clashroyale

November 27, 2023

```
[ ]: import sqlite3
     import pandas as pd
     import numpy as np
     import matplotlib.pyplot as plt
     import scipy.stats as stats
     import pycountry_convert as pc
```

Clash Royale Data Intern Test

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```
[ ]: con = sqlite3.connect("sample.sqlite")

     #create dfs from tables provided
     account = pd.read_sql_query("SELECT * from account", con)
     account_date_session = pd.read_sql_query("SELECT * from account_date_session",␣
      ↪con)
     iap_purchase = pd.read_sql_query("SELECT * from iap_purchase", con)

     con.close()
```

```
[ ]: account.head()
```

```
[ ]:    account_id             created_time created_device created_platform  \
     0    13514010  2016-03-02 17:11:00.332      iPhone6,2              iOS
     1  4308483975   2016-03-02 20:57:46.14      MIDC147PJ          Android
     2 17193137415  2016-03-02 13:52:16.735       SM-G360F          Android
     3 21488104920  2016-03-02 12:43:27.899        H60-L01          Android
     4 21488107995  2016-03-02 17:20:12.145       GT-I9500          Android

       country_code  created_app_store_id
     0           GB                     1
     1           FR                     2
     2           IT                     2
     3           CN                     8
     4           RU                     2
```

This dataset includes information that provide details into the user's account creation process, including the time, device, platform, and geographical location.

```
[ ]: account_date_session.head()
```

```
[ ]:     account_id        date  session_count  session_duration_sec
     0  68730811144  2016-01-01              1                    47
     1  68730812806  2016-01-01              1                   204
     2  68730829426  2016-01-01             12                  4703
     3  68730829426  2016-01-02              9                  4676
     4  68730829426  2016-01-03              9                  2271
```

This dataset contains records of user accounts which allows tracking user activity over time by providing information on the frequency and duration of sessions for each account.

```
[ ]: iap_purchase.head()
```

```
[ ]:     account_id             created_time                     package_id_hash  \
     0  30077202816  2016-03-26 23:59:59.355  ae0253c27c34edd1ab4fe21d6bfc91f8
     1  30077202816  2016-05-31 11:24:37.283  dd4c1bda4f2c904075fb2fbfcf30f30e
     2  21487283560  2016-02-13 03:40:28.644  99a9e0e63efa2fdce8fc8de74c66cea9
     3  21487152816  2016-02-28 00:53:26.678  99a9e0e63efa2fdce8fc8de74c66cea9
     4   8602037685  2016-02-11 01:03:04.727  99a9e0e63efa2fdce8fc8de74c66cea9

        iap_price_usd_cents  app_store_id
     0                  739             0
     1                  369             0
     2                  184             0
     3                  184             0
     4                  184             0
```

This dataset captures information related to in-app purchases. Each row represents a specific in-app purchase, providing insights into user spending behavior within the application.

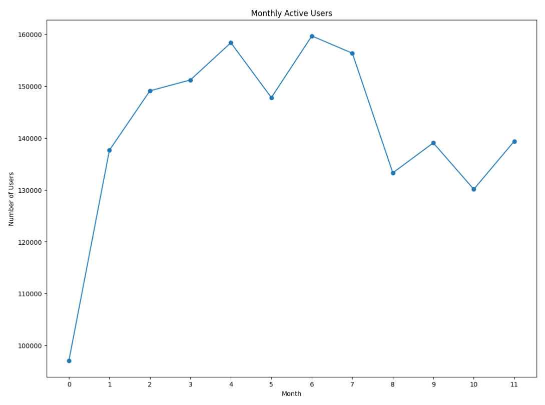
2. Analyse the daily active users:

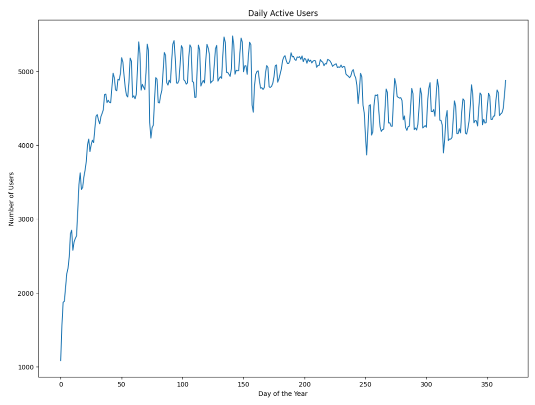
- Compare DAU changes over time.
- Can you identify any trends in data?
- Can you find any ups or drops that are out of the normal behaviour?
- What do you think why do they happen?

```
[ ]: # Convert 'date' to a datetime
     account_date_session['date'] = pd.to_datetime(account_date_session['date'])

     # Group by month and calculate monthly active users for each month
     monthly_active_users = account_date_session.
      ↪groupby(account_date_session['date'].dt.to_period("M"))['account_id'].
      ↪count().tolist()


     # Create a list with the daily active users each day of the year
```

```
daily_active_users = account_date_session.groupby('date')['account_id'].count().
 ↪tolist()


fig, axs = plt.subplots(1, 2, figsize=(30, 10))

# Plot the daily active users by month
axs[0].plot(monthly_active_users, marker='o', linestyle='-')
axs[0].set_title('Monthly Active Users')
axs[0].set_xlabel('Month')
axs[0].set_ylabel('Number of Users')
axs[0].set_xticks(range(len(monthly_active_users)))


# Plot the daily active users for each day of the year
axs[1].plot(daily_active_users)
axs[1].set_title('Daily Active Users')
axs[1].set_xlabel('Day of the Year')
axs[1].set_ylabel('Number of Users')
```

```
[ ]: Text(0, 0.5, 'Number of Users')
```





The daily active users shows a strong trend towards new players in the beginning. On the first 2 months the growth in daily players is very fast but after this the growth stops. There are clear seasonal fluctuations as the summer months seem to have higher count of active users. The decline in active users following the summer months suggests that the end of holidays may have contributed to a decrease in app usage. After a period of initial growth, the app appears to have reached a steady state in terms of user activity, with fairly small fluctuations in active user counts.

3. Analyse sales:

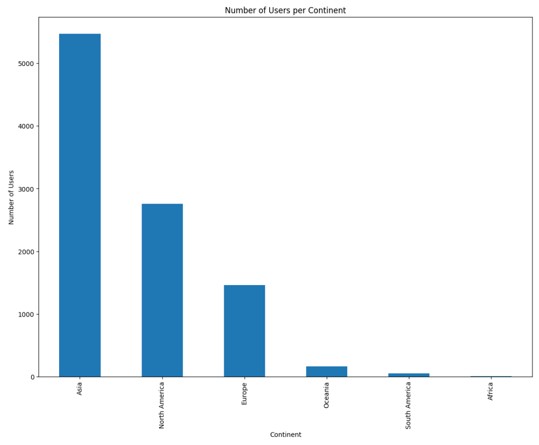
- Analyse the geographic split of the revenue and the users.
- Calculate average revenue per user per market.

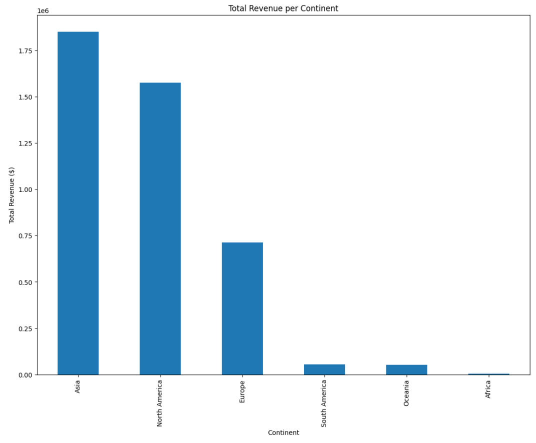
- What are your observations of the results?

```
[ ]: def get_continent_code(country_code):
         try:
             return pc.country_alpha2_to_continent_code(country_code)
         except Exception as e:
             return 'Unknown'

     # Apply the function to create the 'continent' column
     account['continent'] = account['country_code'].apply(lambda x:␣
      ↪get_continent_code(x))

     #Convert continent column to continent name
     account['continent'] = account['continent'].map({'NA': 'North America', 'SA':␣
      ↪'South America', 'AS': 'Asia', 'OC': 'Oceania', 'AF': 'Africa', 'EU':␣
      ↪'Europe'})

     #join continent column to iap_purchase table by account_id
     iap_purchase = pd.merge(iap_purchase, account[['account_id', 'continent']],␣
      ↪on='account_id', how='left')
```

```
[ ]: # Set up subplots
     fig, axs = plt.subplots(1, 2, figsize=(30, 10))

     # Plot the number of users by continent
     iap_purchase['continent'].value_counts().plot(kind='bar', ax=axs[0])
     axs[0].set_title('Number of Users per Continent')
     axs[0].set_xlabel('Continent')
     axs[0].set_ylabel('Number of Users')

     # Plot the total revenue by continent
     iap_purchase.groupby('continent')['iap_price_usd_cents'].sum().
      ↪sort_values(ascending=False).plot(kind='bar', ax=axs[1])
     axs[1].set_title('Total Revenue per Continent')
     axs[1].set_xlabel('Continent')
     axs[1].set_ylabel('Total Revenue ($)')
```

```
[ ]: Text(0, 0.5, 'Total Revenue ($)')
```





```
[ ]: #Calculate average revenue per user per market
     revenue_per_user = iap_purchase.groupby('continent')['iap_price_usd_cents'].
      ↪sum() / iap_purchase.groupby('continent')['account_id'].nunique()
     revenue_per_user = revenue_per_user.sort_values(ascending=False)
     print(revenue_per_user/100)
```

```
continent
South America    55.747000
North America    52.357409
Europe           33.493756
Oceania          18.947778
Asia             18.626012
Africa           12.070000
dtype: float64
```

The results indicate that customers in Asia generally spend significantly less on the game. Although North America has nearly half the number of players compared to Asia, the revenue disparity between these regions appears relatively small.