

Customer Sentiment Analysis

```
In [2]: import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from selenium import webdriver
from selenium.webdriver.common.by import By
import time

from selenium.webdriver.common.keys import Keys
import re
```

```
In [12]: driver = webdriver.Chrome()
driver.maximize_window()
driver.get("https://www.flipkart.com/apple-iphone-15-blue-128-gb/product-reviews/it
```

```
In [13]: usernames_list = []
rating_list = []
review_text_list = []
```

```
In [14]: def data():
    usernames = driver.find_elements(By.XPATH, '//p[@class="_2NsDsF AwS1CA"']')
    ratings = driver.find_elements(By.XPATH, '//div[@class="XQDdHH Ga3i8K"']')
    reviews = driver.find_elements(By.XPATH, '//div[@class="ZmyHeo"]/div/div')
    time.sleep(5)

    for username in usernames:
        name = username.text
        usernames_list.append(name)

    for rating in ratings:
        r = rating.text
        rating_list.append(r)

    for review in reviews:
        r = review.text
        review_text_list.append(r)
```

```
In [15]: # data scrapping
page_number = 1

for page_number in range(1,31):
    if page_number==1:
        data()
        nxt_button = driver.find_element(By.XPATH, '//a[@class="_9QVEpD"']')
        nxt_button.click()
        time.sleep(2)
    else:
        data()
        nxt_button = driver.find_elements(By.XPATH, '//a[@class="_9QVEpD"']')
        time.sleep(3)
```

```
#print(nxt_button)
for nxt_button in nxt_button:
    # print(nxt_button.text)
    if nxt_button.text == 'NEXT':
        nxt_button.click()
        time.sleep(2)
```

In [16]: usernames_list

```
Out[16]: ['Thakur Surya Pratap Singh',
          'bijaya mohanty',
          'Akshay Meena',
          'Nikhil Kumar',
          'Ajin V',
          'Mousam Guha Roy',
          'Flipkart Customer',
          'Arunji Govindaraju',
          'Prithivi Boruah',
          'Rahul Shedge',
          'Kriti Customer',
          'Rishabh Jha',
          'Saurabh Gothwad',
          'CHETAN TILWALIA',
          'Afzöl Hussain',
          'Sheetla Prasad Maurya',
          'Talim (sk)',
          'mohit yadav',
          'Raj Singh',
          'Sandip Mandal',
          'Flipkart Customer',
          'VinodKUMAR VinodKUMAR',
          'AYUSH singh',
          'Ankit Verma',
          'Suman Jain',
          'SONAL PAL',
          'Nitin Kumar',
          'Amit Biswas',
          'Flipkart Customer',
          'Praveen Kumar',
          'Zeeshan Khan',
          'Dev Kumar',
          'Varsha Sadanand Salve',
          'Jayanta Roy',
          'Flipkart Customer',
          'Sajib Das',
          'Bhaskar Sharma',
          'Neeraj Chouhan',
          'Dr Rohith Gurugubelli',
          'Anwar Customer',
          'Jayanth Jai',
          'Akash Deep',
          'Shubhanker Singh',
          'Flipkart Customer',
          'ANUP SINGH GAUTAM',
          'SANDEEP SOMAN',
          'SYAM SUNDER',
          'Akhilesh Bepari',
          'Atul Negi',
          'Feroz Basha',
          'RAHUL SEN',
          'Anubhav Chauhan',
          'Sharon Lepcha',
          'Kesab Pradhan',
          'Naveen S',
          'Preenit Rai',
```

'Abhijit Kumar',
'SHASHANK PATHAK',
'Kishu Kumar',
'jay singh',
'ABIR MODAK',
'Nilanjan Pal',
'Bibhu Prasad Bisoyi',
'PROSIT DAS',
'Sunny Patel',
'Flipkart Customer',
'Mukesh Kumar',
'Nirmala Sahu',
'Purnendu Mondal',
'Ajmir Hossain',
'Nilesh Yadav',
'Mohammad Zishan',
'Abnish Sen',
'Urgain Norzin',
'Anish Sanjay',
'Arpan Dewanjee',
'Surabhi Das',
'Ayan Das',
'VENKATESH REDDY',
'Flipkart Customer',
'Mohammad Mubarak',
'Himanjan Bora',
'Ajay Vishwakarma',
'dr sachchidanand pardeshi',
'Nandita Panchal',
'Aniket Zurange',
'jithu reddy',
'KALPESH SHIRSEKAR',
'Abhishek Kumar',
'Suraj Mehra',
'Flipkart Customer',
'Thilak Kumar',
'Ashish Raj',
'Monish B',
'Shivani Jain',
'Krishna kishor Singh',
'Flipkart Customer',
'Flipkart Customer',
'Aman Nur',
'Subhodeep Roy',
'Manya Customer',
'Gulshan Ahmed',
'K.srinath Sri',
'Amitabh Srivastava',
'Sumitra Swain',
'Vishnu Belamana',
'Vanshu Customer',
'K Deepak',
'Vikash Kumar',
'Nasir Uddin Sheikh',
'Ijas S',
'Sayan Ray',

'Mohd Hasnain',
'Arman Ali',
'Harpreet Singh',
'Gaurav Verma',
'Vipul Kumar singh',
'Jayanth K B',
'Raghupathireddy Paindla',
'Yash saini',
'Dipanjan Saha',
'jeet sikder',
'Flipkart Customer',
'Srasthanibedita Swain',
'Sadiya Sadi',
'Flipkart Customer',
'Saswata Dash',
'Abhishek Yadav',
'shanavas vn',
'mohit raj',
'Flipkart Customer',
'Shailesh choudhari',
'Vikas Pathade',
'Rohit Pingale',
'Mohammad Amir',
'Shivam Maurya',
'santosh parida',
'Sachinaaaa',
'Rajveer Singh',
'Dhruv M Golwala',
'MONIRUL MOLLA',
'Naseer Ahmed',
'Yadu krishnan',
'Khushboo Verma',
'Dr Babu Mandal',
'Flipkart Customer',
'Kishan Behera',
'MOHAMMAD SHAHNAWAZ',
'Mohamed Suheb',
'Ashwani Kumar',
'Malay Singha',
'ALIM Khan',
'SAURABH KUMAR',
'Ravi Gangrale',
'Bhupesh Pant',
'Raghava Karthik',
'Leo Jonas Doyom',
'Aditya Arya',
'Munish Choudhary',
'neeraj gour',
'Priya Mm',
'G MOHAMMED SALEEM',
'Sushobhit Meena',
'Baban Dey',
'Rohit Semwal',
'Srimanti Dutta',
'Shrikant Panigrahi',
'NOOR ALAM',

'Aarif Khan',
'Utpal Mondal',
'Akash Khabale',
'kantu G K',
'ATHAR faisal',
'Charan',
'Hardik Chaudhary',
'Flipkart Customer',
'Ogam Tayeng',
'Manish sinha',
'Varindra Sahu',
'seetha Ram',
'Flipkart Customer',
'Flipkart Customer',
'Flipkart Customer',
'Abi Yuvan',
'jagabandhu jena',
'Adhitya Ramakrishnan',
'Gayatri Godara',
'Satyam Singh',
'Atul kumar Soni',
'Santhosh Bachu',
'pankaj singh',
'Gaurav Kumar',
'R K',
'Babul Ali',
'ANKIT ANAND',
'Deepak Meena',
'Flipkart Customer',
'Flipkart Customer',
'Ritu Raj',
'Rupesh jha',
'PRAKASH MANDAL',
'SHUVAM DAS',
'Yadav ajeet Yadav',
'Sourajyoti Malakar',
'Vicky Krishna',
'MOBARAK SK',
'Flipkart Customer',
'Prashanth Reddy',
'KaryD',
'Biswadeep Roy',
'Venkat Ramana',
'Vishnu Singh',
'Ashbin paul Paul',
'Shadab Lampsy',
'Manoj negi',
'Motam Jamatia',
'Praveen sarwa',
'Deepti Rankhambe',
'Sandeep Mehta',
'Nalinakshya Sahoo',
'Amit Tekriwal',
'Baljinder Singh',
'ANKIT kumar',
'Suman Chakraborty',

'Durga prasad',
'anujyadav anuj',
'Ashwani Mishra',
'Krupansh Patel',
'Dev Sarda',
'Naresh Soni',
'Flipkart Customer',
'Sudipto Sarkar',
'Tekchand Biswal',
'ABDUR RAHMAN',
'Santu Rana',
'Dipin Kapoor',
'Kajal Yadav',
'vikash kumar',
'Jishnu Samanta',
'Amiya Roy',
'Amish Kumar yadav',
'Himalaya Panwar',
'Vamshi Reddy',
'Ashis Karamakar',
'Atul Rasyal',
'Abhisekh Kumar',
'SUMIT LOHIA',
'Rahul Banerjee',
'Nitin Patil',
'Flipkart Customer',
'Flipkart Customer',
'Pinaki Ray',
'Mahipal Gariya',
'Flipkart Customer',
'Sudip Mandal',
'vinay mohan som',
'Sabir Khan',
'SOURAV NANDI',
'Deepsayan Dam',
'Yash',
'Pentakota Pavan',
'Kumar Patel',
'Anbu natarajan S',
'Abhijit Das',
'Mithilesh Kumar Sharma',
'Akash Banik',
'Droonacharjya Chakraborty',
'Zubair Khan',
'Abhishek Prajapati',
'Chandresh Kumar',
'Aravind Ponugoti',
'Prashant Gupta',
'Rishi Raj',
'Teddy Bear',
'Khajahusain Hebbal',
'Akassh Ambaade',
'Sanjay Kumar Jain',
'Deb Neogi',
'Thakur Rakesh',
'Divya',

