

instagram-analysis

May 12, 2024

1 Data Fetching and Setup

This section includes code to fetch and display basic brand data from Instagram using the `instagrapi` library.

```
[1]: pip install instagrapi
```

```
Requirement already satisfied: instagrapi in c:\users\a\anaconda3\lib\site-  
packages (2.1.1)  
Requirement already satisfied: PySocks==1.7.1 in c:\users\a\anaconda3\lib\site-  
packages (from instagrapi) (1.7.1)  
Requirement already satisfied: pycryptodomex==3.20.0 in  
c:\users\a\anaconda3\lib\site-packages (from instagrapi) (3.20.0)  
Requirement already satisfied: requests<3.0,>=2.25.1 in  
c:\users\a\anaconda3\lib\site-packages (from instagrapi) (2.28.1)  
Requirement already satisfied: pydantic==2.6.4 in c:\users\a\anaconda3\lib\site-  
packages (from instagrapi) (2.6.4)  
Requirement already satisfied: typing-extensions>=4.6.1 in  
c:\users\a\anaconda3\lib\site-packages (from pydantic==2.6.4->instagrapi)  
(4.10.0)  
Requirement already satisfied: annotated-types>=0.4.0 in  
c:\users\a\anaconda3\lib\site-packages (from pydantic==2.6.4->instagrapi)  
(0.6.0)  
Requirement already satisfied: pydantic-core==2.16.3 in  
c:\users\a\anaconda3\lib\site-packages (from pydantic==2.6.4->instagrapi)  
(2.16.3)  
Requirement already satisfied: urllib3<1.27,>=1.21.1 in  
c:\users\a\anaconda3\lib\site-packages (from requests<3.0,>=2.25.1->instagrapi)  
(1.26.11)  
Requirement already satisfied: certifi>=2017.4.17 in  
c:\users\a\anaconda3\lib\site-packages (from requests<3.0,>=2.25.1->instagrapi)  
(2022.9.14)  
Requirement already satisfied: idna<4,>=2.5 in c:\users\a\anaconda3\lib\site-  
packages (from requests<3.0,>=2.25.1->instagrapi) (3.3)  
Requirement already satisfied: charset-normalizer<3,>=2 in  
c:\users\a\anaconda3\lib\site-packages (from requests<3.0,>=2.25.1->instagrapi)  
(2.0.4)
```

Note: you may need to restart the kernel to use updated packages.

WARNING: Ignoring invalid distribution -rotobuf (c:\users\A\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\A\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\A\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\A\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\A\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\A\anaconda3\lib\site-packages)

```
[7]: import pandas as pd
from instagrapi import Client

def login_to_instagram(username, password):
    client = Client()
    client.login(username, password)
    return client

def fetch_brand_data(client, username):
    account = client.user_info_by_username(username)
    followers = account.follower_count
    following = account.following_count
    total_posts = account.media_count
    print(f"Brand: {username}, Followers: {followers}, Following: {following},  
↪Total Posts: {total_posts}")

    medias = client.user_medias(account.pk, amount=1)
    top_post = medias[0]
    print(f"Top Post: {top_post}, Likes: {top_post.like_count}, Comments:  
↪{top_post.comment_count}")

    comments = client.media_comments(top_post.id, amount=20)
    comment_texts = [comment.text for comment in comments]
    print(f"First 20 Comments on Top Post: {comment_texts}")

    return {
        "username": username,
        "followers": followers,
        "following": following,
        "total_posts": total_posts,
        "top_post_likes": top_post.like_count,
        "top_post_comments": top_post.comment_count,
        "comments": comment_texts
    }
```

```

def save_data_to_excel(data):
    # Convert dictionary to DataFrame for easier handling
    df = pd.DataFrame.from_dict(data, orient='index').T
    # Save the DataFrame to an Excel file
    df.to_excel(r"C:\Users\A\Desktop\Hiral Project\Social media_
analysis\instagram_data.xlsx", index=False)

def main():
    username = 'instadatascraper' # Instagram username
    password = 'rizulvaidya' # Instagram password
    client = login_to_instagram(username, password)

    brands = ['apple', 'samsung', 'google']
    data = {}
    for brand in brands:
        data[brand] = fetch_brand_data(client, brand)

    # Save all collected data to an Excel file
    save_data_to_excel(data)

if __name__ == "__main__":
    main()

```

Brand: apple, Followers: 32634836, Following: 8, Total Posts: 1174
Top Post: pk='3364258921958479338' id='3364258921958479338_5821462185'
code='C6wP6o3xhXq' taken_at=datetime.datetime(2024, 5, 9, 16, 8, 57,
tzinfo=TzInfo(UTC)) media_type=8 image_versions2={} product_type=''
thumbnail_url=None location=None user=UserShort(pk='5821462185',
username='apple', full_name='', profile_pic_url=None, profile_pic_url_hd=None,
is_private=None) comment_count=1033 comments_disabled=False
commenting_disabled_for_viewer=False like_count=74776 play_count=None
has_liked=None caption_text='\"I wanted to show the power and beauty of a
Ghanaian mother at a young age raising two children on her own.\" #ShotoniPhone
by @fedekortez' accessibility_caption=None usertags=[] sponsor_tags=[]
video_url=None view_count=0 video_duration=0.0 title=''
resources=[Resource(pk='3364258916547825126', video_url=None, thumbnail_url=Url(
'https://instagram.fjai2-4.fna.fbcdn.net/v/t51.29350-15/442419565_10829380827683
37_8406065523413710902_n.jpg?stp=dst-jpg_e35_p1080x1080&_nc_ht=instagram.fjai2-4
.fna.fbcdn.net&_nc_cat=1&_nc_ohc=BPQc19HT1UUQ7kNvgGhHEsd&edm=APU89FABAAAA&ccb=7-
5&oh=00_AYBT3_czNPGjcNtpH5bUZA0-uA5QGL0CnmvnnIahMvnV_w&oe=66462AA5&_nc_sid=bc0c2
c'), media_type=1), Resource(pk='3364258916522571823', video_url=None, thumbnail
_url=Url('https://instagram.fjai2-4.fna.fbcdn.net/v/t51.29350-15/442405854_12796
17583442247_4733316955735558257_n.jpg?stp=dst-jpg_e35_p1080x1080&_nc_ht=instagra
m.fjai2-4.fna.fbcdn.net&_nc_cat=1&_nc_ohc=85Vl69RC4-wQ7kNvgGzElRg&edm=APU89FABAA
AA&ccb=7-5&oh=00_AYAVFg8JFb8zcme7RjxGQ8REup5usPMGTfZZ_zoMALyH0g&oe=66462E95&_nc
sid=bc0c2c'), media_type=1), Resource(pk='3364258916556125253', video_url=None,

thumbnail_url=Url('https://instagram.fjai2-5.fna.fbcdn.net/v/t51.29350-15/442438762_1183660779725326_7799387857264216807_n.jpg?stp=dst-jpg_e35_p1080x1080&_nc_ht=instagram.fjai2-5.fna.fbcdn.net&_nc_cat=110&_nc_ohc=5wUhEl2Y-SEQ7kNvgF9KZuz&edm=APU89FABAAAA&ccb=7-5&oh=00_AYDofaAQ1RDzRPDTKgu7oBeXrNuoSLRs180KGgGJuoiZoA&oe=664652B7&_nc_sid=bc0c2c'), media_type=1), Resource(pk='3364258916556296152', video_url=None, thumbnail_url=Url('https://instagram.fjai2-3.fna.fbcdn.net/v/t51.29350-15/442351891_290264937487607_6232432136031425649_n.jpg?stp=dst-jpg_e35_p1080x1080&_nc_ht=instagram.fjai2-3.fna.fbcdn.net&_nc_cat=111&_nc_ohc=e3dg0J1-SFoQ7kNvgFd49Ml&edm=APU89FABAAAA&ccb=7-5&oh=00_AYBimd6z1hGv7KK9j4viTEmZiNrdTEOeSikAgBvVWfwXGQ&oe=664637DA&_nc_sid=bc0c2c'), media_type=1)] clips_metadata={}, Likes: 74776, Comments: 1033

First 20 Comments on Top Post: ['#stopstealing from DRC', ' ', ' ', 'Free Congo ', 'Blocked for life suckas', ' ', 'So you go and kill Congo people to harvest their lands and then you post this to cover for all genocidal acts!!!', 'BLOCKING ', '#blockout2024', 'Beautiful lady ', '#blockout2024 Block genocide supporters. Block child killers.', '#congoisbleeding', 'Free kongo !!!', 'Hipócritas #freecongo', '#ChopChop2024 #Digitine2024 ', 'Congo is bleeding', 'What about my tanzanian people', 'Ghana, dont@let this post fool you, these people are causing child labour and suffering in Congo in order to make their products and now they want to pretend to pay image to you. When they'll be done with CONGO they WILL find a place to suck blood from, and that could be you.', ' ', 'so beautifulll ']

Brand: samsung, Followers: 1760131, Following: 95, Total Posts: 375

Top Post: pk='3364556688476309680' id='3364556688476309680_30047490566'

code='C6xTntjS4iw' taken_at=datetime.datetime(2024, 5, 10, 2, 0, 8, tzinfo=TzInfo(UTC)) media_type=2 image_versions2={} product_type='feed' thumbnail_url=Url('https://instagram.fjai2-2.fna.fbcdn.net/v/t51.29350-15/436281751_380808011593111_2265411241094223370_n.jpg?stp=dst-jpg_e15&efg=eyJ2ZW5jb2RlX3RhZyI6ImltYWdlX3VybGdlbi41NDB4OTYwLnNkci5mMjkzNTAifQ&_nc_ht=instagram.fjai2-2.fna.fbcdn.net&_nc_cat=107&_nc_ohc=XjtP41Wo35oQ7kNvgFYZrj2&edm=APU89FABAAAA&ccb=7-5&oh=00_AYDyTj9rnZNlqe02QL3n2Z3-vQU6ywbJvCjEGJ6ohowXFQ&oe=66463674&_nc_sid=bc0c2c') location=None user=UserShort(pk='30047490566', username='samsung', full_name='', profile_pic_url=None, profile_pic_url_hd=None, is_private=None) comment_count=41 comments_disabled=False commenting_disabled_for_viewer=False like_count=979 play_count=None has_liked=None caption_text='Season for the big game has come! Amazing #YouMake offers are ready for you - from AI-powered TV to devices for your workout routine. Stay tuned!\n#YouMake #Promo #Sports #AI #Fitness #Samsung' accessibility_caption=None usertags=[] sponsor_tags=[] video_url=Url('https://instagram.fjai2-1.fna.fbcdn.net/v/t66.30100-16/121200995_389179940779120_6840471644942201329_n.mp4?_nc_ht=instagram.fjai2-1.fna.fbcdn.net&_nc_cat=104&_nc_ohc=3Do10CNqUaUQ7kNvgHXUSBO&edm=APU89FABAAAA&ccb=7-5&oh=00_AYA9RuoRGnHKX-asg2DSS22LnLy0YzrqotiyNoiNRKSd3g&oe=66425239&_nc_sid=bc0c2c') view_count=5343 video_duration=0.0 title='' resources=[] clips_metadata={}, Likes: 979, Comments: 41

First 20 Comments on Top Post: ["You well I have a new phone charger you ransomware battery burning Instagram warfare bunch of fuckin corpses waiting so I guess we'll see", '@samsung porfavor denos información y solución para los

#samsungA23.', 'My phone has got Green Line, even without updating the software. To correct it/ change the screen, I have to pay a big amount. Instead of launching new mobiles every few months, you should rectify the existing issues on your phones.', 'Bring us resident evil games', 'Resident evil', 'Cuál es la solución a nivel global para las personas que tenemos Samsung A23 ???? Van hacer una nueva actualización o van a reponer el equipo????', '@rehymining Me pasó lo mismo ', '@braidymichell_ Sí ', '@_lioness500_ OMG, samee. All my pictures and memories ', 'Necesitamos respuestas a los Samsung A23 que no encendieron mas después de la actualización ', 'Artificial Intelligence everywhere. ', 'Q le hiciste a los emojis ', 'I hate the new update it's gonna make me snap the fkin phone in half the gesture on the bottom buttons have changed the swipe feature is horrible I hate it and now I really don't even want to use my phone there should be an. Option to update or remove and update and and update should never change previous user settings thanks for ruining my day and my phone', '@samsung It should be illegal to sell phones without a charger! After spending \$1,400 and then some more dollars, we need to spend more on a charger? #Ridiculous #ChargerGate', 'Deben responder por la falla que tienen con la última actualización del A23, como es posible que un teléfono relativamente nuevo esté dañado por culpa de su misma marca. EXIGIMOS UNA SOLUCION.', 'saquen un samsung folder 3, quiero ser aeatetik 5g ', 'New Folder phone when?', 'Selamat Pagi,\nGimana kabarnya nih bunda/kakak/pak?\nSemoga sehat selalu. Aamiin\n*Mau informasiin sedikit nih Promo Cashback dan Berhadiah Speaker Bluetooth nya Ori Bcare* \n- Double Promo Samsung Galaxy S23 256 normal 13.999.000 promo jadi 10.499.000 CASHBACK 3,5JT tambahan Hadiah Speaker Bluetooth\n- Samsung Galaxy S23 FE 256 CASHBACK 1JT NORMAL 9.999.000 JADI 8.999.000 TAMBAHAN FREE SPEAKER BLUETOOTH \n- Samsung Galaxy A15 Jaringan 5G Ram 16GB rom 256GB Promo cashback 300k normal 3.299.000 kini 2.999.000 dan Free Speaaker Bluetooth\nEiiitsssss yang belum gajian ga usah khawatir,\nDisini bisa cicilan tanpa DP\nSyarat KTP saja!\nProses 15 menit langsung bawa gadget Impian anda!!!\nYang memiliki kartu kredit Bisa cicilan 0% ya guys!!!!\nSegera yuk serbu promonya\nChika 082116532506', 'Selamat Pagi,\nGimana kabarnya nih bunda/kakak/pak?\nSemoga sehat selalu. Aamiin\n*Mau informasiin sedikit nih Promo Cashback dan Berhadiah Speaker Bluetooth nya Ori Bcare* \n- *Samsung Galaxy S23 256 normal 13.999.000 promo jadi 10.499.000 dan tambahan Hadiah Speaker Bluetooth*\n- *Samsung Galaxy A55 promo Free upgrade Memory dari 128GB dapet Galaxy A55 Memory 256GB *\n- *Samsung Galaxy A15 Jaringan 5G Ram 16GB rom 256GB Promo cashback 300k normal 3.299.000 kini 2.999.000 dan Free Speaaker Bluetooth*\n*Terakhir harga terjangkau Cashback 100K*\n*Samsung Galaxy A05 Ram 4 Rom 128GB Cashback 100K dari 1.699.000 kini 1.599.000*\n*Samsung A05 RAM 4 Rom 64GB cashback 100k Normal price 1.499.000 kini 1.399.000*\nEiiitsssss yang belum gajian ga usah khawatir,\nDisini bisa cicilan tanpa DP\nSyarat KTP saja!\nProses 15 menit langsung bawa gadget Impian anda!!!\nYang memiliki kartu kredit Bisa cicilan 0% ya guys!!!!\nSegera yuk serbu promonya\nChika 082116532506', 'Que le hiciste a los emojis ']\nBrand: google, Followers: 15005436, Following: 34, Total Posts: 2396\nTop Post: pk='3365016353641924562' id='3365016353641924562_1067259270' code='C6y8IuGNQfS' taken_at=datetime.datetime(2024, 5, 10, 17, 14, 31, tzinfo=TzInfo(UTC)) media_type=2 image_versions2={} product_type='feed' thumbnai

```

l_url=Url('https://instagram.fjai2-3.fna.fbcdn.net/v/t51.29350-15/442275365_9359
61164975233_5948797720050889507_n.jpg?stp=dst-jpg_e15_fr_p1080x1080&efg=eyJ2ZW5j
b2RlX3RhZyI6ImltYWdlX3VybgGdlbi4xMDgweDE5MjAuc2RyLmYyOTM1MCI9&_nc_ht=instagram.fj
ai2-3.fna.fbcdn.net&_nc_cat=101&_nc_ohc=UWyTmK2F3BQQ7kNvgGG078L&edm=APU89FABAAAA
&ccb=7-5&oh=00_AYCDbexQAhnGeFgZlNG7a0B4Po1qztUfoxhSJvtUUmVBXQ&oe=66465942&_nc_si
d=bc0c2c') location=None user=UserShort(pk='1067259270', username='google',
full_name='', profile_pic_url=None, profile_pic_url_hd=None, is_private=None)
comment_count=191 comments_disabled=False commenting_disabled_for_viewer=False
like_count=3945 play_count=None has_liked=None caption_text='Blink and you'll
miss it #GoogleIO is coming next week on May 14 at 10 am PT. Tune in for our
latest advancements in AI and learn more at the link in bio.'
accessibility_caption=None usertags=[] sponsor_tags=[] video_url=Url('https://in
stagram.fjai2-1.fna.fbcdn.net/v/t66.30100-16/310768958_323495884099048_118110225
8047946833_n.mp4?_nc_ht=instagram.fjai2-1.fna.fbcdn.net&_nc_cat=104&_nc_ohc=0vB9
_sBjXLcQ7kNvgHdHY-_&edm=APU89FABAAAA&ccb=7-5&oh=00_AYDnTfB0fCVCZRnnxGI1vvgdxKsrL
gorWFE738tflnE_5A&oe=66426081&_nc_sid=bc0c2c') view_count=24171
video_duration=0.0 title='' resources=[] clips_metadata={}, Likes: 3945,
Comments: 191
First 20 Comments on Top Post: ['#BLOCKED2024 the block party welcomes you.
#freecongo', '#BLOCKED2024 the block party welcomes you. #freecongo',
'#blockout2024', '#blockout2024', 'Pagi future office ', 'Kurdistan
flaggg ', 'Kurdistan flaggg ', ' Add the
Kurdistan flag to our emojis #kurdistan', ' Add the
Kurdistan flag to our emojis #kurdistan', ' Add the
Kurdistan flag to our emojis #kurdistan', '', '', '', 'GOOGLE PLEASE I NEED HELP
SUPPORT MY ACCOUNT HAA BEEN HACKED', '', 'Lollolololololololololoolkko', 'Your
Husband loves u liar! ', 'Blocklist 2024', '',
'"Hey google, why are you trying to rewrite history?"']

```

2 # Engagement Rate Calculation

Calculate and display the engagement rates for Apple, Samsung, and Google based on likes, comments, and total followers.

```

[8]: def calculate_engagement(likes, comments, followers):
    """
    Calculate the engagement rate based on likes, comments, and the number of
    followers.
    Engagement rate is defined as ((likes + comments) / followers) * 100 to get
    a percentage.
    """
    total_interactions = likes + comments
    engagement_rate = (total_interactions / followers) * 100
    return engagement_rate

# Sample data - replace with your actual data
apple_followers = 32634836

```

```

apple_likes = 74776
apple_comments = 1033

samsung_followers = 1760131
samsung_likes = 979
samsung_comments = 41

google_followers = 15005436
google_likes = 3945
google_comments = 191

# Calculate engagement rates
apple_engagement = calculate_engagement(apple_likes, apple_comments,
    ↪apple_followers)
samsung_engagement = calculate_engagement(samsung_likes, samsung_comments,
    ↪samsung_followers)
google_engagement = calculate_engagement(google_likes, google_comments,
    ↪google_followers)

print(f"Apple Engagement Rate: {apple_engagement:.2f}%")
print(f"Samsung Engagement Rate: {samsung_engagement:.2f}%")
print(f"Google Engagement Rate: {google_engagement:.2f}%")

```

Apple Engagement Rate: 0.23%
 Samsung Engagement Rate: 0.06%
 Google Engagement Rate: 0.03%

3 # Engagement Rate Visualization

Visualize and compare the engagement rates across Apple, Samsung, and Google using a bar chart.

[9]: `pip install matplotlib`

Requirement already satisfied: matplotlib in c:\users\anaconda3\lib\site-packages (3.5.2)Note: you may need to restart the kernel to use updated packages.

Requirement already satisfied: cycler>=0.10 in c:\users\anaconda3\lib\site-packages (from matplotlib) (0.11.0)
 Requirement already satisfied: pillow>=6.2.0 in c:\users\anaconda3\lib\site-packages (from matplotlib) (9.2.0)
 Requirement already satisfied: numpy>=1.17 in c:\users\anaconda3\lib\site-packages (from matplotlib) (1.21.5)
 Requirement already satisfied: fonttools>=4.22.0 in c:\users\anaconda3\lib\site-packages (from matplotlib) (4.25.0)
 Requirement already satisfied: pyparsing>=2.2.1 in c:\users\anaconda3\lib\site-packages (from matplotlib) (3.0.9)

```

Requirement already satisfied: python-dateutil>=2.7 in
c:\users\anaconda3\lib\site-packages (from matplotlib) (2.8.2)
Requirement already satisfied: kiwisolver>=1.0.1 in
c:\users\anaconda3\lib\site-packages (from matplotlib) (1.4.2)
Requirement already satisfied: packaging>=20.0 in c:\users\anaconda3\lib\site-
packages (from matplotlib) (21.3)
Requirement already satisfied: six>=1.5 in c:\users\anaconda3\lib\site-
packages (from python-dateutil>=2.7->matplotlib) (1.16.0)

WARNING: Ignoring invalid distribution -rotobuf (c:\users\anaconda3\lib\site-
packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\anaconda3\lib\site-
packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\anaconda3\lib\site-
packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\anaconda3\lib\site-
packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\anaconda3\lib\site-
packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\anaconda3\lib\site-
packages)

```

```

[10]: import matplotlib.pyplot as plt

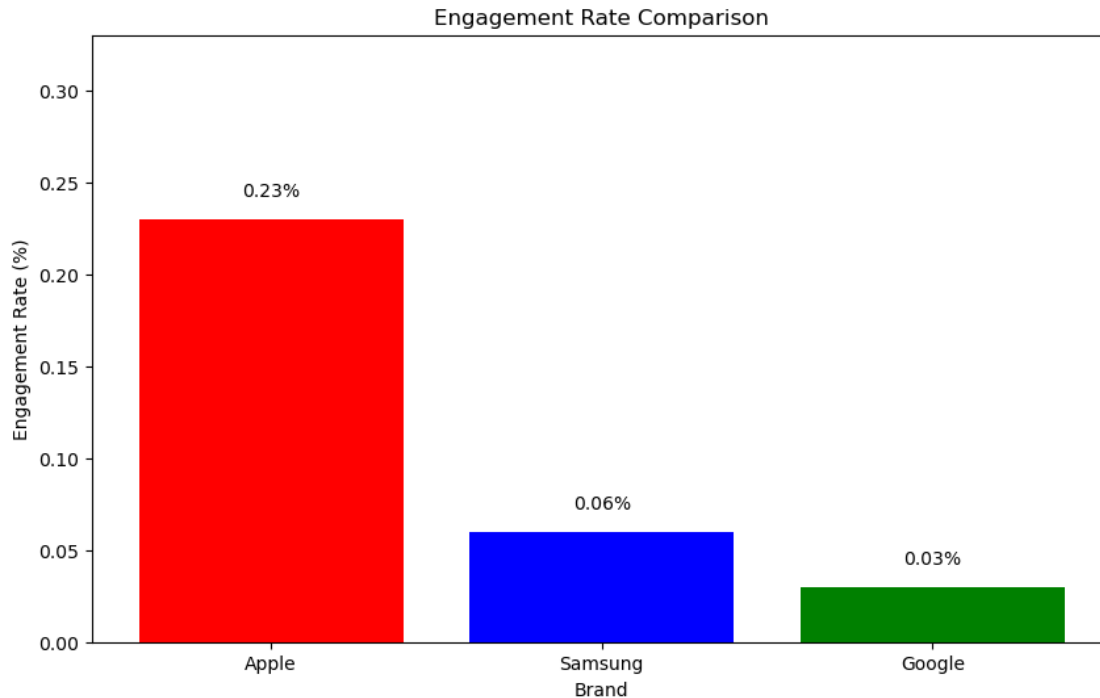
def visualize_engagement_rates(engagement_data):
    brands = list(engagement_data.keys())
    rates = list(engagement_data.values())

    plt.figure(figsize=(10, 6))
    plt.bar(brands, rates, color=['red', 'blue', 'green'])
    plt.xlabel('Brand')
    plt.ylabel('Engagement Rate (%)')
    plt.title('Engagement Rate Comparison')
    plt.ylim(0, max(rates) + 0.1) # add a little space at the top
    for i, rate in enumerate(rates):
        plt.text(i, rate + 0.01, f'{rate:.2f}%', ha='center', va='bottom')
    plt.show()

# Engagement data from your results
engagement_data = {
    'Apple': 0.23,
    'Samsung': 0.06,
    'Google': 0.03
}

visualize_engagement_rates(engagement_data)

```

4 Sentiment Analysis of Comments

Analyze the sentiments of comments using the VADER tool from the NLTK library to classify them into positive, negative, and neutral categories. #

```
[11]: pip install nltk
```

```
Requirement already satisfied: nltk in c:\users\a\anaconda3\lib\site-packages
(3.8.1)
Requirement already satisfied: click in c:\users\a\anaconda3\lib\site-packages
(from nltk) (8.0.4)
Requirement already satisfied: tqdm in c:\users\a\anaconda3\lib\site-packages
(from nltk) (4.64.1)
Requirement already satisfied: joblib in c:\users\a\anaconda3\lib\site-packages
(from nltk) (1.1.0)
Requirement already satisfied: regex>=2021.8.3 in c:\users\a\anaconda3\lib\site-
packages (from nltk) (2022.7.9)
Requirement already satisfied: colorama in c:\users\a\anaconda3\lib\site-
packages (from click->nltk) (0.4.6)
Note: you may need to restart the kernel to use updated packages.

WARNING: Ignoring invalid distribution -rotobuf (c:\users\a\anaconda3\lib\site-
packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\a\anaconda3\lib\site-
packages)
```

```

WARNING: Ignoring invalid distribution -rotobuf (c:\users\a\anaconda3\lib\site-
packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\a\anaconda3\lib\site-
packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\a\anaconda3\lib\site-
packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\a\anaconda3\lib\site-
packages)

```

```

[12]: import nltk
      from nltk.sentiment import SentimentIntensityAnalyzer

      # Download the VADER lexicon
      nltk.download('vader_lexicon')

      def analyze_comments_sentiments(comments):
          """
          Analyze the sentiments of comments using VADER.
          Returns the counts of positive, negative, and neutral comments.
          """
          sia = SentimentIntensityAnalyzer()
          sentiment_summary = {'positive': 0, 'negative': 0, 'neutral': 0}

          for comment in comments:
              score = sia.polarity_scores(comment)['compound']
              if score > 0.05:
                  sentiment_summary['positive'] += 1
              elif score < -0.05:
                  sentiment_summary['negative'] += 1
              else:
                  sentiment_summary['neutral'] += 1

          return sentiment_summary

      # Actual comments data from Apple, Samsung, and Google
      apple_comments = [
          '#stopstealing from DRC', ' ', ' ', 'Free Congo ', 'Blocked for_
          ↪life suckas',
          ' ', 'So you go and kill Congo people to harvest their lands and then you_
          ↪post this to cover for all genocidal acts!!!',
          'BLOCKING ', '#blockout2024', 'Beautiful lady ', '#blockout2024 Block_
          ↪genocide supporters. Block child killers.',
          '#congoisbleeding', 'Free kongo !!!', 'Hipócritas #freecongo',_
          ↪'#ChopChop2024 #Digitine2024 ',
          'Congo is bleeding', 'What about my tanzanian people',

```

```

    'Ghana, dont@let this post fool you, these people are causing child labour_
    ↳and suffering in Congo in order to make their products and now they want to_
    ↳pretend to pay image to you. When they'll be done with CONGO they WILL find_
    ↳a place to suck blood from, and that could be you.',
    ' ', 'so beautifulll '
]

samsung_comments = [
    "You well I have a new phone charger you ransomware battery burning_
    ↳Instagram warfare bunch of fuckin corpses waiting so I guess we'll see",
    '@samsung porfavor denos información y solución para los #samsungA23.', 'My_
    ↳phone has got Green Line, even without updating the software. To correct it/_
    ↳change the screen, I have to pay a big amount. Instead of launching new_
    ↳mobiles every few months, you should rectify the existing issues on your_
    ↳phones.',
    'Bring us resident evil games', 'Resident evil',
    'Cuál es la solución a nivel global para las personas que tenemos Samsung_
    ↳A23 ???? Van hacer una nueva actualización o van a reponer el equipo????',
    '@rehymining Me pasó lo mismo ', '@braidymichell_ Sí ', '@_lioness500_ OMG,_
    ↳samee. All my pictures and memories ',
    'Necesitamos respuestas a los Samsung A23 que no encendieron mas después de_
    ↳la actualización ',
    'Artificial Intelligence everywhere. ', 'Q le hiciste a los emojis ',
    "I hate the new update it's gonna make me snap the fkkin phone in half the_
    ↳gesture on the bottom buttons have changed the swipe feature is horrible I_
    ↳hate it and now I really don't even want to use my phone there should be an_
    ↳Option to update or remove and update and and update should never change_
    ↳previous user settings thanks for ruining my day and my phone",
    '@samsung It should be illegal to sell phones without a charger! After_
    ↳spending $1,400 and then some more dollars, we need to spend more on a_
    ↳charger? #Ridiculous #ChargerGate',
    'Deben responder por la falla que tienen con la última actualización del_
    ↳A23, como es posible que un teléfono relativamente nuevo esté dañado por_
    ↳culpa de su misma marca. EXIGIMOS UNA SOLUCION.', 'saquen un samsung folder_
    ↳3, quiero ser aeatetik 5g ',
    'New Folder phone when?', 'Selamat Pagi,\nGimana kabarnya nih bunda/kakak/_
    ↳pak?\nSemoga sehat selalu. Aamiin\n*Mau informasiin sedikit nih Promo_
    ↳Cashback dan Berhadiah Speaker Bluetooth nya Ori Bcare* \n- Double Promo_
    ↳Samsung Galaxy S23 256 normal 13.999.000 promo jadi 10.499.000 CASHBACK_
    ↳3,5JT tambahan Hadiah Speaker Bluetooth\n- Samsung Galaxy S23 FE 256_
    ↳CASHBACK 1JT NORMAL 9.999.000 JADI 8.999.000 TAMBAHAN FREE SPEAKER_
    ↳BLUETOOTH \n- Samsung Galaxy A15 Jaringan 5G Ram 16GB rom 256GB Promo_
    ↳cashback 300k normal 3.299.000 kini 2.999.000 dan Free Speaeker Bluetooth'
]

google_comments = [

```

```

'#BLOCKED2024 the block party welcomes you. #freecongo', '#BLOCKED2024 the
↳block party welcomes you. #freecongo', '#blockout2024', '#blockout2024',
'Pagi future office ', 'Kurdistan flaggg ', 'Kurdistan flaggg ',
'
Add the Kurdistan flag to our emojis #kurdistan', '
↳Add the Kurdistan flag to our emojis #kurdistan', '
Add the
↳Kurdistan flag to our emojis #kurdistan',
'', '', '', 'GOOGLE PLEASE I NEED HELP SUPPORT MY ACCOUNT HAA BEEN HACKED',
↳'',
'Lolllololololololololoolkko', 'Your Husband loves u liar! ',
↳'Blocklist 2024', '', '"Hey google, why are you trying to rewrite history?"'
]

# Analyze sentiments
apple_sentiments = analyze_comments_sentiments(apple_comments)
samsung_sentiments = analyze_comments_sentiments(samsung_comments)
google_sentiments = analyze_comments_sentiments(google_comments)

print(f"Apple Sentiments: {apple_sentiments}")
print(f"Samsung Sentiments: {samsung_sentiments}")
print(f"Google Sentiments: {google_sentiments}")

```

```

[nltk_data] Downloading package vader_lexicon to
[nltk_data] C:\Users\A\AppData\Roaming\nltk_data...

```

```

Apple Sentiments: {'positive': 3, 'negative': 5, 'neutral': 12}
Samsung Sentiments: {'positive': 2, 'negative': 6, 'neutral': 10}
Google Sentiments: {'positive': 4, 'negative': 0, 'neutral': 16}

```

```

[13]: import matplotlib.pyplot as plt

def plot_sentiment_results(results):
    brands = list(results.keys())
    positives = [result['positive'] for result in results.values()]
    negatives = [result['negative'] for result in results.values()]
    neutrals = [result['neutral'] for result in results.values()]

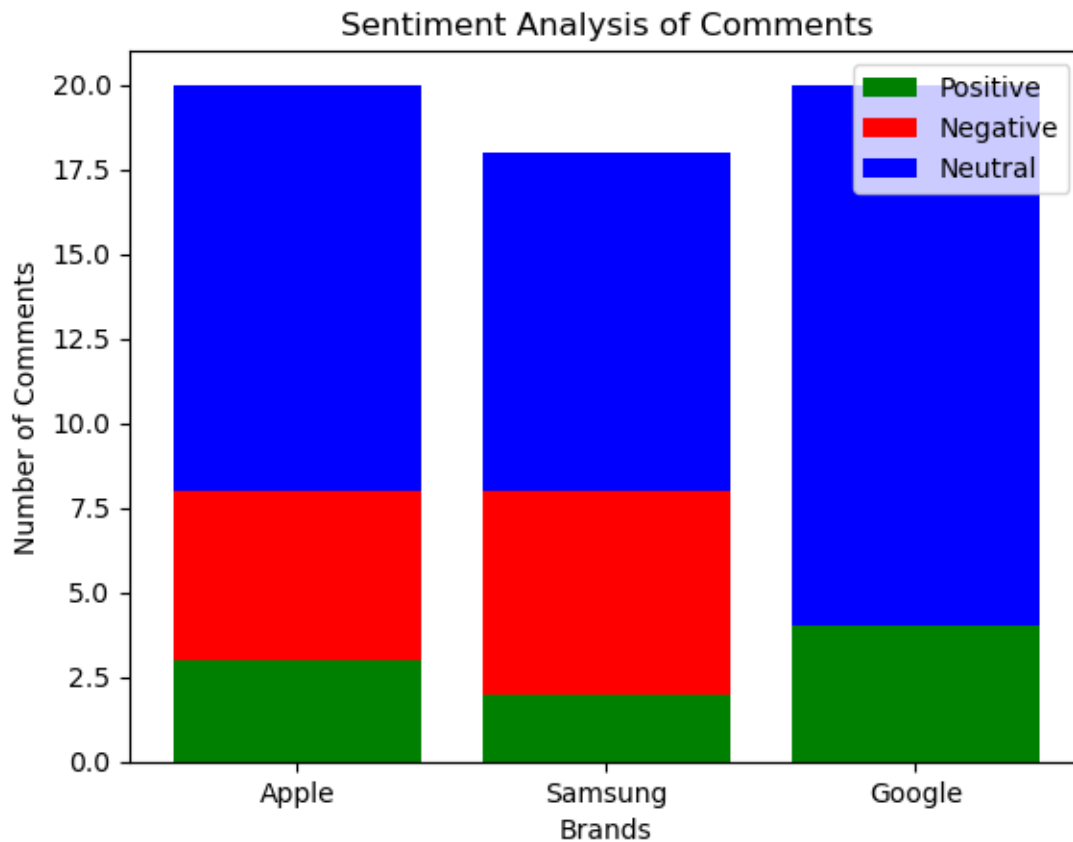
    x = range(len(brands))
    plt.bar(x, positives, color='g', label='Positive')
    plt.bar(x, negatives, bottom=positives, color='r', label='Negative')
    plt.bar(x, neutrals, bottom=[i+j for i,j in zip(positives, negatives)],
↳color='b', label='Neutral')

    plt.xlabel('Brands')
    plt.ylabel('Number of Comments')
    plt.title('Sentiment Analysis of Comments')
    plt.xticks(x, brands)
    plt.legend()

```

```
plt.show()

# Example usage
results = {'Apple': apple_sentiments, 'Samsung': samsung_sentiments, 'Google': google_sentiments}
plot_sentiment_results(results)
```



5 # Historical Data Collection

Fetch and store the last 50 posts for each brand to analyze historical engagement trends.

```
[14]: pip install pandas openpyxl
```

Requirement already satisfied: pandas in c:\users\anaconda3\lib\site-packages (1.4.4)

Requirement already satisfied: openpyxl in c:\users\anaconda3\lib\site-packages (3.0.10)

Requirement already satisfied: numpy>=1.18.5 in c:\users\anaconda3\lib\site-packages (from pandas) (1.21.5)

Requirement already satisfied: python-dateutil>=2.8.1 in

```

c:\users\anaconda3\lib\site-packages (from pandas) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in c:\users\anaconda3\lib\site-
packages (from pandas) (2022.1)
Requirement already satisfied: et_xmlfile in c:\users\anaconda3\lib\site-
packages (from openpyxl) (1.1.0)
Requirement already satisfied: six>=1.5 in c:\users\anaconda3\lib\site-
packages (from python-dateutil>=2.8.1->pandas) (1.16.0)
Note: you may need to restart the kernel to use updated packages.

WARNING: Ignoring invalid distribution -rotobuf (c:\users\anaconda3\lib\site-
packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\anaconda3\lib\site-
packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\anaconda3\lib\site-
packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\anaconda3\lib\site-
packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\anaconda3\lib\site-
packages)
WARNING: Ignoring invalid distribution -rotobuf (c:\users\anaconda3\lib\site-
packages)

```

```

[16]: from instagrapi import Client
import pandas as pd
from datetime import datetime

def fetch_historical_data_to_excel(username, post_count):
    cl = Client()
    cl.login('instadatascraper', 'rizulvaitya') # Replace with your credentials

    user_id = cl.user_id_from_username(username)
    posts = cl.user_medias(user_id, amount=post_count)

    # Create a list to store post data
    data = []
    for post in posts:
        data.append({
            'Post ID': post.id,
            'Date Posted': post.taken_at.strftime('%Y-%m-%d %H:%M:%S'), #
            ↪Format datetime for readability
            'Likes': post.like_count,
            'Comments': post.comment_count,
            'Caption': post.caption_text if post.caption_text else "",
            'URL': f"https://www.instagram.com/p/{post.code}/"
        })

    # Convert the list of data into a pandas DataFrame
    df = pd.DataFrame(data)

```

```

# Write the DataFrame to an Excel file
excel_filename = fr'C:\Users\A\Desktop\Hiral Project\Social media_
↪analysis\{username}_historical_data.xlsx'
df.to_excel(excel_filename, index=False)

return f"Data saved to {excel_filename}"

# Example usage
fetch_historical_data_to_excel('apple', 50)
fetch_historical_data_to_excel('samsung', 50)
fetch_historical_data_to_excel('google', 50)

```

[16]: 'Data saved to C:\\Users\\A\\Desktop\\Hiral Project\\Social media
analysis\\google_historical_data.xlsx'

```

[17]: import pandas as pd

# Load the data
apple_data = pd.read_excel(r'C:\Users\A\Desktop\Hiral Project\Social media_
↪analysis\apple_historical_data.xlsx')
samsung_data = pd.read_excel(r'C:\Users\A\Desktop\Hiral Project\Social media_
↪analysis\samsung_historical_data.xlsx')
google_data = pd.read_excel(r'C:\Users\A\Desktop\Hiral Project\Social media_
↪analysis\google_historical_data.xlsx')

# Display the first few rows to confirm the data
print(apple_data.head())
print(samsung_data.head())
print(google_data.head())

```

| | Post ID | Date Posted | Likes | Comments \ |
|---|--------------------------------|---------------------|--------|------------|
| 0 | 3364258921958479338_5821462185 | 2024-05-09 16:08:57 | 75037 | 1041 |
| 1 | 3363523937801465097_5821462185 | 2024-05-08 16:03:15 | 59280 | 500 |
| 2 | 3362925887900870437_5821462185 | 2024-05-07 20:03:02 | 114253 | 812 |
| 3 | 3359188419162191280_5821462185 | 2024-05-02 16:14:46 | 122983 | 1021 |
| 4 | 3358456438489164706_5821462185 | 2024-05-01 16:00:27 | 64579 | 410 |

| | Caption \ |
|---|---|
| 0 | "I wanted to show the power and beauty of a Gh... |
| 1 | "I have been fascinated by the incredible dive... |
| 2 | To celebrate the launch of the new iPad Pro, N... |
| 3 | "Every time I see a horse in my dreams, I like... |
| 4 | "Color evokes so many emotions, it's the main ... |

| | URL |
|---|---|
| 0 | https://www.instagram.com/p/C6wP6o3xhXq/ |

1 <https://www.instagram.com/p/C6tozNiLe0J/>
 2 <https://www.instagram.com/p/C6rg0cKS-cl/>
 3 <https://www.instagram.com/p/C6ePBHJxLWw/>
 4 <https://www.instagram.com/p/C6bolZBxSui/>

| | Post ID | Date Posted | Likes | Comments | \ |
|---|---------------------------------|---------------------|-------|----------|---|
| 0 | 3364556688476309680_30047490566 | 2024-05-10 02:00:08 | 984 | 41 | |
| 1 | 3364496219170308141_30047490566 | 2024-05-10 00:00:15 | 966 | 27 | |
| 2 | 3364443807139062749_30047490566 | 2024-05-09 22:16:37 | 3352 | 41 | |
| 3 | 3363107016238322823_30047490566 | 2024-05-08 02:00:19 | 1159 | 52 | |
| 4 | 3363076724894115840_30047490566 | 2024-05-08 01:00:08 | 1342 | 29 | |

Caption \

0 Season for the big game has come! Amazing #You...
 1 Watch how @francislola balances naps and play ...
 2 "No matter the miles, the #GalaxyS24 lets love...
 3 Mom works hard so she needs her downtime. Luck...
 4 Health is a huge part of living a happy, fulfi...

URL

0 <https://www.instagram.com/p/C6xTntjS4iw/>
 1 <https://www.instagram.com/p/C6xF3xHyoAt/>
 2 <https://www.instagram.com/p/C6w59EnSWPd/>
 3 <https://www.instagram.com/p/C6sKANEglSH/>
 4 <https://www.instagram.com/p/C6sDHaDsqaA/>

| | Post ID | Date Posted | Likes | Comments | \ |
|---|--------------------------------|---------------------|-------|----------|---|
| 0 | 3365016353641924562_1067259270 | 2024-05-10 17:14:31 | 3961 | 193 | |
| 1 | 3363654611923000468_1067259270 | 2024-05-08 20:08:18 | 11576 | 343 | |
| 2 | 3363531282590641706_1067259270 | 2024-05-08 16:03:16 | 11436 | 277 | |
| 3 | 3362867460221031177_1067259270 | 2024-05-07 18:05:50 | 3615 | 165 | |
| 4 | 3362809142770001381_4512854723 | 2024-05-07 16:09:40 | 21726 | 643 | |

Caption \

0 Blink and you'll miss it #GoogleIO is coming...
 1 Meet Mustafa He used the Google UX Design Ce...
 2 AlphaFold 3 is our newest AI model from @Googl...
 3 We're a week away from #GoogleIO Until then,...
 4 Colorful. Powerful. AI-full. Meet #Pixel8a, a ...

URL

0 <https://www.instagram.com/p/C6y8IuGNQfS/>
 1 <https://www.instagram.com/p/C6uGgxSxlyU/>
 2 <https://www.instagram.com/p/C6tqeF5uq4q/>
 3 <https://www.instagram.com/p/C6rTiNJMdMJ/>
 4 <https://www.instagram.com/p/C6rGRkyPeXl/>

6 # Engagement Over Time Visualization

Plot the engagement trends over time for each brand using likes and comments data.

```
[18]: import matplotlib.pyplot as plt

def plot_engagement_over_time(data, brand_name):
    # Convert 'Date Posted' to datetime format
    data['Date Posted'] = pd.to_datetime(data['Date Posted'])

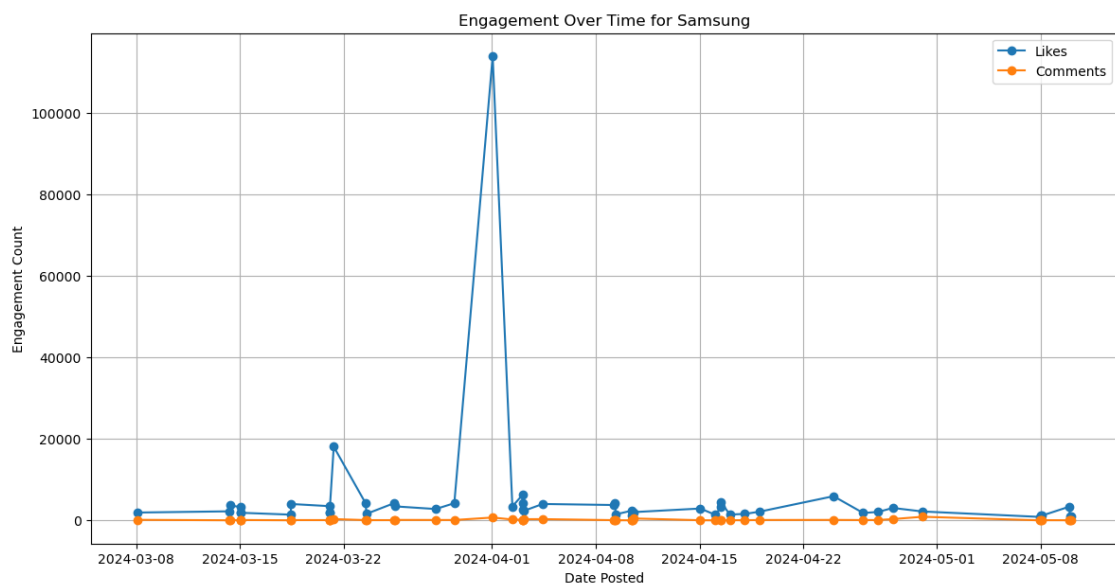
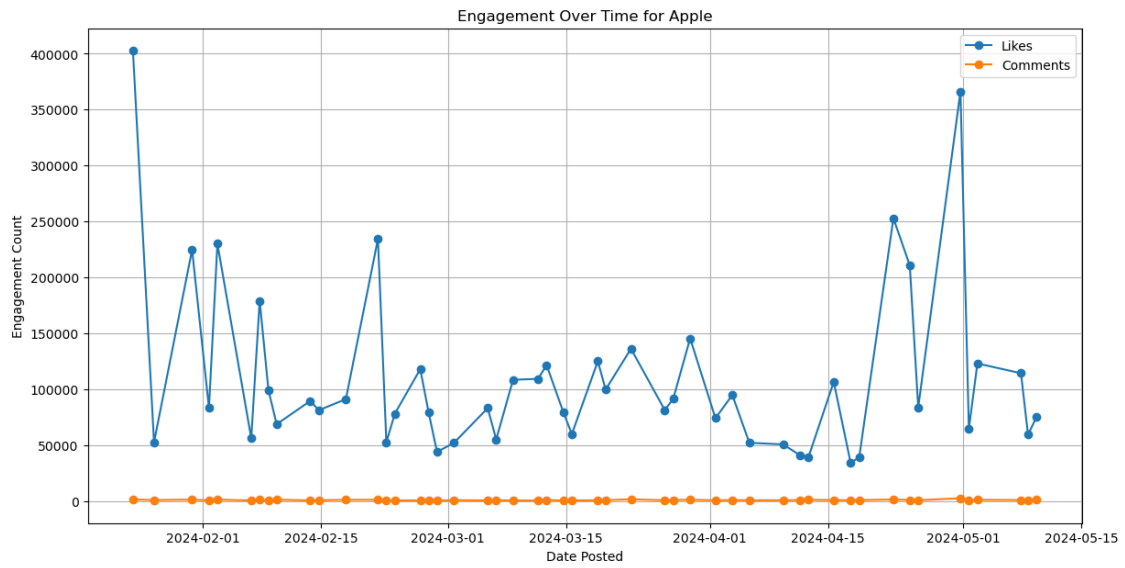
    # Sorting data by date
    data = data.sort_values('Date Posted')

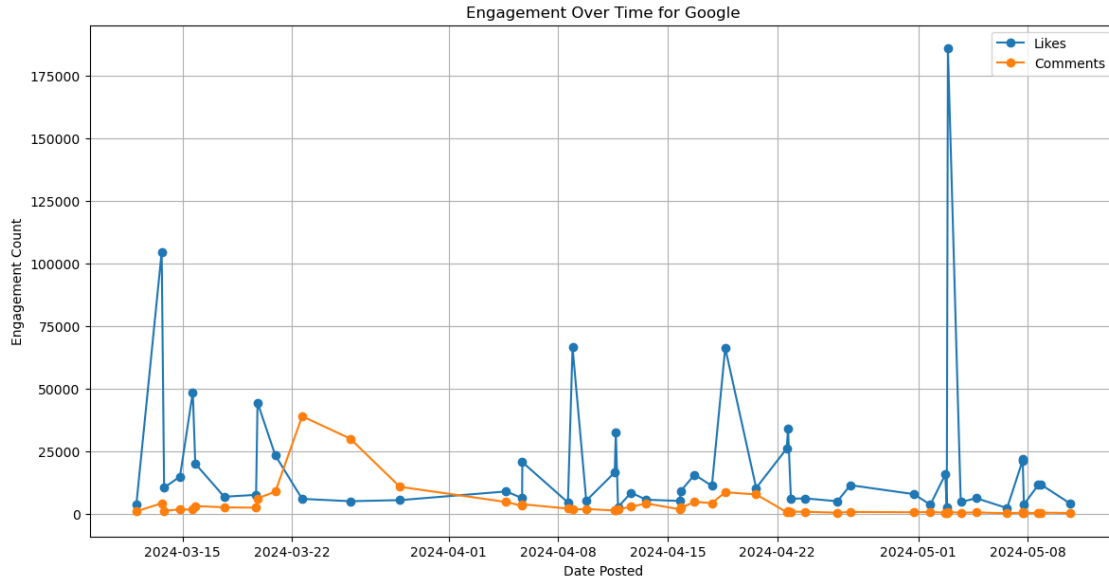
    # Plotting
    plt.figure(figsize=(14, 7))
    plt.plot(data['Date Posted'], data['Likes'], label='Likes', marker='o')
    plt.plot(data['Date Posted'], data['Comments'], label='Comments',
    ↪marker='o')
    plt.title(f'Engagement Over Time for {brand_name}')
    plt.xlabel('Date Posted')
    plt.ylabel('Engagement Count')
    plt.legend()
    plt.grid(True)
    plt.show()

# Plot engagement for Apple
plot_engagement_over_time(apple_data, 'Apple')

# Plot engagement for Samsung
plot_engagement_over_time(samsung_data, 'Samsung')

# Plot engagement for Google
plot_engagement_over_time(google_data, 'Google')
```





7 # Topic Modeling of Post Captions

Use Latent Dirichlet Allocation (LDA) to identify common topics within the captions of the posts for each brand.

```
[20]: from sklearn.feature_extraction.text import CountVectorizer
from sklearn.decomposition import LatentDirichletAllocation

def extract_topics(data, n_topics=5, n_words=10):
    count_vect = CountVectorizer(max_df=0.95, min_df=2, stop_words='english')
    dtm = count_vect.fit_transform(data['Caption'])
    lda = LatentDirichletAllocation(n_components=n_topics, random_state=0)
    lda.fit(dtm)

    # Displaying topics
    feature_names = count_vect.get_feature_names_out()
    for topic_idx, topic in enumerate(lda.components_):
        print(f"Topic #{topic_idx+1}:")
        print(" ".join([feature_names[i] for i in topic.argsort()[::-n_words - 1:
↵-1]]))

    # Apply topic extraction on Apple data
    extract_topics(apple_data)
```

Topic #1:

like photography moment want time don choose convey beautiful city

Topic #2:

women new pro create max using photographer sustainable creating day

Topic #3:

apple iphone commissioned 15 pro music northlandscapes shot video fascinated

Topic #4:

beauty details like visual artistic shots storytelling color love comes

Topic #5:

nature photographs interesting power emotions life color character things simple

```
[27]: from sklearn.feature_extraction.text import CountVectorizer
      from sklearn.decomposition import LatentDirichletAllocation

      def extract_topics(data, n_topics=5, n_words=10):
          count_vect = CountVectorizer(max_df=0.95, min_df=2, stop_words='english')
          dtm = count_vect.fit_transform(data['Caption'])
          lda = LatentDirichletAllocation(n_components=n_topics, random_state=0)
          lda.fit(dtm)

          # Displaying topics
          feature_names = count_vect.get_feature_names_out()
          for topic_idx, topic in enumerate(lda.components_):
              print(f"Topic #{topic_idx+1}:")
              print(" ".join([feature_names[i] for i in topic.argsort()[::-n_words - 1:
↵-1]]))

          # Apply topic extraction on samsung data
          extract_topics(samsung_data)
```

Topic #1:

music home frame soundbar dolbyatmos customizabledesign wirelessspeaker

qsymphony beautifulspeaker musicbeautifullyframed

Topic #2:

samsungtv lifestylescreen theframe lifestyletv arttv www art com make laundry

Topic #3:

8k neoqled8k upscaleeverymoment moment upscale samsungaitv neo qled experience

mothersday

Topic #4:

ai bespoke new experience bespokeai samsungbespoke samsung_bespoke qled neo

dolesslivemore

Topic #5:

windfree equilibrium newfound 2024 technology 16 newfoundequilibrium

milandesignweek mdw2024 le

```
[26]: from sklearn.feature_extraction.text import CountVectorizer
      from sklearn.decomposition import LatentDirichletAllocation

      def extract_topics(data, n_topics=5, n_words=10):
          count_vect = CountVectorizer(max_df=0.95, min_df=2, stop_words='english')
          dtm = count_vect.fit_transform(data['Caption'])
```

```

lda = LatentDirichletAllocation(n_components=n_topics, random_state=0)
lda.fit(dtm)

# Displaying topics
feature_names = count_vect.get_feature_names_out()
for topic_idx, topic in enumerate(lda.components_):
    print(f"Topic #{topic_idx+1}:")
    print(" ".join([feature_names[i] for i in topic.argsort()[:n_words - 1:
↵-1]]))

# Apply topic extraction on google data
extract_topics(google_data)

```

Topic #1:
link bio googleio 14 pt ai latest 10 updates google
Topic #2:
link bio tap today googledoodle learn help nature celebrates year
Topic #3:
pixel google connection app day new years work internet results
Topic #4:
bio link google world learn looking search turn help meet
Topic #5:
google tap app try swipe new eclipse link bio pro

8 # Comparative Engagement Analysis

Compare the total engagement across Apple, Samsung, and Google, visualizing the combined likes and comments over time.

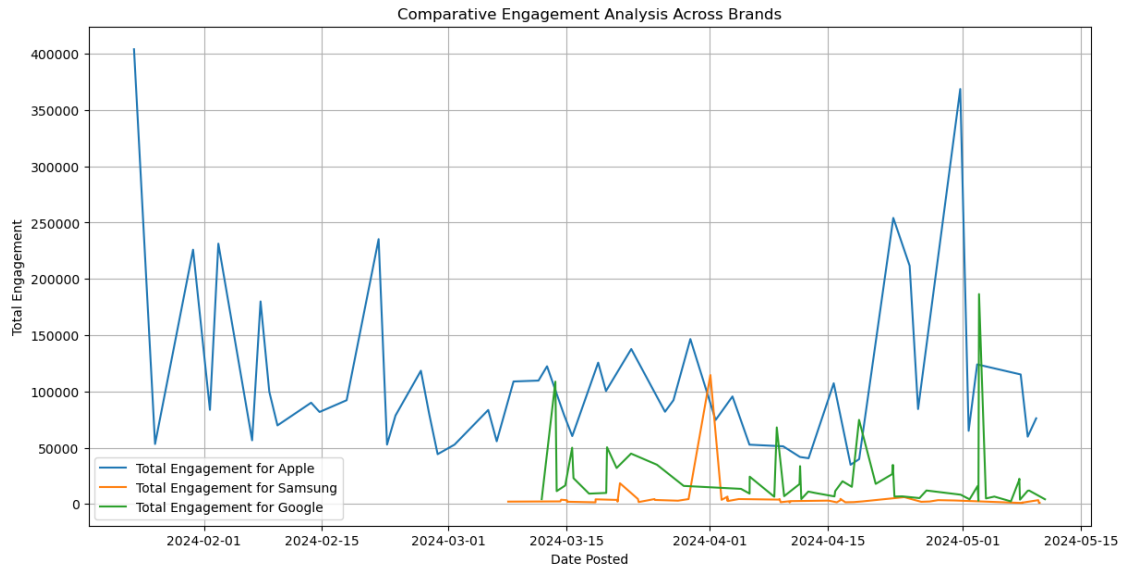
```

[23]: def compare_engagement(data_list, labels):
    plt.figure(figsize=(14, 7))
    for data, label in zip(data_list, labels):
        plt.plot(data['Date Posted'], data['Likes'] + data['Comments'],
↵label=f'Total Engagement for {label}')

    plt.title('Comparative Engagement Analysis Across Brands')
    plt.xlabel('Date Posted')
    plt.ylabel('Total Engagement')
    plt.legend()
    plt.grid(True)
    plt.show()

# Comparing Apple, Samsung, and Google
compare_engagement([apple_data, samsung_data, google_data], ['Apple',
↵'Samsung', 'Google'])

```

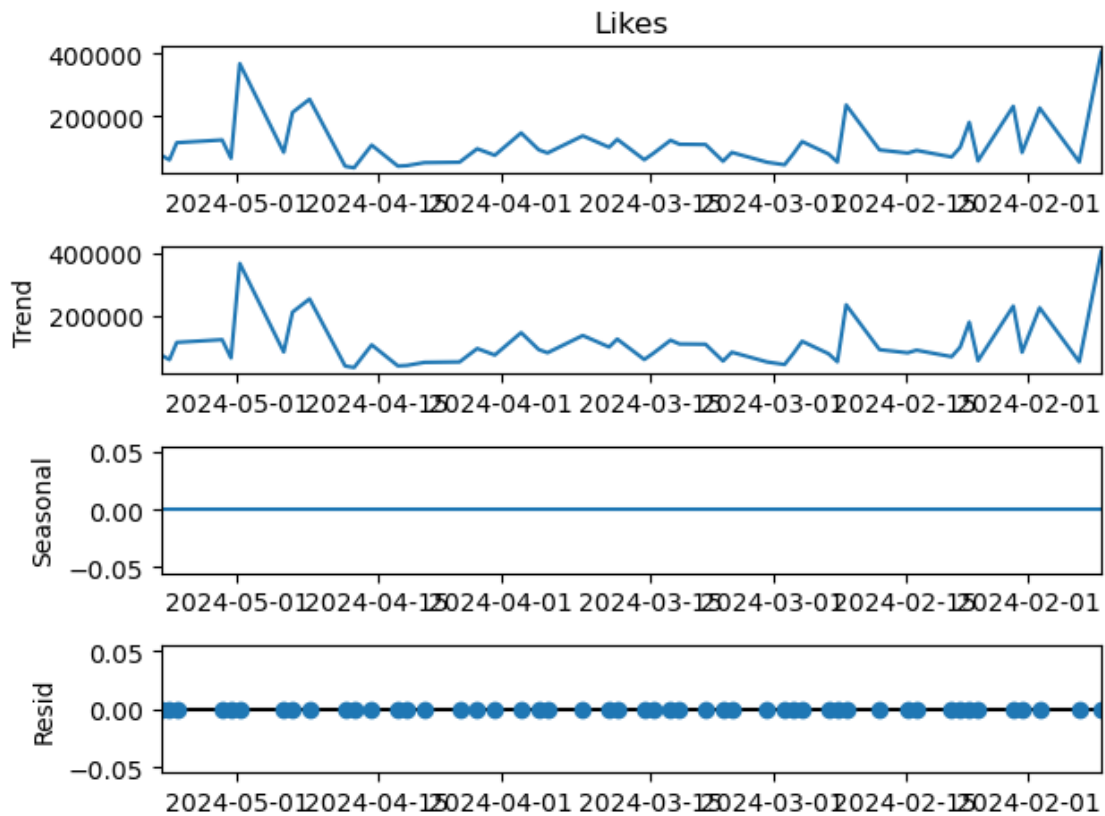


9 Seasonal Decomposition of Time-Series Data

Apply seasonal decomposition to the time-series data of likes for each brand to identify underlying patterns such as trends and seasonality.

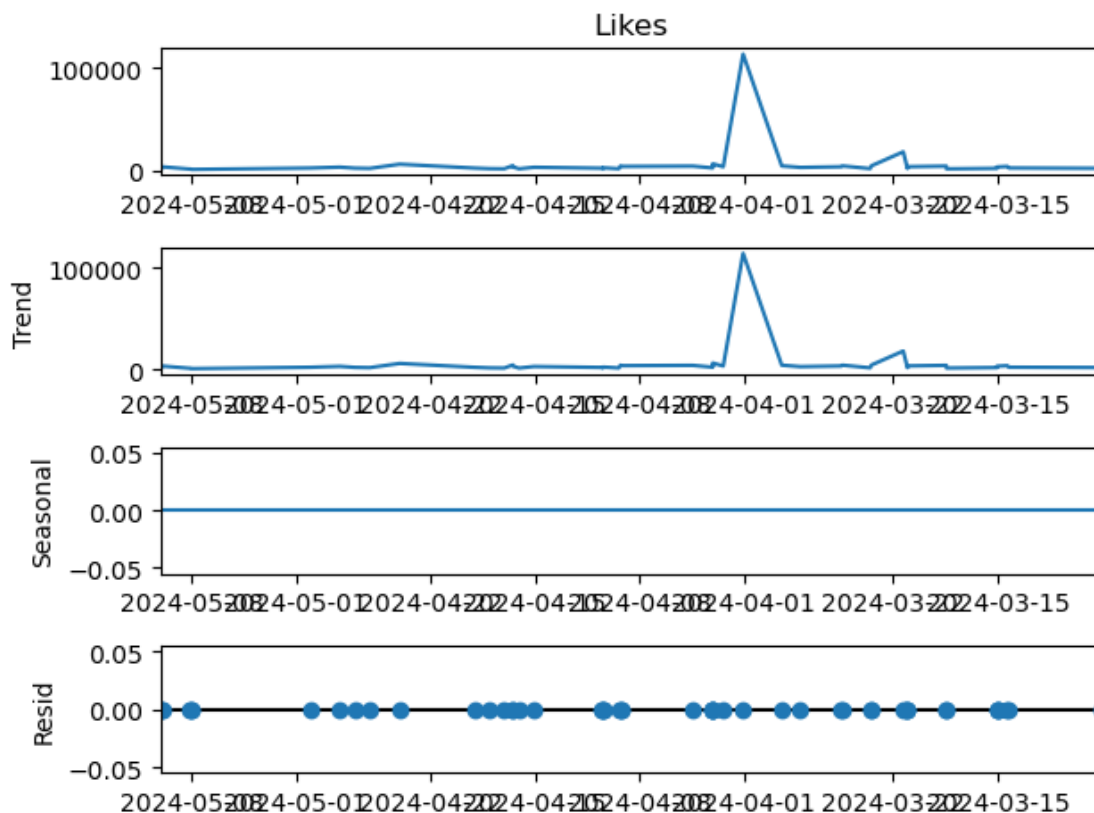
```
[24]: from statsmodels.tsa.seasonal import seasonal_decompose

# Example of decomposing time-series data for Apple
apple_data['Date Posted'] = pd.to_datetime(apple_data['Date Posted'])
apple_data.set_index('Date Posted', inplace=True)
result = seasonal_decompose(apple_data['Likes'], model='additive', period=1)
result.plot()
plt.show()
```



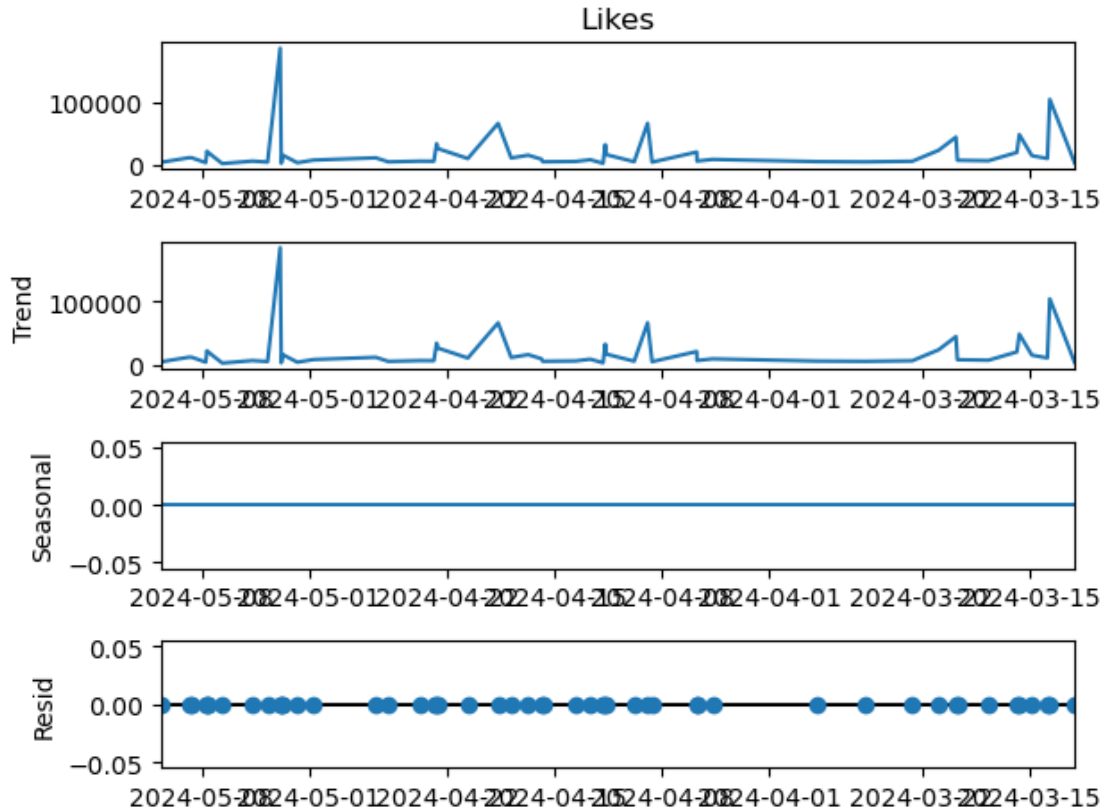
```
[25]: from statsmodels.tsa.seasonal import seasonal_decompose

# Example of decomposing time-series data for samsung
samsung_data['Date Posted'] = pd.to_datetime(samsung_data['Date Posted'])
samsung_data.set_index('Date Posted', inplace=True)
result = seasonal_decompose(samsung_data['Likes'], model='additive', period=1)
result.plot()
plt.show()
```



```
[28]: from statsmodels.tsa.seasonal import seasonal_decompose

# Example of decomposing time-series data for google
google_data['Date Posted'] = pd.to_datetime(google_data['Date Posted'])
google_data.set_index('Date Posted', inplace=True)
result = seasonal_decompose(google_data['Likes'], model='additive', period=1)
result.plot()
plt.show()
```

10 “Engagement Trend Analysis and Strategic Insights”

```
[32]: # Import necessary libraries
import matplotlib.pyplot as plt
import pandas as pd

# Load the data if needed
# Example: Assuming data is already loaded in variables apple_data,
#         samsung_data, google_data
apple_data = pd.read_excel(r'C:\Users\A\Desktop\Hiral Project\Social media_
                           ↳analysis\apple_historical_data.xlsx')
samsung_data = pd.read_excel(r'C:\Users\A\Desktop\Hiral Project\Social media_
                              ↳analysis\samsung_historical_data.xlsx')
google_data = pd.read_excel(r'C:\Users\A\Desktop\Hiral Project\Social media_
                              ↳analysis\google_historical_data.xlsx')

# Plot a summary visualization if needed
def plot_summary_statistics(data_list, labels):
    plt.figure(figsize=(14, 7))
```

```

    colors = ['red', 'green', 'blue']
    for data, label, color in zip(data_list, labels, colors):
        plt.plot(data['Date Posted'], data['Likes'] + data['Comments'],
        ↪label=f'Total Engagement for {label}', color=color)

    plt.title('Comparative Engagement Analysis Across Brands')
    plt.xlabel('Date Posted')
    plt.ylabel('Total Engagement')
    plt.legend()
    plt.grid(True)
    plt.show()

# Display the summary plot
data_list = [apple_data, samsung_data, google_data]
labels = ['Apple', 'Samsung', 'Google']
plot_summary_statistics(data_list, labels)

# Summary and Recommendations
from IPython.display import Markdown, display

def display_conclusion():
    summary_text = """
    ##Conclusion and Recommendations

    ###Summary of Findings
    - High Engagement: Apple's strategy is yielding the highest engagement,
    ↪suggesting a strong alignment with audience preferences.
    - Sentiment Insights: Negative sentiments across brands indicate areas for
    ↪improvement, particularly in customer service and product quality.
    - Trend Analysis: Seasonal trends suggest the optimal times for these
    ↪brands to post to maximize engagement.

    ###Recommendations
    - Content Strategy: For Apple, continuing to leverage current strategies
    ↪while incorporating more direct engagement could be beneficial.
    - Customer Feedback: Samsung and Google should address the negative
    ↪sentiments in comments by enhancing transparency and customer service.
    - Posting Schedule: All brands could benefit from aligning their posting
    ↪schedules with the observed peaks in engagement.

    ###Future Directions
    - Further analysis with a larger dataset over different platforms could
    ↪provide more generalized insights.
    - Implementing machine learning models to predict engagement based on post
    ↪characteristics could optimize content strategies.

```

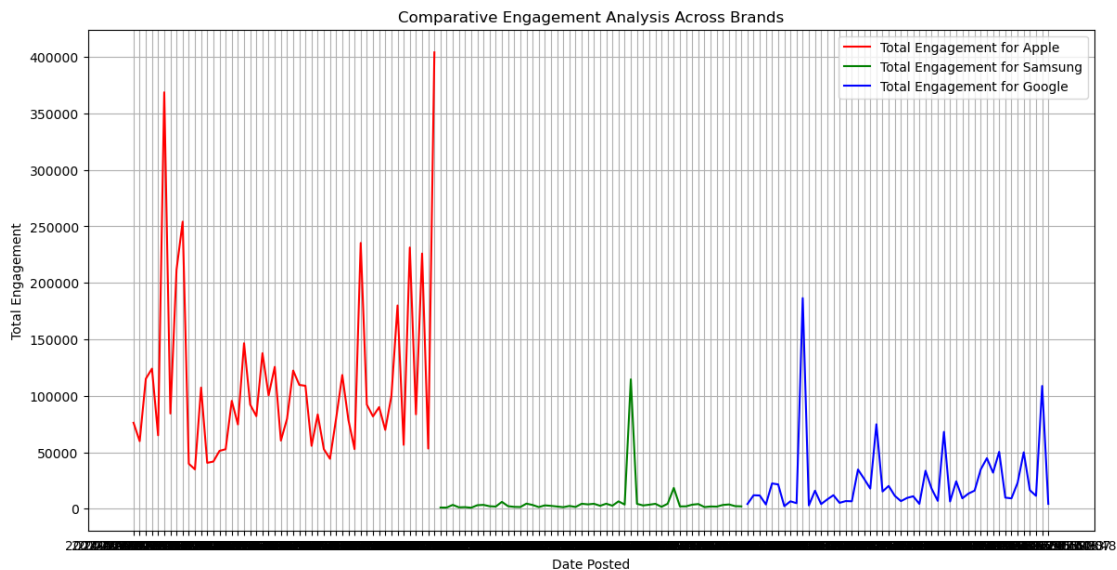
###Reflection on Methodology

- The methods used provided robust insights into brand performance on Instagram. However, the analysis would benefit from a broader sentiment analysis to capture subtler nuances of customer feedback.

"""

```
display(Markdown(summary_text))
```

```
display_conclusion()
```



##Conclusion and Recommendations

###Summary of Findings

- High Engagement: Apple's strategy is yielding the highest engagement, suggesting a strong alignment with audience interests.
- Sentiment Insights: Negative sentiments across brands indicate areas for improvement, particularly in customer service and product quality.
- Trend Analysis: Seasonal trends suggest the optimal times for these brands to post to maximize engagement.

###Recommendations

- Content Strategy: For Apple, continuing to leverage current strategies while incorporating more user-generated content.
- Customer Feedback: Samsung and Google should address the negative sentiments in comments by engaging with users and providing solutions.
- Posting Schedule: All brands could benefit from aligning their posting schedules with the observed peak engagement times.

###Future Directions

- Further analysis with a larger dataset over different platforms could provide more generalized insights.
- Implementing machine learning models to predict engagement based on post characteristics could optimize content strategy.

###Reflection on Methodology

- The methods used provided robust insights into brand performance on Instagram. However, the analysis would benefit from a broader sentiment analysis to capture subtler nuances of customer feedback.

[]: