]	0.950000	0.000000
7	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
8	Akshay Meena	5	So beautiful, so elegant, just a vowww 😍❤️	[]	[]	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

```python
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	Neeraj Chouhan	5	Amezing camera and all over best phone 👌	[]	[]	0.300000	0.000000	Neutral
1	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
2	Ajin V	5	High quality camera😍	[]	[]	0.540000	0.000000	Neutral
3	Mousam Guha Roy	4	Very nice	[]	[]	1.000000	0.000000	Neutral
4	Flipkart Customer	5	Awesome photography experience. Battery backup...	[Awesome photography experience., Battery bac...	[1.0, 0.7, 0.5]	0.700000	0.733333	Positive
5	Rishabh Jha	5	Awesome 🔥🔥😊	[]	[]	1.000000	0.000000	Neutral
6	Prithivi Boruah	5	Camera Quality Is Improved Loving It	[]	[]	0.950000	0.000000	Neutral

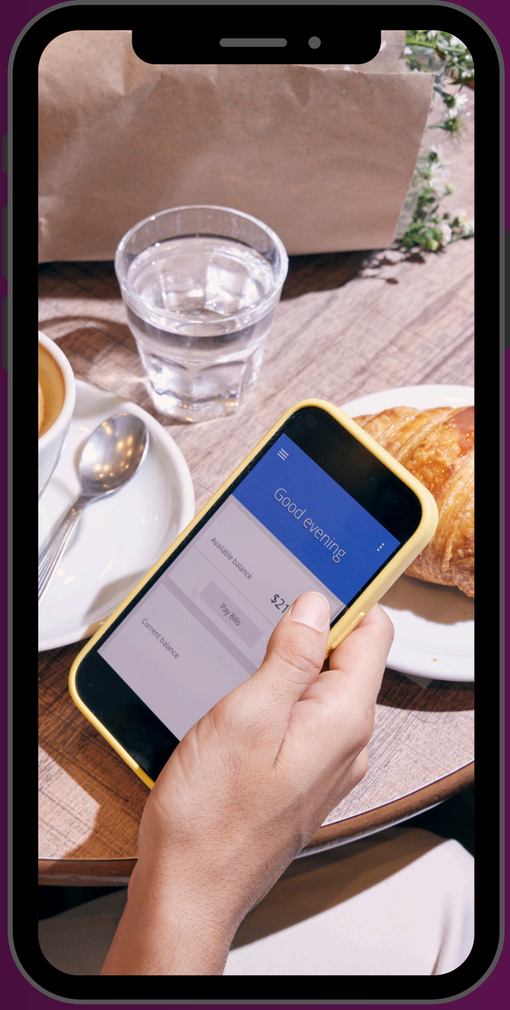


```
if pol <= -0.6:
    print("Extremely Negative")
elif pol <= -0.2:
    print("Negative")
elif pol <0.2:
    print("Neutral")
elif pol <= 0.6:
    print("Positive")
else:
    print("Extremely Positive")
```

```
Positive
```

Conclusion

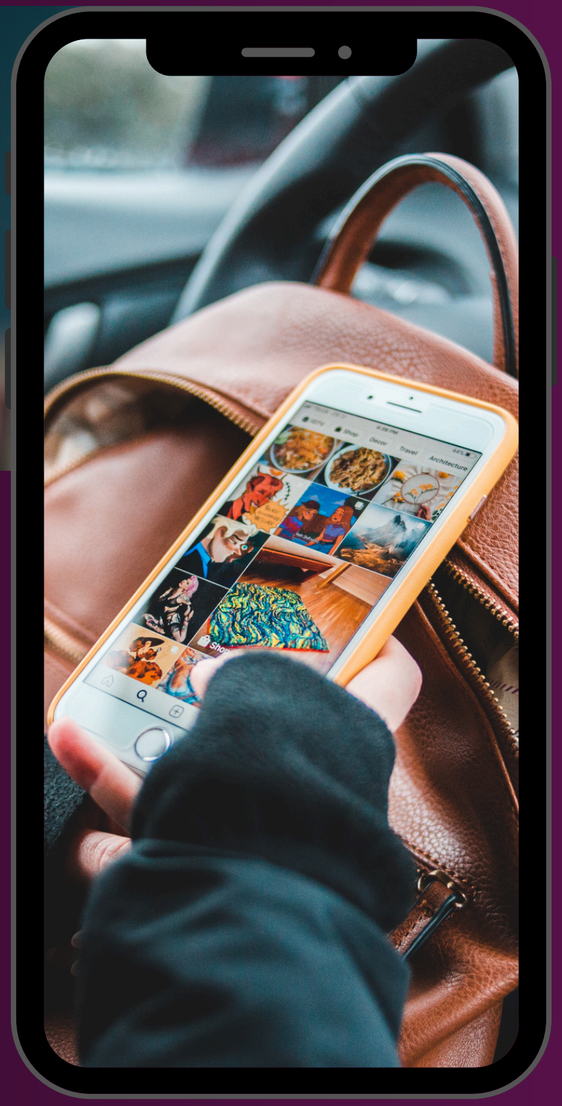
- Comprehensive Analysis: The sentiment analysis of 300+ customer reviews for the iPhone 15 128GB model provided valuable insights into user perceptions.
- Key Findings:
- Positive Sentiments: Customers praised the camera, performance, and display.
- Negative Sentiments: Common complaints focused on 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.



Github

E-Mail

Linkedin



Thank You

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