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'Flipkart Customer',  
'Gajendra Singh',  
'Anil Kumar',  
'Mr. Kadir',  
'Flipkart Customer',  
'Flipkart Customer',  
'Anubhav baliyan',  
'shivam singh',  
'Dr Anita jadhav',  
'Parvindar Singh',  
'Ataur Rahaman',  
'Suresh J',  
'Varun giri',  
'Yuvraj Singh',  
'Dhiraj Singh',  
'Sanzeed Aman',  
'Flipkart Customer',  
'Prajwal Suryan',  
'Sahaj Modi',  
'Amit Srivastava']
```

In [17]: rating_list

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5',  
'5']
```

In [18]: review_text_list

```

Out[18]: ['Awesome 🤩',
'Just go for it.Amazing one.Beautiful camera with super fast processor',
'So beautiful, so elegant, just a vowww😍❤️',
'Switch from OnePlus to iPhone I am stunned with camera performance. Everything i
s perfect on iPhone 15.',
'High quality camera😍',
'Very nice',
'Awesome photography experience. Battery backup is good . Display is much better
than 14 version.',
'Awesome product very happy to hold this. Better In hand feel,matte finish.\nGood
camera, Brighter screen with Dynamic Island, USB-C, great battery life.\n\n60Hz di
splay is a dealbreaker for some.Its not much noticeable.\n\nThank u Flipkart for t
he best deal and quick delivery.',
'Camera Quality Is Improved Loving It',
'Totally happy!\nCamera 5\nBattery 5\nDisplay 5\nDesign 5',
'Just loved the product , colour , design is wow and camera is amazing , just cli
cked first picture of my grandmother 😊 in portrait mode and results r here in fro
nt of you guys 😍😍',
'Awesome 🤩😍',
'Simply premium.',
'Nice 🤩',
'Thanks Flipkart I m glad such a beautiful iPhone 15',
'Best mobile phone\nCamera quality is very nice\nBattery backup is very good\nSou
nd quality is amazing.',
'I love this phone. The camera is amazing: its I am so happy',
'Nice ❤️',
'for me its 10 out of 10🌟',
'Great!',
'Nice product',
'Nice phone good',
'best camera and battery is also very good\nIn love with dynamic Island\nType-c c
harging is very fast.\nOverall best phone',
'Awesome camra quality superb camra 😊',
'Simply Awesome 😍',
'Awesome phone powerful performance and battery backup are also very good no heat
ing issue 😊',
'Very nice product 🤩🤩🤩🤩',
'A Perfect Smartphone 😍❤️🤩🤩',
'Using this Iphone 15 from 1month and it has best Camera',
'This is my first iphone ever used loving it already this is worth it 😊',
'Awesome quality I am very happy. Thank you Flipkart.',
'Camera quality top notch 👍',
'The iPhone 15 exceeded my expectations in every way possible. The sleek design,
stunning display, and lightning-fast performance make it a standout device in the
smartphone market. The camera quality is unparalleled, capturing every moment with
incredible detail and clarity. Plus, the battery life is impressive, easily lastin
g me throughout the day.\nWith the added bonus of a great deal and discount, purch
asing the iPhone 15 from Flipkart was an absolute steal.',
'Nice 😊😊😊😊😊',
'Camera 🤩',
'moving from android to apple is a surreal experience. still apple could focus on
more flexibility towards the apps.',
'Awesome',
'Amezing camera and all over best phone🤩',
'Great for photography nd videography\nEspecially inbuilt 2x zoom helps a lot whi
ch is missing in previous basic models',

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'Only 90fps is need\nAnd best phone of the year goes to this phone',
'Their is nothing to explain about Apple iPhone nowadays everyone knows when ur c
omes to iPhone 15 is just amazing 🧯',
"Camera is just wow. All classes clicks are done at night....phone Performance is
awesome.... I'm writing now again for review...it's really maintained its premium
image",
'Simply wow wow wow 😍❤️',
'Best for regular usage',
'Absolutely gorgeous 😍',
'48 megapixel is lit🧯\nThin bessels compared to 14\nLesser in weight\nDynamic Is
land works perfectly\nGood battery backup ⚡\nMy rating 5/5',
'Camera is so good',
"It's performance is super and nice camera also a ok battery backup..",
'It looks so good in my hand !.....WAU?',
'Loved this product ❤️❤️',
'Such a amazing phone 🤩',
'I have recently switched from Android to ios, it does feel very strange at the b
eginning but now I am getting habitual to the ios\nIt is really very nice and feel
s premium. The camera is also very nice. I am fully satisfied with this purchas
e.',
'I was sceptical of online purchase but I was wrong I got what I ordered\nBest ph
one ever',
'Nice photo',
'Very nice product😊😊we loved the phone very much',
'Camera is good but not too good like other camera phone.\nPerformance is good bu
t missed 90hz display.\nBattery is good enough for a day use.\nSound is quite awes
ome like no other phones\nRest phone is good to go for.',
'A perfect n balanced phone ❤️. Was thinking of switching to ios from last two ye
ars and yeah its worth buying the black beauty ❤️.',
'Great Experience Flipkart I am giving 10 of 10 Camera, Sound, Screen... Transpor
tation Mi note 9 pro Max to Iphone 15 .',
'Absolutely premium product..just wow',
'Just upgraded from iphone 12 to 15 and I totally loved this 15 series.\nCamera:-
No doubt iphones camera are best of any other smartphone, primary camera is now 48
mp which gives quite sharp images, 2x in portrait mode is definitely a game change
r in base varient.\nBattery:- 3349 mAH is quite better as compared to older versio
ns.\nPerformance:- Apple improve performance by introducing A-16 bionic chip, no d
oubt performance is on top.\nDisplay:- In display we get dynamic island which give
s phone mo...',
'The camera quality is just awesome ..just like DSLR',
'Meet my expectations!',
'Nice Product Thanks for Flipkart\nCamera 10/10\nBattery 8/10\nDisplay 10/10',
'As Expected 🤔😂',
'Loved it 😍',
'This mobile is phenomenal, I like the camera most',
'Pic Quality Awesome',
'Just ok like any other premium android phone. Sound is just fantastic and face u
nlock feature is more convenient than fingerprint scanner. Battery backup is more
than android 5000 mah battery. This is my frist iPhone, migrated from android due
to chipset heating problem in Google tensor chip and Samsung exonys processor.',
'Switch from android to iPhone🧯\nJust wow. Camera and battery backup is outstand
ing for daily use',
'I have been using this phone since two months.\nAnd this phone is amazing.\n\nCa
mera- 10/10\nDisplay- 10/10\nPerformance- 10/10\nBattery- 9.5/10',
'Best in class...! Superb camera and performance. Fine grip.',
'Amazing one_____😍😍👍',

'Super',
"It's amazing and also the delivery boy was very humble.",
'Really its the best and richest design 🥰',
'Writing this review after extensive usage. Hope it helps interested buyers decide.\n1. Display:- 4/5 (Great display but limited to 60Hz in 2023-24)\n2. Camera:- 4/5 (Great cameras but no telephoto at this price segment but this time Apple really nailed it with the 15 series 24mp shots are very sharp and detailed)\n3. Performance:- 5/5 (One of the fastest SOC available right now)\n4. Battery:- 3/5 (Average battery life also charger not included in the box and still charges slowly with the 20w brick...)',
'Awesome...',
'Light weight phone. Camera and sound is fine and performance is highly appreciable.',
'Super\nGood Product',
'Mobile battery consumption very fast\nSo that I charge 3 times to charge in a day',
'Everything lovely\nJust for the first time u wont feel much difference b/w pro and non pro model iphones.',
'Coming from an iPhone 11, the upgrade is not completely unnecessary. I can see few daily improvements which impacts me personally. The battery backup is a good upgrade. The cameras are obviously better. The Dynamic Island is alright but not something I cannot live without. Face ID works smoother.\n\nI am not into games, so no comments on that. For a regular person, this phone is more than enough. And for people with other Apple devices, this is just an awesome part of the ecosystem.',
'Love the performance 👍',
'Very good quality',
'Brilliant 🌟',
'I order smartphone from Flipkart. This is my 4th phone i order. I have had the best experience every time.',
'Performance super',
'Coming from iPhone 12 mini.\nCamera is definitely a upgrade over the previous generation.\nDesign outside remains the same. Pastel colours with matte finish.\n\nThe Dynamic Island is what i liked for the notification part.\n\nProcessor of previous generation pro models.\n\nOverall a value for money among the 15 models.\n\nGot it a great deal in flipkart clubbing exchange and bank offers.\n\nDelivery was on time.',
'awesome camera looks like Captured DSLR quality\nSounds quality best\nBattery backup is good not better and best\nAbout performance i have no words',
'Nice',
'Nice one 🌟',
'I upgraded from iPhone 13 to 15 and this phone is awesome worth the money go for it',
'Awesome phone ❤️',
'Battery is worst!\n\nI am moving from android, so i feel my 20k android phone is better than this iPhone. Although i brought this for apple ecosystem!',
'Awesome🥰switch from android to iOS',
'best camera phone 🥰',
'Superb... Shifted from Android to iPhone 15..classs👍',
"Great phone except the battery, which isn't bad as well. Just not as good as other flagships",
'good one.',
'Fully satisfied 👍',
'The phone is pretty awesome! Switching from android to ios. Smooth performance, amazing camera and battery backup so far is great. Worth it!',
'Overall same',
'Amazing product❤️❤️\nBest iPhone out of all the iPhone series',
'This is an amazing phone and back side of phone is frozen glass which makes it l

ess prone to finger marks while holding. Till now enjoying it, will update with further details after a week.',

'Awesome Phone\nAwesome Camera\n👁️.....Rest is History Dudu',

'Worth Varma',

"Arrived on launch day and after using it for a day, the iPhone 15 is AMAZING. After almost 5 years it was finally time for me to upgrade from my iPhone XR. Set up was smooth and seamless, especially using iCloud to transfer data over. The display is greatly improved, and it gets a lot brighter which is helpful outdoors. The dynamic island works smoothly even on the standard model's 60Hz screen. This phone's cameras take highly detailed photos even without a dedicated telephoto lens. In terms o...",

'Awesome product',

'Just looking like a aww',

'iPhone 15 impresses with sleek design, powerful performance, and stunning camera upgrades. A technological leap forward, delivering a top-tier experience. 🤩😊

👍',

"I was looking for a compact phone as daily driver which has a good camera, performance, stability and especially display.. I was hesitant to move from Android to an IOS but yeah I won't regret.. I loved the camera, Loved the display, phone is handy, can use it in one hand, clean software (ofcourse). I love how Apple has given importance to the privacy and security of the user and their devices too. Have been using it regularly with a 6-9 hours of screentime and the battery lasts for more than...",

'Nice device!',

'Upgraded from iPhone 11, The camera quality is awesome\nThe display quality is great and the dynamic island working perfectly\nHappy with Apple and Flipkart',

'Pros\n48MP Camera With 2x Zoom.\nDynamic Island.\nUSB-C Port.\nSuperb Design and Premium Build.\n\nCons\nOnly 60Hz Display Refresh Rate.\nSlow Charging.\nNo Action Button.\nNo Always-on Display.\n\nRating\nCamera - 4.5/5\nBattery - 4/5\nPerformance - 4.5/5\nCharging - 4/5\nDisplay - 4/5\nDesign and Build - 4.5/5\nSound - 4/5\nSoftware - 4.5/5\nValue For Money - 4/5\nOverall Experience - 4.5/5\n\nHit Like 👍 Button If This Review Really Helps You.',

'v v good',

'Not giving a fast refresh rate is really a bad idea.\nShame on you apple...with this range of phone this kind of average feature should have been given.',

'Awesome quality',

'I just loved it 🤩Thank you so much ❤️',

'Very good. Happy with the product. Camera quality and performance is amazing.',

"Battery lasted longer than my first relationship (4days). Listening to arijit singh songs on full volume since then still isn't getting over. Has more warmth than her. Unlike her there's two way communication here as touchpad is very responsive. Fingerprint unlock is nice as it only opens up to me. 5 Star for this -1 for Shivanshi",

'The photos clicked with the mobile just seems awesome and lively!!',

'10/10 I love this love it very good work',

'Good stuff.. bss thora battery casual hai 🤔',

'Awsm.',

'Nice just heat issue',

'Good phone',

'Awesome battery backup. Best lowlight camera .',

'Amazing camera quality',

'SUPER\n12 MINI TO 15 🤩🤩🤩',

"I have been an Android phone user since ever, until now.\nThe matte frosting on the back is marvelous and doesn't attract fingerprints or smudges.\nI love the form factor as it's one hand friendly.\nFor better gaming experience users should opt for the plus size.\n\nThe screen is great with excellent outdoor visibility. The bat

tery life is crazy good especially the standby time. Barely sips anything overnight. I am using an Android fast charger to charge this and the charging time is decent, no is...",

'After 10 days of use.\nCamera 10/10\nBattery 8/10(I am a light user so battery stands more than 20 hrs)\nPerformance 10/10\nDisplay 10/10',

'Best phone i have ever used in terms of performance, photography and other features.',

'My Experience from January to till date was awesome, it gives you best performance in any features than other iPhones.',

'Nice Colour',

'Design and performance is good. But somehow I felt the quality and standard is not the same as it used to be. It does heat up while charging and prolonged usage. This is unexpected and unacceptable. Also there are connectivity issues with Apple CarPlay.',

'Nice product\nBest phone 📱',

'Excellent!!!',

'A fantastic product.\n\nI was an iPhone 13 user I have upgraded to this. Brilliant display. I can see a great difference in battery backup. I can also say that the Dynamic Island helps in UI to the users. Looks premium. Price range might drop in a year.\nThanks for Flipkart sale days.',

'Best in class Device, Apple never ceases to Amaze customers. Lightweight and sleek look. Matte back finish helps with a fine grip.',

'Awesome experience entering the apple ecosystem, below are some of the pros and cons\nPros~\n2) camera is awesome and clicks good photos even in daylight and night\n3) size is perfect and easy to handle\n4) Apple ecosystem is the best\n5) battery charging rate is good and not too slow, and battery backup is also lasting 1 day for a normal usage.\n6) Dynamic Island is the best upgrade from 14.\n7) texture and phone build quality has improved a lot\n\nCons~\n1) sometimes phone gets heated but that is ma...',

'Best photo for iPhone 15',

'My mom gift',

'Awesome experience. thanks to flipkart',

'Great experience',

'Marvellous camera. Light weight. Perfect handy.\nUsed every pro version before 15.\nBut trust me . I personally feel this 15 is at par with its pro version camera .',

'I bought at 53k for my Father.. He really liked the phone. Best phone at this price range.\n\nCamera : 5/5\nDisplay : 5/5\nBattery : 4/5\nPerformance : 5/5\n\nOnly cons is that it still comes with 60Hz display and battery does not last long.',

'Speechless\nSo Beautiful\nSo Elegant\nJust Looking Like Of Wow 🥰😊😍\nI Upgraded iPhone 12 To iPhone 15',

'Gud product',

'Mind blowing purchase, I received the right item. Thank you Flipkart.\nIf telling about iPhone its value for money\nGreat camera and video. 5/5\nDisplay 5/5\nSound and heroics 5/5\nOverall good.',

'Fantastic ❤️',

'Good product (value for money) terms are not suitable for this type of product because a huge amount for any middle class Indian taxpayer person ❤️',

'Good over',

'Firstly I worried that Flipkart send duplicate or refurbished iPhone but I am wrong great shopping experience genuine product at reasonable price max discount rather than other online or offline platforms great deal with Flipkart I am impressed and obviously great product from Apple',

'Great camera quality 🥰🥰',

'Awesome Phone with awesome camera. Updated from iPhone 13 to 15 I love this.',

'Beautiful camera and also updated features for iPhone 15.',

'Great device\nThe 60hz is not a big deal like the influencers says that it is.',
 'Happy 😊',
 'Camera is good',
 'Super',
 'The product is good, the battery is decent and there are no heating issues as public mentioned before buying this.\nSound quality is amazing and no need speaker\nDisplay and picture quality like theatre experience.\nSmall screen but lot of wonders',
 'Good 👍 my 2nd i phone',
 'Good phone but display 60 hz very slow in 2023',
 'Great product,must buy if you are iPhone lovers',
 'You have to charge it 3 times atleast if you use it as a primary phone\n\nOtherwise the phone is yoo',
 'This is my first iPhone . Bought it from flipkart and flipkart never disappoints me. Bought it during Republic Day sale and got a really good deal. Thank You Flipkart',
 'Black one is classy. Photos are much better than 13',
 'Awsom 🥰🥰',
 'Apple iPhone 15 blue 128GB GOOD MOBILE phone Name Aarif khan Alwar Rajasthan Indian',
 'This is undoubtedly the best in the market! Feels premium and also the performance is at par excellence! A beast in terms of camera quality and battery backup!',
 'Why the apple does not work on battery backup\n\nIts really worst. according to price battery backup is very bad you need to charge 2 times for a days.\nEven 6k 7k price phone gives awesome battery life.',
 'Its good but its bad in battery condition and its has heating issue.\nThis mobile is not for heavy mobile user like\n\nThis is ok for professional person.\nThis is for average mobile user\n\nWho have this mindset (brand and society remarks are important)\n\nSo go for 🍏\n\nOtherwise there are lot of mobiles available with advance technology and with comfortable and better user interface',
 'To,\n\nDear Flipkart Team, I hope this email finds you well. I am writing to bring to your attention an issue I encountered during my recent access to Urly on 25th September 2024 through my Plus membership. On the night of 25th September, I eagerly awaited the bigbillion sale and placed an order for an iPhone 15 using my HDFC credit card. However, despite multiple attempts, the order did not go through. I eventually made the full payment via Google Pay, but noticed discrepancies in the amount ch...',
 'Mobile heats a lot and battery drain fast',
 'It was on republic sale. I got value for money.\n\nPiece is genuine.\n\nCamera is best with 48 MP primary lens.\n\nPerformance is very good.\n\nThere are some restrictions otherwise it is very good.',
 'Nice',
 "After 4+ months.\n\nCons:\n\n1. Still heats eats up a lot!!!\n\n2. Wifi connection is very poor in this model, it fails to connect most of the time automatically where I manually need to search and join the wifi and then again it automatically disconnects. I have an iPad air which works fine, maybe it's a range issue.\n\n3. My keyboard switches automatically from Microsoft SwiftKey to stock ios keyboard. Idk what's the issue??\n\n4. Need to switch to airplane mode after going out from the wifi range otherwise...",
 'I love it',
 'Best purchase.',
 'Mobile is good, battery is drain fast 1 day 2 time charging,\n\nI am heavy user, but still good',
 'Only using this for few days here are my pro and cons\n\nPro\n\n1. Form factor is very nice small design\n\n2. Battery life is really good easily 1 day with heavy usage\n\n3. Camera quality is really insane\n\n\nCons\n\n1. Charging takes too much time\n\n2.

60hz display although once you get used to its not much of an issue\n3. Some times phone gets hot',

'A very good product and also loved it',

"Probably best phone to buy under 53k\nOverall good balanced phone\nBeing a ios device it'll never give you the fun of an Android device. Buy only if you want it for professional reasons",

'Battery only drain fast\nBattery health 98 at two month\nBut worth',

"Design The iPhone 15 has a satin-finished design and a durable glass panel on the front.\nDynamic Island The Dynamic Island helps with multitasking.\nIP68 ingress protection The iPhone 15 can withstand being submerged in up to 6 meters of fresh water for 30 minutes.\nStereo speakers The iPhone 15's stereo speakers are loud and have good sound quality. The battery life is lower than expected draining very fast and as usual heating issues there.",

'Everything is awesome! Great phone..',

'If you are happy..... if you are feeling good.....then nothing else matters 🥰🙏',

'Nice phone',

"This is the first time I've purchased iphone and it's great.\n\nPerformance, speed and the feature is good and new update of the IOS having great feature and customizations in the UI.",

'Very nice iPhone 15, very good quality, very nice display. Very nice camera, thanks.',

'Nice product...camera is awesome....also light weight',

'Awesome experience in my opinion. I am first time iPhone user. And can say:-\nCamera: 10/10\nPerformance: 10/10\nDisplay: 10/10\nBattery: 8/10',

'Everything is fine but sometimes it unnecessarily heats up.',

'NICE',

'Nice product but battery 🔋 quality Bad',

'Nice prod',

'Best in that price range 🌟🔥',

'-Wonderful performance\n-Camera quality is superb\n-battery backup not that good\n-sound quality is awesome',

'Best product...',

'Switched from Redmi 12 5G to iPhone 15 . It feels like I have never used Phone. Totally Worth It and the Feeling of using iPhone is Super Awesome.',

'Nice product thank you flipkart',

'Switching Android to ios awesome experience,I just love it . And thanks Flipkart for open box delivery option.',

'iPhone 15 better than 16 ..',

'What to say about iphone😄\nIf you have money then buy it.',

'Am a Android User First Time Switching To IOS Really Its Awesome (iphone 15)\nCamera 5/5\nBattery 4/5\nDesign 5/5\nDisplay 5/5\nSpeaker 5/5',

'All are good 😊',

"Initially I missed 120 Hz screen refresh rate after switching from Mi 11x pro to iPhone 15. It been a month using iPhone 15, accordingly to my experience, unless you want to purchase more apple products like Mac book, apple watch etc. it is not smart decision to buy iPhone. But I surely appreciated it's small form factor and less weight. Battery backup is also good.",

'Awesome product and received an original product',

'Awestruck by its performance 🤩',

'Far better than 15pro no finger print even with moisturize hands',

'Amazing 🥰🥰🥰🥰\nJust go and buy it blindly if you have enough of money',

"Phone is good built lightweight,handy, camera good quality, display great phone is nice if love it's OS and can spend that much",

'I bought this in big billion days in Flipkart, overall the phone',

'Apple as usual. Eco system is great. Rest all are average for the price but I pa

id for the ecosystem',

'Phone is good but if u already have an iPhone 12,13,14 then it's not worth upgrading, same design and similar performance except dynamic Island which I guarantee you will ever notice or use',

'I phone is phone nothing but it's a brand that makes the cost. Better should be more improved. And it gives heat.',

'Product is good. But worst delivery experience',

'Overall performance is best. Good aesthetic and nice color. Only thing worries me that it gets really hot with increase of brightness and during 15 min video call..',

'Phone is great.',

'Phone is good. Good battery backup , upgraded camera.\nBut I feel refresh rate should be 90hz atleast.',

'The only thing I like about this phone is the camera quality and that is the reason I bought this phone.\nI already have an Android phone which is less than 50% of its price and still is better in every aspect except the camera.\nWell! Definitely, iPhone 15 has a flagship level chipset but I am not a gamer and a normal user and I find mid range and flagship all perform at similar level in daily tasks.\nWhile iPhone 15 only has 60hz screen which feels choppy, all other phones have 120-144hz screen...',

'Too much heat when camera used',

'The best part of camera is cinematic video which is fabulous. Rest of the things are good, but cinematic mode is on next level, higher rate is missing which may hurt phone noise cancellation is on. Also next level. Some small small features which make sweet point to use and make it different from android efforts of making iOS and developing some sweet sweet things are appreciable and if you have MacBook or iPad, ecosystem work, fantastically the best things for this iPhone is much much better...',

'Awesome phone. best performance',

'Good',

'Very good product',

'The iPhone 15 features a 48-megapixel main camera sensor\nIt is powered by the A16 Bionic SoC\nThe iPhone 15 now comes with Dynamic Island',

'Overall Beast Performance 🔥\n10/10 Just Go For It 😊👍',

'The best one from apple💙',

'Very good',

'Except battery everything work awesome',

'What a phone super performance with light weight.\nPlease find my details review as follows.\n1. Camera - camera is super with very good quality photo even at night as well.\n2. Battery - battery backup is fine and will last for one day long.\n3. Performance - iPhone 15 performance is super. No lagging and no heating issue.\nCons-\n1. Battery could be better at this price range.\n2. Face recognition is not good as not always open with face ID',

'Nice product. The look of the phone is awesome 🥰. Great to have the iPhone black color.',

'First time experiencing iPhone. It feels premium and quality is awesome love it ❤️❤️❤️',

'I have both Galaxy S23 and iPhone, Galaxy is taking 9/10 good photos compared to iPhone 7/10 photos. iPhone only shine on video.\nFor better photo buy Galaxy S23\nBetter video go for iPhone.',

'I am an iPhone user since long. I have bought this YELLOW colour. But really feel that Apple should rethink and rename this colour as GOLDEN YELLOW, its edges are slightly on the Golden side as you can see in the pics. Additional feature as compare to iPhone 13, this has Dynamic Island and camera is superb 🥰 I am using it for 5 hrs daily, not facing any heating issue as such.',

'I have moved from android to ios, iPhone 15 is really a good device, fulfills all

1 the basic things that needed at daily life\n\nJust a note for the battery consumption, it drains a bit fast',

'Camera is best quality',

"I recently purchased the iPhone 15 from Flipkart, and I'm thrilled with my experience. The sleek design and vibrant display are stunning, and the performance is top-notch with its powerful A16 Bionic chip. The camera quality is exceptional, capturing detailed and vivid photos even in low light. Battery life has been impressive, easily lasting a full day with heavy use. Flipkart's delivery was prompt, and the packaging was secure. Overall, I'm extremely satisfied with my purchase and would highly recommend it.",

"Upgraded from iPhone 11. worth buying it. here are some pros and cons.\nPros:\n1) Smooth, constant software update,\n2) 6 GB RAM, 1 day easily sustainable battery life\n3) extremely helpful if you are in apple ecosystem.\n4) 48MP camera is really great if we compare with my iPhone 11's 12 MP. Best video quality.\n5) don't go for 15 plus or pro model even if you have enough money. but 128 GB base model with in 65000 RS and use that extra money to buy MacBook AIR or airpod 3rd GEN.\nCons:\n1) 60Hz display...",

'All good in this camera superb',

'Excellent purchase battery life is good for medium usage but can get you through the whole day on single charge. Am just loving this phone',

'Amazing Camera and battery',

'Excellent product',

'The product is good. Price is excessive due to Apple branding only. Battery backup is not up to expectations. Flagship Titanium is lacking in it which is available in pro models only. At this price the screen should have been 6.8 inches at least.',

"I can say the 60hz doesn't feel 60hz it is very smooth and may be because of apple\nI was too worried about the 60 hz because I was switching from 120hz Android (realme GT master edition) to this one but after using iPhone 15 I feel lags in my android 120hz\nBut I feel camera quality is avg but videography is next level\nLove the speaker\nQuality of display is just wow\nCharging is also quite good and battery backup is also awesome\nI am getting 5-6 hr gameplay (free fire+bgmi) from 10% to 25% quickly...",

'Click the pic is amazing.',

'Awesome.\n\nCamera too good\nDisplay too good\nBattery Good\nFeels too good',

'Look and design very nice',

'ok',

'Love iPhone 15',

"Well, there is a little bit of heating issue there, not at charging but in general operations. From design perspective, dynamic island is horribly thick for a 6.1 screen. It could have been smarter if the look was a little bit slim. What stops apple to increase the battery capacity now a days is beyond explanation. The Chinese manufacturers has definitely done a phenomenal job in terms of both the battery and charging. There's no trade off there, it's a success for them. In software, the competition...",

'Perfect one to upgrade\nEdit after 7 months : No disappointments, build quality good as this has undergone few hard falls. Underwater also good. Camera quality is awesome. Battery is always an issue but it is okay for a person who uses 5-6 hours daily. Videos are also good in cinematic mode. Good update I bought it at 78k when launched. But around 65 it is a super deal to do at this time.',

"Almost good but the battery is overheating I don't know why and it drained very quickly this is one of the major issues in this phone otherwise all ok but not satisfied with the battery",

'Excellent',

"Amazing phone But\nNow days Chinese people drop Apple's brand value.",

'Very nice phone I'm happy very good 👍',

"Amazing. This is my second iphone after 11 pro.\nUsed it for 3 days till now. No heating issue. While setting up the device/updating ios/transferring data - it did n't heat at all. Smooth experience. Best buy for 2024.",

'Pros:\n1. Incredibly smart device this year\n2. iOS interface\n3. Data Privacy\n4. Premium build quality\n5. Dynamic Island\n6. Ecosystem benefits if you own other Apple devices\n7. Powerful processor\n\nCons:\n1. 60Hz refresh rate for a flagship (although not very noticeable)\n2. No improvements to Siri\n3. Expensive\n4. Low possibility of repair',

'Black colour is just awesome 🔥🔥',

'Everything is good. Battery backup is hardly 6hrs will come while continuously usage. Camera is fantastic. In this iphone 60 hz refreshing rate is equals to 120hz refresh rate in android. Very light weight.',

'A Mixed Bag of Brilliance\n\nThe iPhone 15 flaunts an impressive camera setup, capturing moments with exceptional clarity and detail. However, users may encounter heating issues post 80% charge, which could disrupt prolonged usage. Occasionally, screen touch glitches may hamper the otherwise seamless user experience. Despite these setbacks, the iPhone 15 excels in performance and features. The standout Dynamic Island feature enhances productivity and personalization. Overall, the iPhone 15 is a...',

"This phone are not only for show off, these are the real master peice for content creators and reels creators, All or good but camara will nailed it,the one and only negative is battery. That's all thankyou 👍",

'Battery is decent and Display,performance and Camera top notch 🔥🔥and overall value for money phone',

'Kidney to gya\nOne kidney for i phone\nAnd one for i phone accessories',

'Awesomeness Cellphone. This is my first IOS and the experience is fantastic I am loving it. The videography is to next level. Very Happy.',

'Good one!',

'I am very happy with the service of Flipkart and product was very good.\nthanks Flipkart',

'All is well, but battery health is draining very fast.',

'My first iPhone and just love it ❤️',

"Perfect upgrade from 13.. An incredible device that delivers everything I could want. The design is sleek and lightweight, with the new Dynamic Island feature. The camera is a standout, photos and videos look professional with excellent low-light performance and vibrant colors.\n\nThe A16 Bionic chip ensures lightning-fast performance, whether I'm gaming, editing videos, or running multiple apps. Battery life is also impressive, easily lasting a full day with moderate use.",

"Best iPhone upgrade after the iPhone 14. I got this in Big Billion Day Sale for 53k. I'm reviewing this phone after 3 months.\n\nThe Camera and display quality is amazing. But I switched from a 120 Hz display android phone so it took me a while to adapt to this one.\n\nBut looking at a overall scenario it is a decent phone with clean UI. I've been liking iOS now and will definitely upgrade to iOS in future.\n\nThe battery is not upto the mark but it does the job pretty well.\n\nI liked the animations an...",

'All and all a beast!!!🔥🔥\n\nThe only thing which can be improved is battery 😞',

'Recently bought this phone and realized why Apple make the best phones in the world.\n\nOne of the most beautiful purchase I ever made 💙',

'Mashallah Great phone, last time brought iPhone 12 for face unlock with mask, this is worth upgrade planning to keep at least 3 years, thank you team flipkart for great offer',

'The iPhone 15 is simply amazing! The design is sleek, and the slightly curved edges make it feel great in the hand. The display is bright, sharp, and stunning, everything looks fantastic on it, whether watching videos or scrolling through photos. The camera upgrades are noticeable, especially in low light, and impressed by the

he level of detail in every shot. Performance is super smooth, with no lag even when running multiple apps.',

'Thanks to flipkart service nice open box delivery. iPhone 15 performance is great and so smooth. 👍👍',

'At the time of sale it was the best deal for me , intended to buy pixel 8 but went for iphone 15 was really worth it . Performance user experience camera design is undoubtedly excellent the only drawback is the battery life , which sustains for only 6 7 hours and in daily life have to charge 2 times . As a flagship phone it could be a better but nothing is perfect, without the battery issue in every aspect it is value for money.',

'Great',

'Great product and I would really recommend this device to anyone who wants to use a phone for a long time if Apple is making an expensive product then they will deliver a quality. I have been using the apple devices since 2009 till now. Awesome experience thanks to Apple. 🍏',

"In 51500, it's the best option",

'Very good',

'Nice product but poor packaging from flipkart',

'I phone 15 amazing phone 📱 i am very happy for buy this phone... amazing feature camera support',

'Only one word GREAT GREAT GREATER',

'Go the best deal on Flipkart. 😊\nThanks Flipkart team for such offers. ,,,👍❤️',

'Best phone',

'Switched from Android to iOS, it was such a smooth experience.',

'Loved it',

'Best camera ever for photos',

'Originally product like store, no difference,\nI had checked in apple website all thing is like store or shop.\nAnd 5000 save money, thank you Flipkart',

'Great product from apple thank u apple team\n1. Camera- great\n2. Display- fantastic\n3. Performance- next level\n4. Battery- super\n5. Design- great',

'Best',

'Excellent!',

"I have used iPhone for 20 days already and it was a great experience with Flipkart including purchase of iPhone with replacement of old phone was pretty smooth. The phone is awesome and since it's iPhone it doesn't require any review.",

'Awesome Deal!!! Best camera!!!',

'Excellent Device.... 🔥🔥\nCamera (PORTRAIT) NEXT LEVEL 🔥🔥\nPerformance 🔥\nBattery 🔥\nI just loved it 😍❤️\nWORTH IT 🙌🙌',

'Awesome phone, camera✅, build✅, battery lasts 1 day easily✅, overall met my expectations😊',

'Amazing Camera and Nice Colour...',

'It is the best iPhone that I have ever seen after iPhone 13, Its camera quality is so amazing. Especially, H1EF MAX mode. It's the best iPhone after 15 pro.']

```
In [19]: print(f"Length of Usernames list is {len(usernames_list)}.")
print(f"Length of Ratings list is {len(rating_list)}.")
print(f"Length of Review Text List list is {len(review_text_list)}.")
print(f"Max length of all list is {max(len(usernames_list),len(review_text_list),len(rating_list))}.")
```

```
Length of Usernames list is 300.
Length of Ratings list is 300.
Length of Review Text List list is 300.
Max length of all list is 300
```

```
In [20]: # appending None if len of all three is not same.
difference = max(len(usernames_list),len(review_text_list),len(rating_list))-len(rating_list)
```

```
print(f"{difference} number of None value to be inserted in rating_list.")
```

0 number of None value to be inserted in rating_list.

```
In [21]: for r in range(0,difference):  
        rating_list.append(None)
```

```
In [22]: print(f"Length of Usernames list is {len(usernames_list)}.")  
        print(f"Length of Ratings list is {len(rating_list)}.")  
        print(f"Length of Review Text List list is {len(review_text_list)}.")
```

Length of Usernames list is 300.

Length of Ratings list is 300.

Length of Review Text List list is 300.

```
In [23]: df = pd.DataFrame({  
        "usernames":usernames_list,  
        "reviews":review_text_list,  
        "ratings":rating_list  
    })  
  
df
```

```
Out[23]:
```

| | usernames | reviews | ratings |
|-----|---------------------------|---|---------|
| 0 | Thakur Surya Pratap Singh | Awesome 😎 | 5 |
| 1 | bijaya mohanty | Just go for it.Amazing one.Beautiful camera wi... | 5 |
| 2 | Akshay Meena | So beautiful, so elegant, just a vowwww 😊❤️ | 5 |
| 3 | Nikhil Kumar | Switch from OnePlus to iPhone I am stunned wit... | 5 |
| 4 | Ajin V | High quality camera 😊 | 5 |
| ... | ... | ... | ... |
| 295 | Sanzeed Aman | Awesome Deal!!! Best camera!!! | 5 |
| 296 | Flipkart Customer | Excellent Device.... 🔥🔥\nCamera (PORTRAIT) NEX... | 5 |
| 297 | Prajwal Suryan | Awesome phone, camera ✅, build ✅, battery lasts ... | 5 |
| 298 | Sahaj Modi | Amazing Camera and Nice Colour... | 5 |
| 299 | Amit Srivastava | It is the best iPhone that I have ever seen af... | 5 |

300 rows × 3 columns

EDA

```
In [24]: df['usernames']=df['usernames'].astype('object')  
        df['reviews']=df['reviews'].astype('object')  
        df['ratings']=df['ratings'].astype('float32')
```

```
In [25]: print(f"DataFrame info before data cleaning.")
```

DataFrame info before data cleaning.

In [26]: `df.info()`

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 300 entries, 0 to 299
Data columns (total 3 columns):
#   Column      Non-Null Count  Dtype
---  -
0   usernames   300 non-null    object
1   reviews     300 non-null    object
2   ratings     300 non-null    float32
dtypes: float32(1), object(2)
memory usage: 6.0+ KB
```

In [27]: `df.isnull().sum()`

```
Out[27]: usernames    0
reviews             0
ratings             0
dtype: int64
```

Data Cleaning

In [28]: `# filling None values with median in ratings column.`
`df['ratings'] = df['ratings'].fillna(df['ratings'].median())`

In [29]: `print(f"DataFrame info after data cleaning.")`

DataFrame info after data cleaning.

In [30]: `df.isnull().sum()`

```
Out[30]: usernames    0
reviews             0
ratings             0
dtype: int64
```

In [31]: `# review columns cleaning start`

In [32]: `df`

Out[32]:

| | usernames | reviews | ratings |
|-----|---------------------------|---|---------|
| 0 | Thakur Surya Pratap Singh | Awesome 😎 | 5.0 |
| 1 | bijaya mohanty | Just go for it.Amazing one.Beautiful camera wi... | 5.0 |
| 2 | Akshay Meena | So beautiful, so elegant, just a vowww 😊❤️ | 5.0 |
| 3 | Nikhil Kumar | Switch from OnePlus to iPhone I am stunned wit... | 5.0 |
| 4 | Ajin V | High quality camera 😊 | 5.0 |
| ... | ... | ... | ... |
| 295 | Sanzeed Aman | Awesome Deal!!! Best camera!!! | 5.0 |
| 296 | Flipkart Customer | Excellent Device.... 🔥🔥\nCamera (PORTRAIT) NEX... | 5.0 |
| 297 | Prajwal Suryan | Awesome phone, camera✅, build✅, battery lasts ... | 5.0 |
| 298 | Sahaj Modi | Amazing Camera and Nice Colour... | 5.0 |
| 299 | Amit Srivastava | It is the best iPhone that I have ever seen af... | 5.0 |

300 rows × 3 columns

```
In [33]: pattern = r"[a-zA-Z0-9]+"
review_text_cleaned_list = []

for review in df['reviews'].dropna().values:
    matches = re.findall(pattern, review)
    sentence = " ".join(matches)
    review_text_cleaned_list.append(sentence)
```

```
In [34]: df['reviews'] = review_text_cleaned_list
df
```

Out[34]:

| | usernames | reviews | ratings |
|-----|---------------------------|---|---------|
| 0 | Thakur Surya Pratap Singh | Awesome | 5.0 |
| 1 | bijaya mohanty | Just go for it Amazing one Beautiful camera wi... | 5.0 |
| 2 | Akshay Meena | So beautiful so elegant just a vowwww | 5.0 |
| 3 | Nikhil Kumar | Switch from OnePlus to iPhone I am stunned wit... | 5.0 |
| 4 | Ajin V | High quality camera | 5.0 |
| ... | ... | ... | ... |
| 295 | Sanzeed Aman | Awesome Deal Best camera | 5.0 |
| 296 | Flipkart Customer | Excellent Device Camera PORTRAIT NEXT LEVEL Pe... | 5.0 |
| 297 | Prajwal Suryan | Awesome phone camera build battery lasts 1 day... | 5.0 |
| 298 | Sahaj Modi | Amazing Camera and Nice Colour | 5.0 |
| 299 | Amit Srivastava | It is the best iPhone that I have ever seen af... | 5.0 |

300 rows × 3 columns

In [35]: *# review columns cleaning end*

Sentiment Analysis

In [62]: *#pip install textblob*

In [38]: **from** textblob **import** TextBlob

In [83]: **polarity_list** = []

In [84]: **subjectivity_list** =[]

In [85]: **len**(review_text_cleaned_list)

Out[85]: 300

In [96]: *# Polarity analysis*

```
In [88]: for review in review_text_cleaned_list:
        sentence = TextBlob(review)
        polarity=sentence.polarity
        polarity_list.append(round(polarity,2))
```

In [97]: *# Subjectivity analysis*

```
In [90]: for review in review_text_cleaned_list:
        sentence = TextBlob(review)
```

```
subjectivity = sentence.subjectivity  
subjectivity_list.append(round(subjectivity,2))
```

In [92]: polarity_list

```
Out[92]: [1.0,  
0.5,  
0.68,  
1.0,  
0.16,  
0.78,  
0.73,  
0.58,  
0.6,  
0.8,  
0.41,  
1.0,  
0.0,  
0.6,  
0.39,  
0.74,  
0.63,  
0.6,  
0.0,  
0.8,  
0.6,  
0.65,  
0.52,  
1.0,  
1.0,  
0.74,  
0.78,  
1.0,  
1.0,  
0.38,  
1.0,  
0.5,  
0.45,  
0.6,  
0.0,  
0.38,  
1.0,  
1.0,  
0.09,  
0.5,  
0.6,  
0.43,  
0.1,  
0.5,  
0.7,  
0.07,  
0.7,  
0.48,  
0.7,  
0.7,  
0.3,  
0.4,  
0.25,  
0.6,  
0.58,  
0.48,
```

0.28,
0.6,
0.15,
0.17,
1.0,
0.0,
0.4,
-0.1,
0.7,
0.5,
1.0,
0.29,
0.2,
0.6,
0.81,
0.6,
0.33,
0.17,
0.6,
0.2,
1.0,
0.34,
0.52,
0.26,
0.32,
0.19,
0.5,
0.91,
0.9,
1.0,
0.33,
0.12,
0.69,
0.6,
0.6,
0.65,
1.0,
-0.25,
1.0,
1.0,
1.0,
0.17,
0.7,
0.5,
0.49,
0.0,
0.8,
0.19,
0.0,
0.3,
0.27,
1.0,
0.3,
0.43,
0.41,
0.6,

0.65,
0.16,
0.7,
-0.01,
1.0,
0.45,
0.77,
0.32,
0.57,
0.64,
0.7,
0.0,
0.6,
0.0,
1.0,
0.6,
0.33,
0.36,
0.45,
0.44,
0.62,
0.6,
0.2,
0.8,
1.0,
0.46,
0.47,
0.56,
1.0,
0.0,
0.6,
0.8,
0.5,
0.31,
0.48,
0.0,
0.44,
0.4,
0.21,
0.7,
0.4,
0.8,
0.83,
0.85,
0.4,
0.8,
0.7,
0.33,
0.27,
0.35,
0.15,
0.8,
0.4,
0.47,
0.14,
0.0,

0.35,
1.0,
-0.3,
0.23,
0.12,
0.2,
0.72,
0.6,
-0.03,
0.5,
1.0,
0.35,
0.06,
0.8,
0.35,
0.17,
0.16,
0.9,
0.75,
0.6,
0.54,
0.69,
0.67,
0.62,
0.01,
0.6,
-0.05,
0.6,
0.0,
0.82,
1.0,
0.54,
0.6,
0.42,
0.5,
0.0,
0.48,
0.7,
0.13,
0.69,
0.0,
0.3,
0.03,
0.59,
0.0,
0.13,
0.11,
0.5,
-0.15,
0.42,
0.8,
0.7,
0.01,
0.2,
0.25,
1.0,

0.7,
0.91,
0.08,
0.0,
1.0,
0.91,
1.0,
0.19,
0.56,
0.58,
0.42,
0.14,
0.22,
1.0,
0.32,
0.18,
0.85,
0.49,
0.6,
1.0,
0.06,
0.46,
0.6,
0.76,
0.78,
0.5,
0.5,
0.02,
0.43,
0.29,
1.0,
0.6,
0.83,
0.5,
0.05,
0.42,
0.37,
0.25,
0.12,
0.22,
0.0,
0.45,
0.7,
0.7,
0.26,
0.38,
0.35,
0.3,
0.0,
0.59,
0.32,
0.37,
0.4,
0.47,
0.8,
0.26,

```
1.0,  
0.91,  
0.1,  
1.0,  
0.53,  
0.33,  
1.0,  
0.2,  
0.7,  
1.0,  
0.38,  
0.52,  
1.0,  
1.0,  
0.51,  
1.0,  
0.5,  
0.5,  
0.6,  
0.53]
```

In [93]: subjectivity_list

```
Out[93]: [1.0,  
          0.79,  
          1.0,  
          1.0,  
          0.54,  
          1.0,  
          0.7,  
          0.56,  
          0.95,  
          1.0,  
          0.76,  
          1.0,  
          0.36,  
          1.0,  
          0.68,  
          0.68,  
          0.83,  
          1.0,  
          0.0,  
          0.75,  
          1.0,  
          0.8,  
          0.42,  
          1.0,  
          1.0,  
          0.93,  
          1.0,  
          1.0,  
          0.3,  
          0.46,  
          1.0,  
          0.5,  
          0.77,  
          1.0,  
          0.0,  
          0.75,  
          1.0,  
          0.3,  
          0.42,  
          0.65,  
          0.9,  
          0.73,  
          1.0,  
          0.19,  
          0.9,  
          0.53,  
          0.6,  
          0.72,  
          0.6,  
          0.8,  
          0.7,  
          0.69,  
          0.6,  
          1.0,  
          0.69,  
          0.57,
```

0.4,
0.57,
0.95,
0.51,
1.0,
0.0,
0.6,
0.4,
0.8,
0.5,
1.0,
0.51,
0.62,
0.9,
0.6,
0.9,
0.67,
0.71,
0.25,
0.51,
1.0,
0.54,
0.63,
0.78,
0.43,
0.39,
0.6,
0.78,
1.0,
0.3,
0.67,
0.27,
0.54,
1.0,
1.0,
0.55,
1.0,
0.75,
1.0,
0.3,
1.0,
0.6,
0.6,
1.0,
0.75,
0.06,
0.6,
0.41,
0.0,
0.1,
0.57,
1.0,
0.9,
0.83,
0.6,
1.0,

0.73,
0.41,
0.6,
0.64,
1.0,
0.5,
0.89,
0.61,
0.75,
0.66,
0.6,
0.0,
1.0,
0.0,
0.65,
0.9,
0.67,
0.63,
0.6,
0.34,
0.56,
1.0,
0.43,
0.65,
1.0,
0.6,
0.27,
0.57,
0.3,
0.0,
0.6,
0.75,
0.72,
0.51,
1.0,
0.0,
0.46,
0.9,
0.56,
0.6,
0.66,
0.75,
0.87,
1.0,
0.42,
1.0,
0.6,
0.67,
0.51,
0.3,
0.56,
0.75,
0.5,
0.47,
0.61,
0.0,

0.35,
0.3,
0.96,
0.56,
0.27,
0.6,
0.57,
1.0,
0.52,
0.6,
0.3,
0.58,
0.61,
0.79,
0.37,
0.57,
0.45,
0.88,
0.8,
1.0,
0.58,
0.8,
0.9,
0.67,
0.7,
1.0,
0.83,
1.0,
0.0,
0.8,
0.3,
0.59,
1.0,
0.57,
0.5,
0.0,
0.51,
0.6,
0.33,
0.88,
0.0,
0.75,
0.69,
0.66,
0.05,
0.47,
0.28,
0.5,
0.8,
0.63,
0.75,
0.6,
0.43,
0.2,
0.41,
0.3,

0.6,
0.78,
0.25,
0.0,
0.3,
0.78,
1.0,
0.51,
0.8,
0.64,
0.65,
0.31,
0.33,
0.3,
0.61,
0.49,
0.8,
0.63,
0.9,
1.0,
0.68,
0.66,
0.9,
0.68,
1.0,
0.5,
0.6,
0.35,
0.53,
0.65,
1.0,
0.9,
0.93,
0.42,
0.56,
0.72,
0.79,
0.38,
0.66,
0.39,
0.0,
0.64,
0.6,
0.66,
0.78,
0.47,
0.52,
0.51,
1.0,
0.51,
0.41,
0.67,
0.59,
0.61,
0.75,
0.48,

```
0.3,  
0.78,  
0.8,  
1.0,  
0.75,  
0.25,  
0.3,  
0.5,  
0.8,  
0.3,  
0.75,  
0.64,  
0.3,  
1.0,  
0.69,  
0.65,  
0.48,  
0.5,  
0.95,  
0.73]
```

```
In [91]: print(f"Length of Polarity is {len(polarity_list)}.")  
        print(f"Length of Subjectivity is {len(subjectivity_list)}.")
```

```
Length of Polarity is 300.  
Length of Subjectivity is 300.
```

```
In [94]: df['Polarity'] = polarity_list  
        df['Subjectivity'] = subjectivity_list
```

```
In [95]: df
```

Out[95]:

| | usernames | reviews | ratings | Polarity | Subjectivity |
|-----|---------------------------|---|---------|----------|--------------|
| 0 | Thakur Surya Pratap Singh | Awesome | 5.0 | 1.00 | 1.00 |
| 1 | bijaya mohanty | Just go for it Amazing one Beautiful camera wi... | 5.0 | 0.50 | 0.79 |
| 2 | Akshay Meena | So beautiful so elegant just a vovwww | 5.0 | 0.68 | 1.00 |
| 3 | Nikhil Kumar | Switch from OnePlus to iPhone I am stunned wit... | 5.0 | 1.00 | 1.00 |
| 4 | Ajin V | High quality camera | 5.0 | 0.16 | 0.54 |
| ... | ... | ... | ... | ... | ... |
| 295 | Sanzeed Aman | Awesome Deal Best camera | 5.0 | 1.00 | 0.65 |
| 296 | Flipkart Customer | Excellent Device Camera PORTRAIT NEXT LEVEL Pe... | 5.0 | 0.50 | 0.48 |
| 297 | Prajwal Suryan | Awesome phone camera build battery lasts 1 day... | 5.0 | 0.50 | 0.50 |
| 298 | Sahaj Modi | Amazing Camera and Nice Colour | 5.0 | 0.60 | 0.95 |
| 299 | Amit Srivastava | It is the best iPhone that I have ever seen af... | 5.0 | 0.53 | 0.73 |

300 rows × 5 columns

In [99]: `df['Sentiment Type'] = df['Polarity'].apply(lambda x: "Positive" if x >= 0.1 else "`

In [100]:

`df`

Out[100...

| | usernames | reviews | ratings | Polarity | Subjectivity | Sentiment Type |
|-----|---------------------------|---|---------|----------|--------------|----------------|
| 0 | Thakur Surya Pratap Singh | Awesome | 5.0 | 1.00 | 1.00 | Positive |
| 1 | bijaya mohanty | Just go for it Amazing one Beautiful camera wi... | 5.0 | 0.50 | 0.79 | Positive |
| 2 | Akshay Meena | So beautiful so elegant just a vowww | 5.0 | 0.68 | 1.00 | Positive |
| 3 | Nikhil Kumar | Switch from OnePlus to iPhone I am stunned wit... | 5.0 | 1.00 | 1.00 | Positive |
| 4 | Ajin V | High quality camera | 5.0 | 0.16 | 0.54 | Positive |
| ... | ... | ... | ... | ... | ... | ... |
| 295 | Sanzeed Aman | Awesome Deal Best camera | 5.0 | 1.00 | 0.65 | Positive |
| 296 | Flipkart Customer | Excellent Device Camera PORTRAIT NEXT LEVEL Pe... | 5.0 | 0.50 | 0.48 | Positive |
| 297 | Prajwal Suryan | Awesome phone camera build battery lasts 1 day... | 5.0 | 0.50 | 0.50 | Positive |
| 298 | Sahaj Modi | Amazing Camera and Nice Colour | 5.0 | 0.60 | 0.95 | Positive |
| 299 | Amit Srivastava | It is the best iPhone that I have ever seen af... | 5.0 | 0.53 | 0.73 | Positive |

300 rows × 6 columns

In [102...

```
# Save as CSV
df.to_csv("Customer_Sentiment_Analysis.csv", index=False)

# Save as Excel
df.to_excel("Customer_Sentiment_Analysis.xlsx", index=False)
```

4. Data Analysis and Insights:

In [3]:

```
df = pd.read_csv("Customer_Sentiment_Analysis.csv")
df
```

Out[3]:

| | usernames | reviews | ratings | Polarity | Subjectivity | Sentiment Type |
|-----|---------------------------|---|---------|----------|--------------|----------------|
| 0 | Thakur Surya Pratap Singh | Awesome | 5.0 | 1.00 | 1.00 | Positive |
| 1 | bijaya mohanty | Just go for it Amazing one Beautiful camera wi... | 5.0 | 0.50 | 0.79 | Positive |
| 2 | Akshay Meena | So beautiful so elegant just a vowww | 5.0 | 0.68 | 1.00 | Positive |
| 3 | Nikhil Kumar | Switch from OnePlus to iPhone I am stunned wit... | 5.0 | 1.00 | 1.00 | Positive |
| 4 | Ajin V | High quality camera | 5.0 | 0.16 | 0.54 | Positive |
| ... | ... | ... | ... | ... | ... | ... |
| 295 | Sanzeed Aman | Awesome Deal Best camera | 5.0 | 1.00 | 0.65 | Positive |
| 296 | Flipkart Customer | Excellent Device Camera PORTRAIT NEXT LEVEL Pe... | 5.0 | 0.50 | 0.48 | Positive |
| 297 | Prajwal Suryan | Awesome phone camera build battery lasts 1 day... | 5.0 | 0.50 | 0.50 | Positive |
| 298 | Sahaj Modi | Amazing Camera and Nice Colour | 5.0 | 0.60 | 0.95 | Positive |
| 299 | Amit Srivastava | It is the best iPhone that I have ever seen af... | 5.0 | 0.53 | 0.73 | Positive |

300 rows × 6 columns

```
In [4]: # df.groupby('Sentiment Type').size()

positive_count = (df["Sentiment Type"]=="Positive").sum()
negative_count = (df["Sentiment Type"]=="Negative").sum()
```

```
In [5]: print(f"Number of positive reviews {positive_count}.")
print(f"Number of negative reviews {negative_count}.")
```

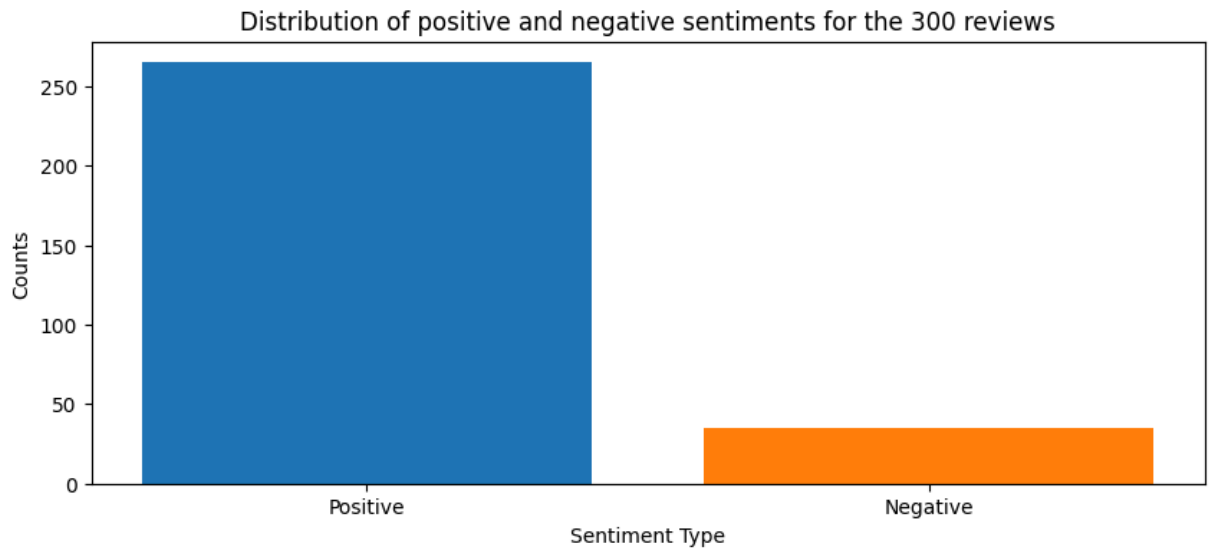
Number of positive reviews 265.
Number of negative reviews 35.

```
In [6]: # Sentiment Distribution: Calculate the overall distribution of positive and negati
```

```
In [7]: bar_colors = ['tab:blue', 'tab:orange']

plt.figure(figsize=(10, 4))
```

```
plt.bar(x=["Positive","Negative"],height=[positive_count,negative_count],label=["Po
plt.title("Distribution of positive and negative sentiments for the 300 reviews")
plt.xlabel("Sentiment Type")
plt.ylabel("Counts")
plt.show()
```

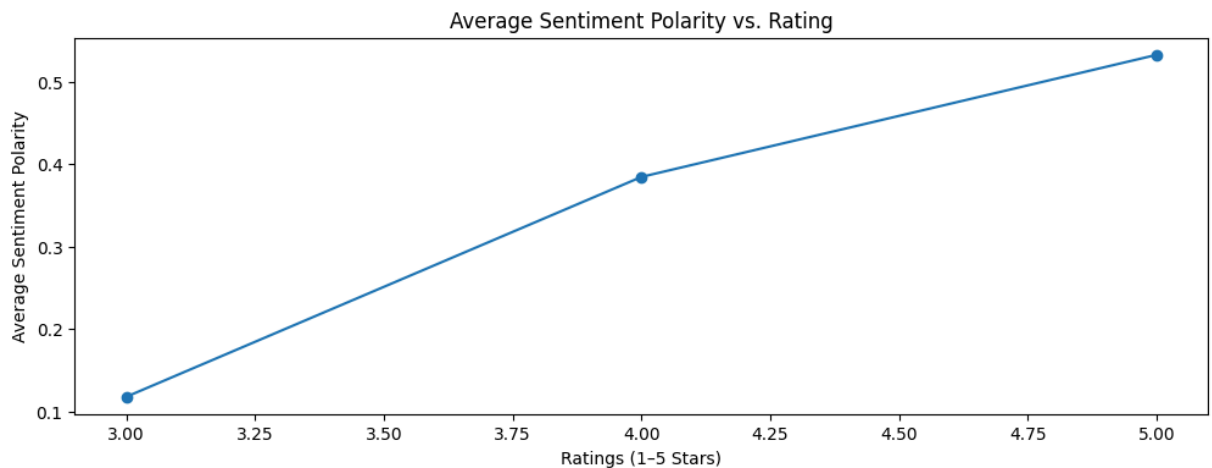


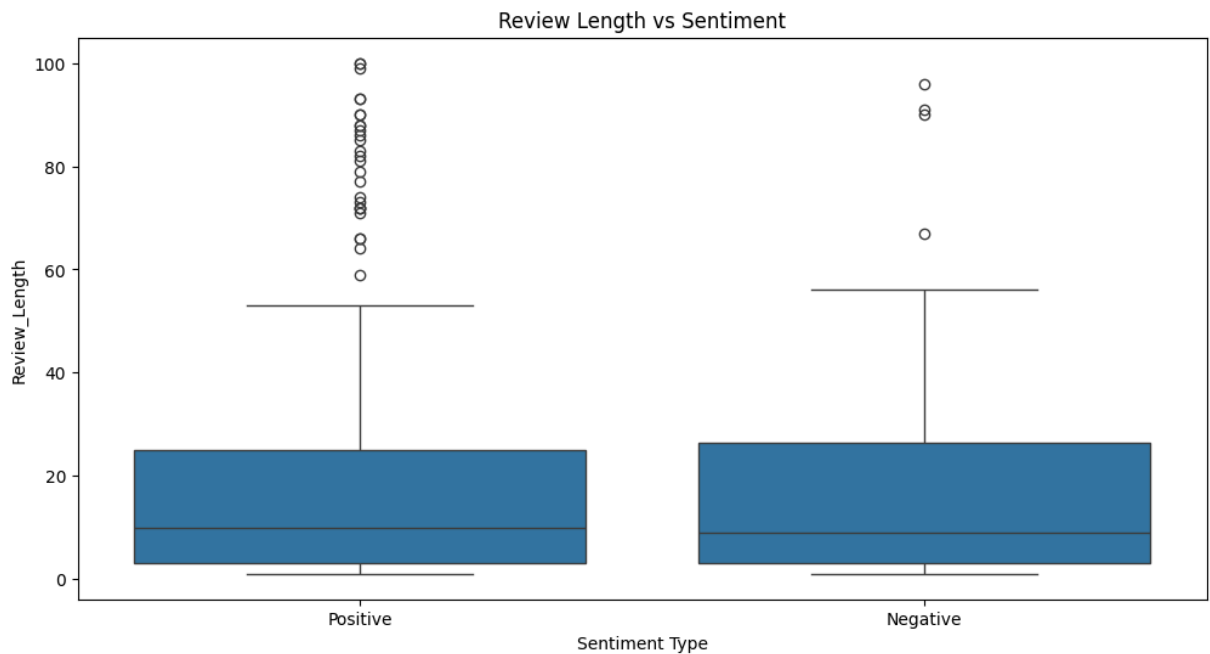
In [156... *# Average Rating vs Sentiment: Analyze if there is any correlation between the nume*

```
In [8]: avg_polarity = df.groupby('ratings')['Polarity'].mean()
avg_polarity
```

```
Out[8]: ratings
3.0    0.118000
4.0    0.384444
5.0    0.532362
Name: Polarity, dtype: float64
```

```
In [9]: plt.figure(figsize=(12, 4))
plt.plot(avg_polarity.index, avg_polarity.values, marker='o')
plt.xlabel('Ratings (1-5 Stars)')
plt.ylabel('Average Sentiment Polarity')
plt.title('Average Sentiment Polarity vs. Rating')
plt.show()
```





5. Reporting:

Customer Sentiment Analysis Report

iPhone 15 (128GB) ·
Flipkart

Summary of insights derived from 300 Flipkart customer reviews (ratings, review text) processed for polarity/subjectivity.

1) Overview of the Data Collection & Cleaning

- **Source:** Flipkart product reviews for iPhone 15 128GB (300 reviews captured).
- **Fields scraped:** Username, review text, star rating.
- **Cleaning:** Normalized column types, removed special characters/emoji from text, ensured equal lengths, handled missing values, converted ratings to numeric.
- **Sentiment engine:** TextBlob polarity (-1 to +1) & subjectivity (0 to 1).

Note: This report summarizes patterns visible across the 300-review sample.

2) Sentiment Analysis Results

RATINGS SNAPSHOT

- **5★:** Dominant share (very positive)
- **4★:** Moderate share (minor issues)

SENTIMENT SCORES

- **Average polarity:** High positive (most reviews between ~0.6 and 1.0)

- **≤3★**: Small share (battery/heating/60Hz)

- **Average subjectivity**: High (~0.7–1.0) → opinion-heavy, experience-based

```
<div style="border:1px solid #e2e8f0; border-radius:12px; padding:12px; margin-top:12px;">
  <h3 style="margin:0 0 6px; font-size:14px; text-transform:uppercase; letter-spacing:0.6px; color:#475569;">Theme Highlights</h3>
  <div style="display:grid; grid-template-columns:repeat(auto-fit,minmax(220px,1fr)); gap:10px;">
    <div>
      <strong style="display:block; margin-bottom:4px;">Positive</strong>
      <ul style="margin:6px 0 0 18px;">
        <li>Excellent camera quality (photos & video)</li>
        <li>Premium, light design; great in-hand feel</li>
        <li>Smooth performance (A16 Bionic)</li>
        <li>Display quality & Dynamic Island usefulness</li>
        <li>Apple ecosystem (continuity, reliability)</li>
      </ul>
    </div>
    <div>
      <strong style="display:block; margin-bottom:4px;">Negative</strong>
      <ul style="margin:6px 0 0 18px;">
        <li>Battery drains faster for heavy users</li>
        <li>Heating during charging, gaming, long camera use</li>
        <li>60Hz refresh rate feels dated at this price</li>
      </ul>
    </div>
  </div>
</div>
```

3) Insights

- **Camera as the hero**: Most frequently praised aspect; users cite sharper 48MP shots, strong portrait/cinematic video.
- **Perceived value**: Many upgraders (from Android/iPhone 11–13) report clearly better performance and display brightness.
- **Friction points**: Battery & thermal behavior constrain some heavy-use scenarios; 60Hz refresh rate is a recurring critique.
- **Expectation setting matters**: When buyers know the 60Hz/battery trade-offs, satisfaction remains high due to camera/performance.

4) Recommendations

PRODUCT IMPROVEMENTS (APPLE)

- Further optimize battery longevity and charging efficiency.

- Improve thermal management for camera/gaming sessions.
- Consider 90–120Hz display to match segment expectations.

MARKETING FOCUS (FLIPKART)

- Lead with **camera excellence, premium design, and smooth performance.**
- Showcase real customer visuals/testimonials in PDP creatives.
- Set clear expectations on refresh rate & typical battery life.
- Promote trusted delivery, open-box checks, and exchange/bank offers.

In []: