

```
In [3]:  
import pandas as pd  
import numpy as np  
import matplotlib.pyplot as plt  
import seaborn as sns  
import warnings  
  
warnings.filterwarnings("ignore")  
%matplotlib inline  
  
import cufflinks as cf  
  
cf.go_offline()
```

```
In [4]: df=pd.read_csv("E://data//googleplaystore.csv")
```

```
In [5]: df.shape
```

```
Out[5]: (10841, 13)
```

```
In [6]: df.sample()
```

```
Out[6]:  
          App   Category  Rating  Reviews    Size  Installs  Type  Price  Content Rating  Genres  Last Updated  Current Ver  Android Ver  
3608  Kids Fang - Infant Videos, Children's Songs, F...  PARENTING     4.6      349   4.4M  100,000+    Free      0    Everyone  Parenting  March 21, 2018      1.7  4.4 and up
```

```
In [7]: df.info()
```

```
<class 'pandas.core.frame.DataFrame'>  
RangeIndex: 10841 entries, 0 to 10840  
Data columns (total 13 columns):  
 #   Column           Non-Null Count  Dtype     
---  --  
 0   App              10841 non-null   object    
 1   Category         10841 non-null   object    
 2   Rating           9367 non-null   float64  
 3   Reviews          10841 non-null   object    
 4   Size              10841 non-null   object    
 5   Installs          10841 non-null   object    
 6   Type              10840 non-null   object    
 7   Price              10841 non-null   object    
 8   Content Rating   10840 non-null   object    
 9   Genres            10841 non-null   object    
 10  Last Updated     10841 non-null   object    
 11  Current Ver      10833 non-null   object    
 12  Android Ver      10838 non-null   object    
dtypes: float64(1), object(12)  
memory usage: 1.1+ MB
```

```
In [8]: df.isnull().sum()
```

```
Out[8]: App          0
Category      0
Rating        1474
Reviews       0
Size          0
Installs      0
Type          1
Price          0
Content Rating 1
Genres         0
Last Updated   0
Current Ver    8
Android Ver    3
dtype: int64
```

Check for Null Values

```
In [9]: df[df["Rating"].isnull()]
```

	App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver
23	Mcqueen Coloring pages	ART_AND DESIGN	NaN	61	7.0M	100,000+	Free	0	Everyone	Art & Design;Action & Adventure	March 7, 2018	1.0	4.1 and up
113	Wrinkles and rejuvenation	BEAUTY	NaN	182	5.7M	100,000+	Free	0	Everyone 10+	Beauty	September 20, 2017	8.0	3.0 and up
123	Manicure - nail design	BEAUTY	NaN	119	3.7M	50,000+	Free	0	Everyone	Beauty	July 23, 2018	1.3	4.1 and up
126	Skin Care and Natural Beauty	BEAUTY	NaN	654	7.4M	100,000+	Free	0	Teen	Beauty	July 17, 2018	1.15	4.1 and up
129	Secrets of beauty, youth and health	BEAUTY	NaN	77	2.9M	10,000+	Free	0	Mature 17+	Beauty	August 8, 2017	2.0	2.3 and up
...
10824	Cardio-FR	MEDICAL	NaN	67	82M	10,000+	Free	0	Everyone	Medical	July 31, 2018	2.2.2	4.4 and up
10825	Naruto & Boruto FR	SOCIAL	NaN	7	7.7M	100+	Free	0	Teen	Social	February 2, 2018	1.0	4.0 and up
10831	payermonstationnement.fr	MAPS_AND NAVIGATION	NaN	38	9.8M	5,000+	Free	0	Everyone	Maps & Navigation	June 13, 2018	2.0.148.0	4.0 and up
10835	FR Forms	BUSINESS	NaN	0	9.6M	10+	Free	0	Everyone	Business	September 29, 2016	1.1.5	4.0 and up
10838	Parkinson Exercices FR	MEDICAL	NaN	3	9.5M	1,000+	Free	0	Everyone	Medical	January 20, 2017	1.0	2.2 and up

1474 rows × 13 columns

Checking for Duplicated rows

```
In [10]: df[df.duplicated()]
```

Out[10]:

	App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver
229	Quick PDF Scanner + OCR FREE	BUSINESS	4.2	80805	Varies with device	5,000,000+	Free	0	Everyone	Business	February 26, 2018	Varies with device	4.0.3 and up
236	Box	BUSINESS	4.2	159872	Varies with device	10,000,000+	Free	0	Everyone	Business	July 31, 2018	Varies with device	Varies with device
239	Google My Business	BUSINESS	4.4	70991	Varies with device	5,000,000+	Free	0	Everyone	Business	July 24, 2018	2.19.0.204537701	4.4 and up
256	ZOOM Cloud Meetings	BUSINESS	4.4	31614	37M	10,000,000+	Free	0	Everyone	Business	July 20, 2018	4.1.28165.0716	4.0 and up
261	join.me - Simple Meetings	BUSINESS	4.0	6989	Varies with device	1,000,000+	Free	0	Everyone	Business	July 16, 2018	4.3.0.508	4.4 and up
...
8643	Wunderlist: To-Do List & Tasks	PRODUCTIVITY	4.6	404610	Varies with device	10,000,000+	Free	0	Everyone	Productivity	April 6, 2018	Varies with device	Varies with device
8654	TickTick: To Do List with Reminder, Day Planner	PRODUCTIVITY	4.6	25370	Varies with device	1,000,000+	Free	0	Everyone	Productivity	August 6, 2018	Varies with device	Varies with device
8658	ColorNote Notepad Notes	PRODUCTIVITY	4.6	2401017	Varies with device	100,000,000+	Free	0	Everyone	Productivity	June 27, 2018	Varies with device	Varies with device
10049	Airway Ex - Intubate. Anesthetize. Train.	MEDICAL	4.3	123	86M	10,000+	Free	0	Everyone	Medical	June 1, 2018	0.6.88	5.0 and up
10768	AAFP	MEDICAL	3.8	63	24M	10,000+	Free	0	Everyone	Medical	June 22, 2018	2.3.1	5.0 and up

483 rows × 13 columns

In [11]:

df=df.drop_duplicates()

In [12]:

df

Out[12]:

	App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver
0	Photo Editor & Candy Camera & Grid & ScrapBook	ART_AND DESIGN	4.1	159	19M	10,000+	Free	0	Everyone	Art & Design	January 7, 2018	1.0.0	4.0.3 and up
1	Coloring book moana	ART_AND DESIGN	3.9	967	14M	500,000+	Free	0	Everyone	Art & Design;Pretend Play	January 15, 2018	2.0.0	4.0.3 and up
2	U Launcher Lite – FREE Live Cool Themes, Hide ...	ART_AND DESIGN	4.7	87510	8.7M	5,000,000+	Free	0	Everyone	Art & Design	August 1, 2018	1.2.4	4.0.3 and up
3	Sketch - Draw & Paint	ART_AND DESIGN	4.5	215644	25M	50,000,000+	Free	0	Teen	Art & Design	June 8, 2018	Varies with device	4.2 and up
4	Pixel Draw - Number Art Coloring Book	ART_AND DESIGN	4.3	967	2.8M	100,000+	Free	0	Everyone	Art & Design;Creativity	June 20, 2018	1.1	4.4 and up
...
10836	Sya9a Maroc - FR	FAMILY	4.5	38	53M	5,000+	Free	0	Everyone	Education	July 25, 2017	1.48	4.1 and up
10837	Fr. Mike Schmitz Audio Teachings	FAMILY	5.0	4	3.6M	100+	Free	0	Everyone	Education	July 6, 2018	1.0	4.1 and up
10838	Parkinson Exercises FR	MEDICAL	NaN	3	9.5M	1,000+	Free	0	Everyone	Medical	January 20, 2017	1.0	2.2 and up
10839	The SCP Foundation DB fr nn5n	BOOKS_AND_REFERENCE	4.5	114	Varies with device	1,000+	Free	0	Mature 17+	Books & Reference	January 19, 2015	Varies with device	Varies with device
10840	iHoroscope - 2018 Daily Horoscope & Astrology	LIFESTYLE	4.5	398307	19M	10,000,000+	Free	0	Everyone	Lifestyle	July 25, 2018	Varies with device	Varies with device

10358 rows × 13 columns

Exploring the data

In [13]:

df

Out[13]:

	App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver
0	Photo Editor & Candy Camera & Grid & ScrapBook	ART_AND DESIGN	4.1	159	19M	10,000+	Free	0	Everyone	Art & Design	January 7, 2018	1.0.0	4.0.3 and up
1	Coloring book moana	ART_AND DESIGN	3.9	967	14M	500,000+	Free	0	Everyone	Art & Design;Pretend Play	January 15, 2018	2.0.0	4.0.3 and up
2	U Launcher Lite – FREE Live Cool Themes, Hide ...	ART_AND DESIGN	4.7	87510	8.7M	5,000,000+	Free	0	Everyone	Art & Design	August 1, 2018	1.2.4	4.0.3 and up
3	Sketch - Draw & Paint	ART_AND DESIGN	4.5	215644	25M	50,000,000+	Free	0	Teen	Art & Design	June 8, 2018	Varies with device	4.2 and up
4	Pixel Draw - Number Art Coloring Book	ART_AND DESIGN	4.3	967	2.8M	100,000+	Free	0	Everyone	Art & Design;Creativity	June 20, 2018	1.1	4.4 and up
...
10836	Sya9a Maroc - FR	FAMILY	4.5	38	53M	5,000+	Free	0	Everyone	Education	July 25, 2017	1.48	4.1 and up
10837	Fr. Mike Schmitz Audio Teachings	FAMILY	5.0	4	3.6M	100+	Free	0	Everyone	Education	July 6, 2018	1.0	4.1 and up
10838	Parkinson Exercises FR	MEDICAL	NaN	3	9.5M	1,000+	Free	0	Everyone	Medical	January 20, 2017	1.0	2.2 and up
10839	The SCP Foundation DB fr nn5n	BOOKS_AND_REFERENCE	4.5	114	Varies with device	1,000+	Free	0	Mature 17+	Books & Reference	January 19, 2015	Varies with device	Varies with device
10840	iHoroscope - 2018 Daily Horoscope & Astrology	LIFESTYLE	4.5	398307	19M	10,000,000+	Free	0	Everyone	Lifestyle	July 25, 2018	Varies with device	Varies with device

10358 rows × 13 columns

In [14]:

df.columns

Out[14]:

```
Index(['App', 'Category', 'Rating', 'Reviews', 'Size', 'Installs', 'Type',
       'Price', 'Content Rating', 'Genres', 'Last Updated', 'Current Ver',
       'Android Ver'],
      dtype='object')
```

In [17]:

categorical_features=[i for i in df.columns if df[i].dtype=="O"]

In [18]:

numeric_features=[i for i in df.columns if df[i].dtype!="O"]

In [19]:

cat_df=df[categorical_features]

In [20]:

num_df=df[numeric_features]

In [21]:

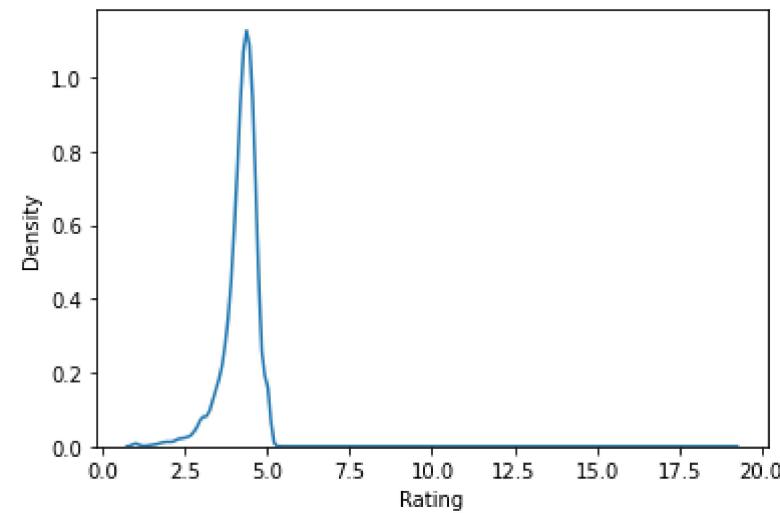
df["App"].value_counts(normalize=True)*100

```
Out[21]: ROBLOX          0.086889  
8 Ball Pool           0.067581  
Bubble Shooter        0.057926  
Helix Jump            0.057926  
Zombie Catchers       0.057926  
...  
Theme Android P Black design for LG V30 0.009654  
Popsicle Launcher for Android P 9.0 launcher 0.009654  
PixelLab - Text on pictures    0.009654  
P Launcher for Android™ 9.0      0.009654  
iHoroscope - 2018 Daily Horoscope & Astrology 0.009654  
Name: App, Length: 9660, dtype: float64
```

check the distribution of the numeric variable

```
In [22]: sns.kdeplot(num_df["Rating"])
```

```
Out[22]: <AxesSubplot:xlabel='Rating', ylabel='Density'>
```



```
In [23]: num_df
```

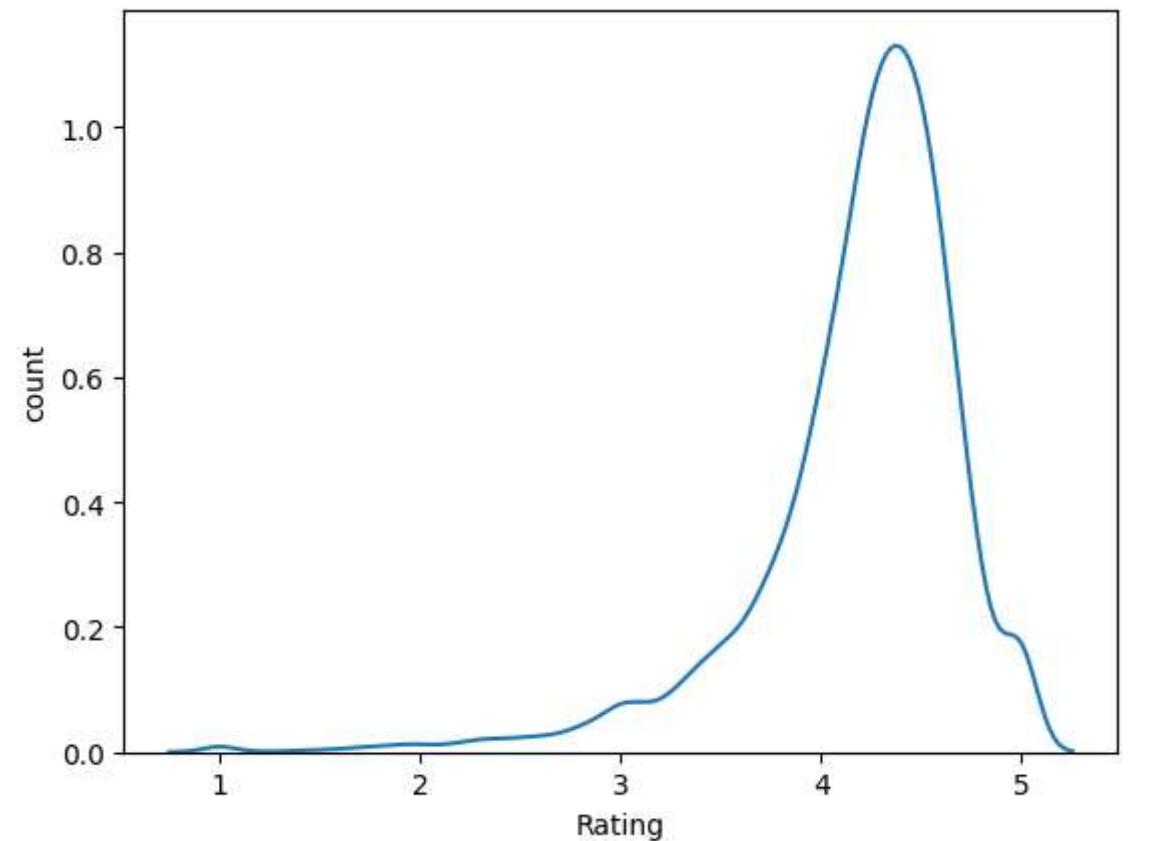
Out[23]:

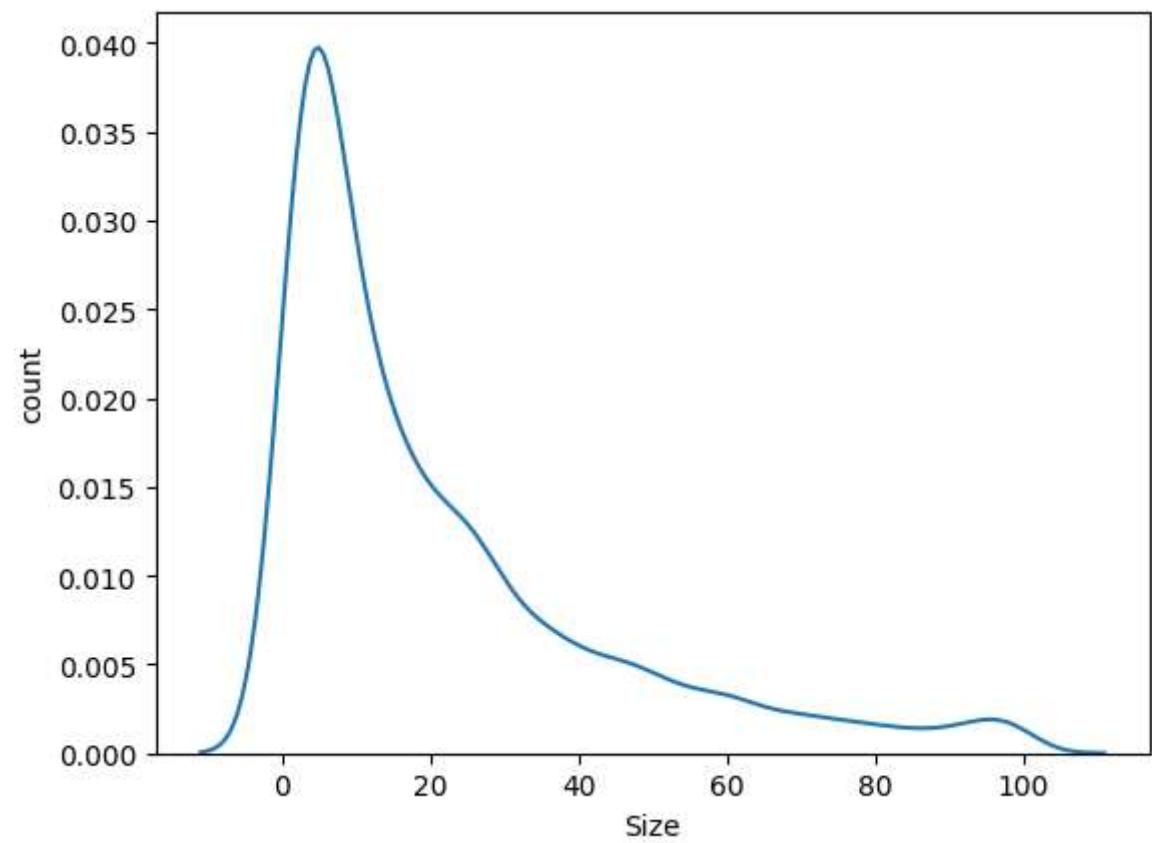
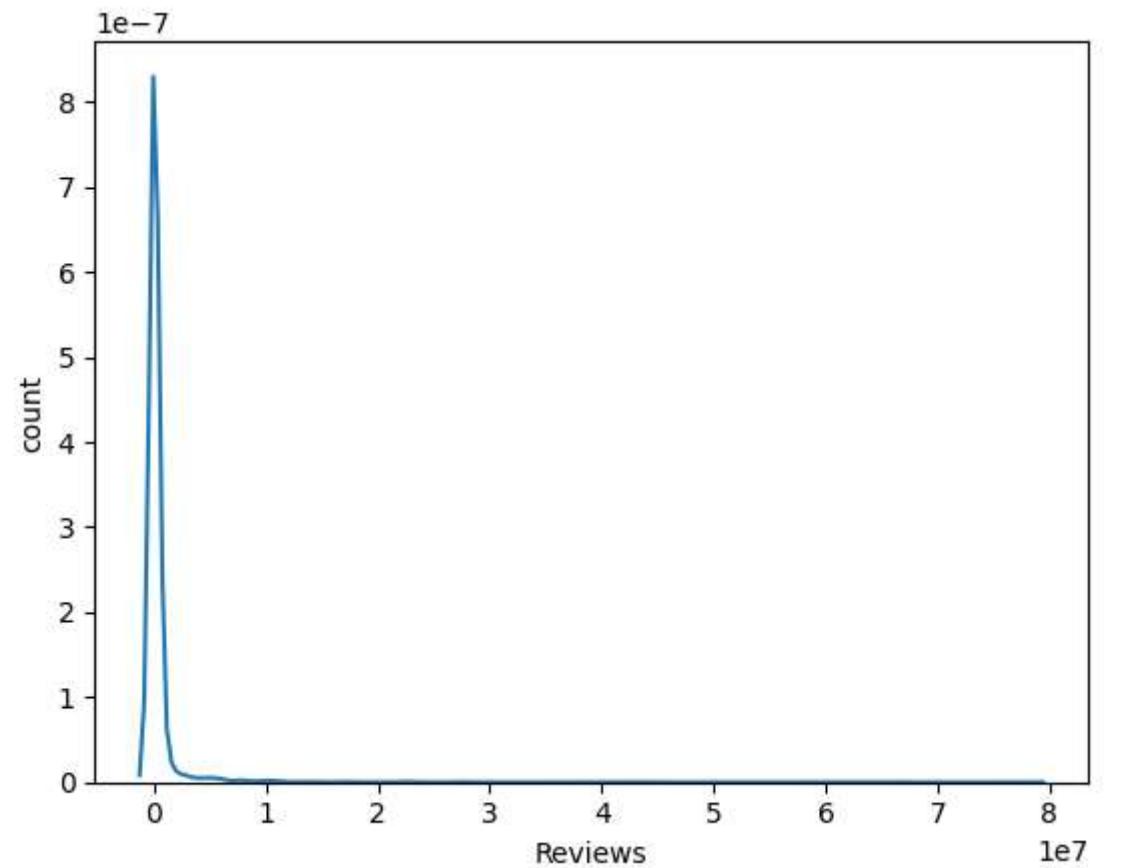
	Rating	Reviews	Size	Installs	Price	Day	Month	Year
0	4.1	159	19.0	10000	0.0	7	1	2018
1	3.9	967	14.0	500000	0.0	15	1	2018
2	4.7	87510	8.7	5000000	0.0	1	8	2018
3	4.5	215644	25.0	50000000	0.0	8	6	2018
4	4.3	967	2.8	100000	0.0	20	6	2018
...
10835	4.5	38	53.0	5000	0.0	25	7	2017
10836	5.0	4	3.6	100	0.0	6	7	2018
10837	NaN	3	9.5	1000	0.0	20	1	2017
10838	4.5	114	NaN	1000	0.0	19	1	2015
10839	4.5	398307	19.0	10000000	0.0	25	7	2018

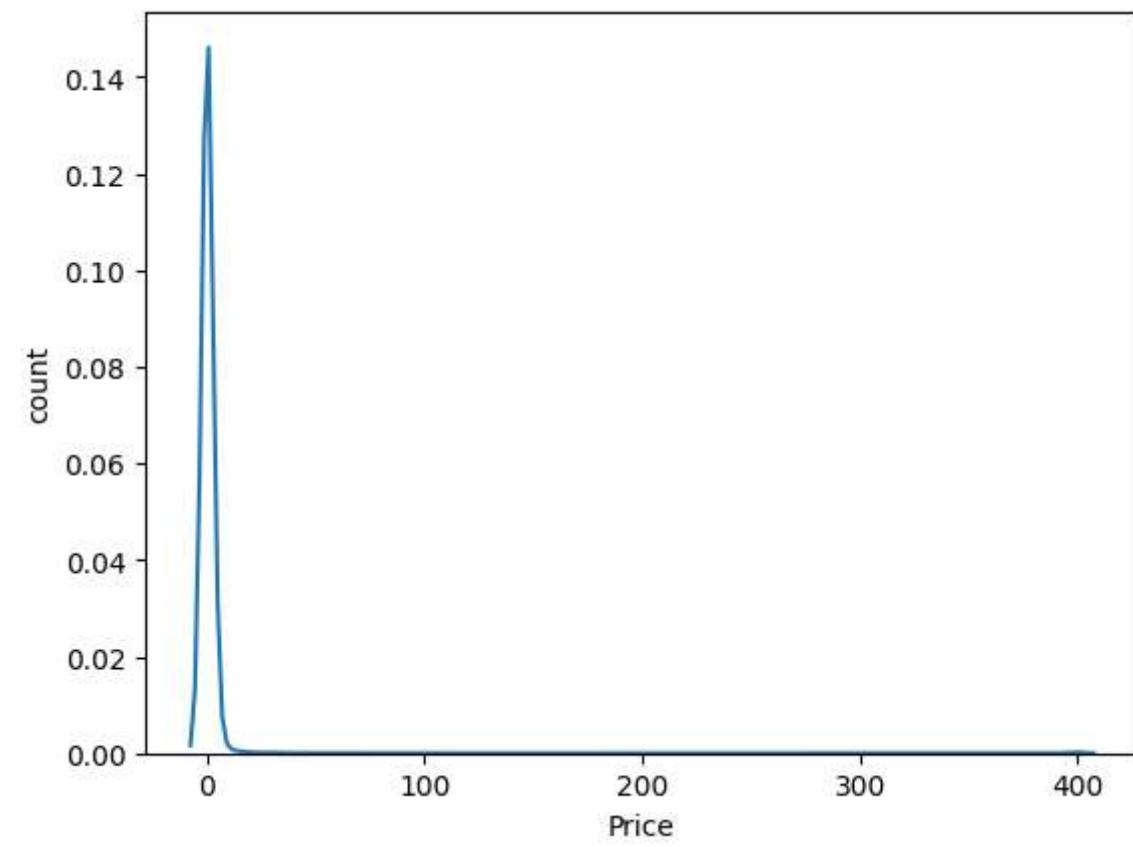
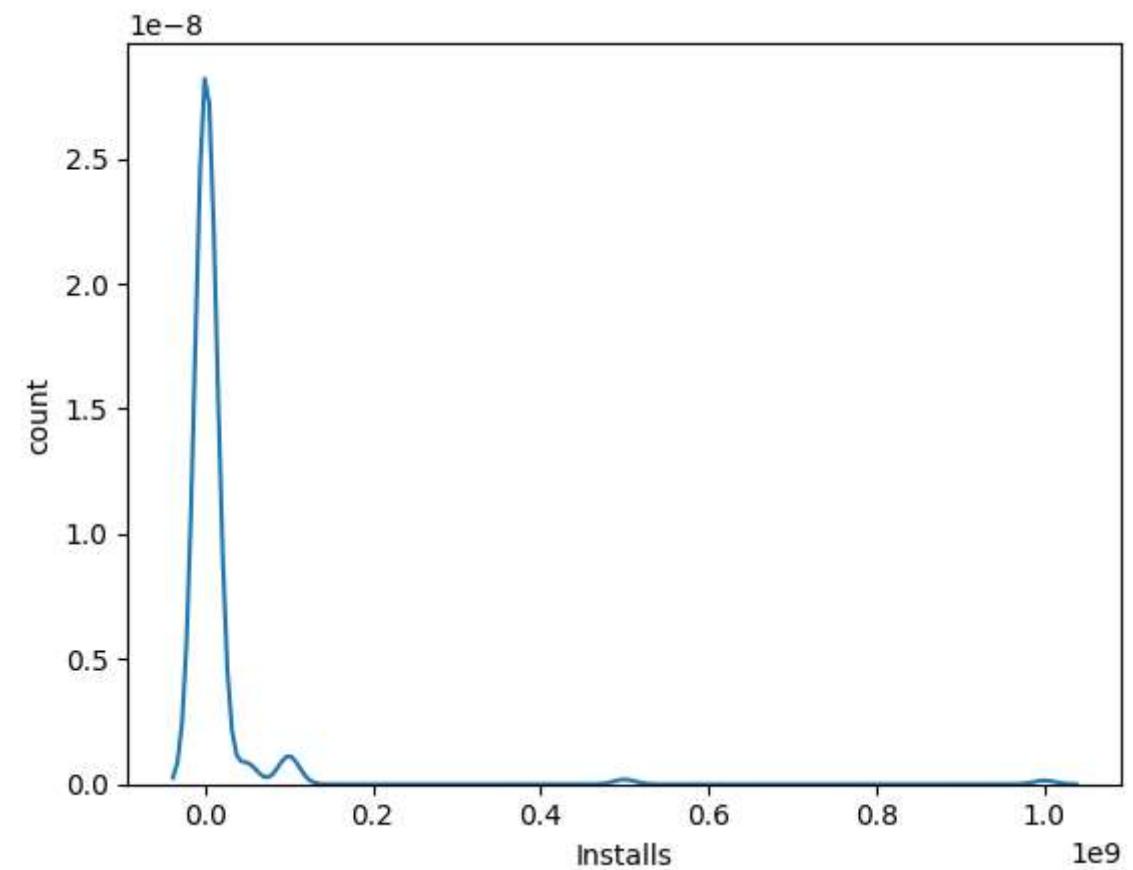
10357 rows × 8 columns

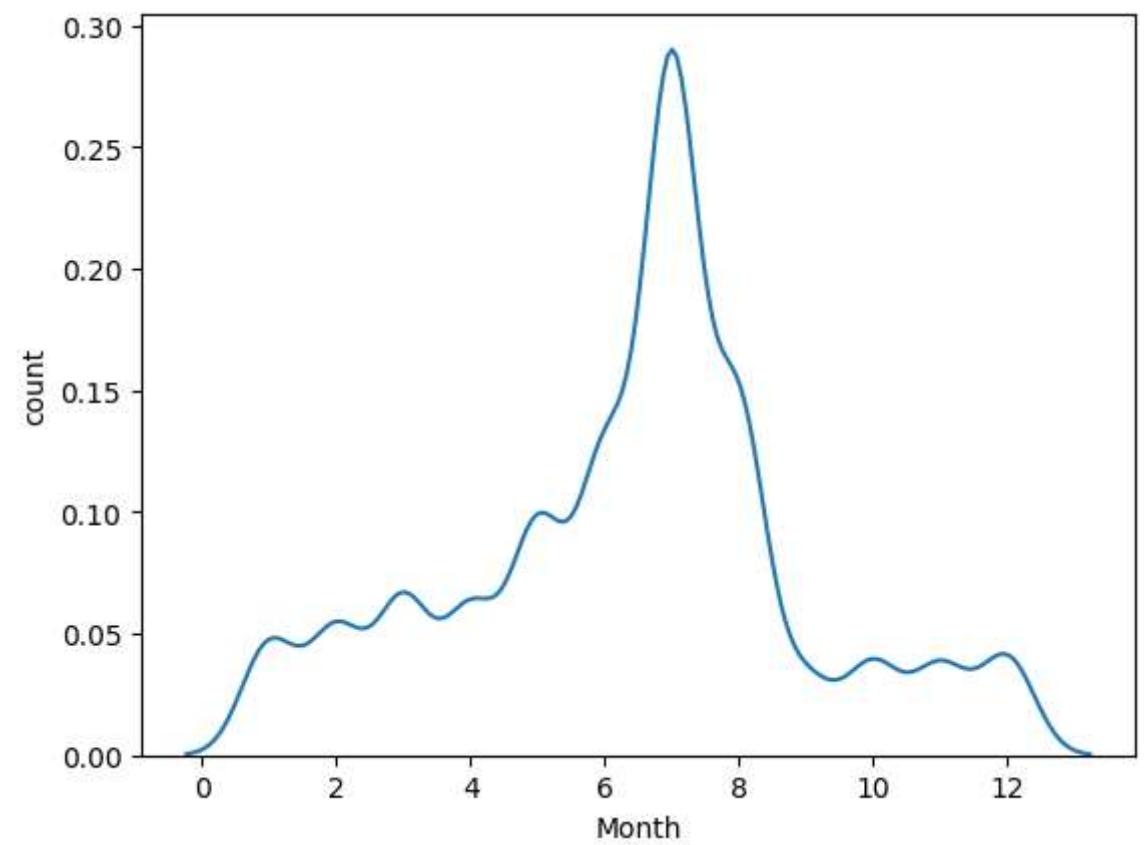
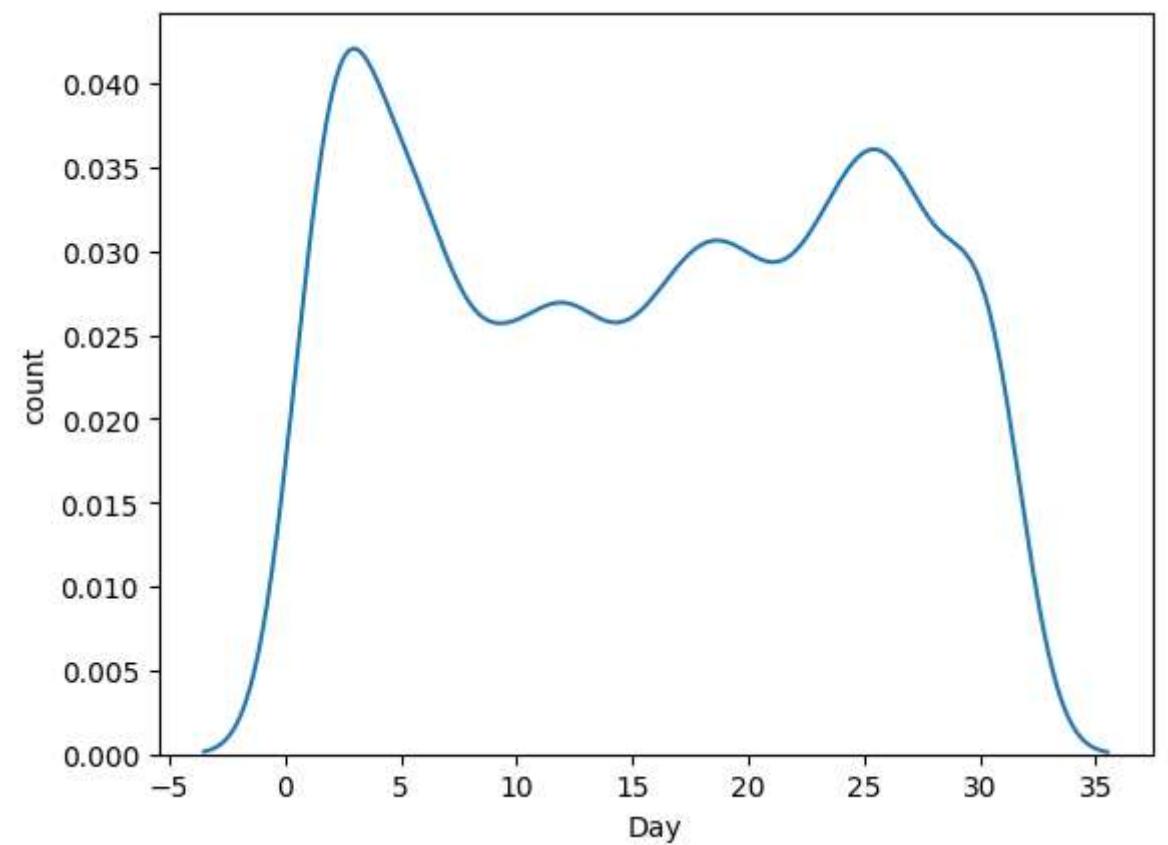
In [24]:

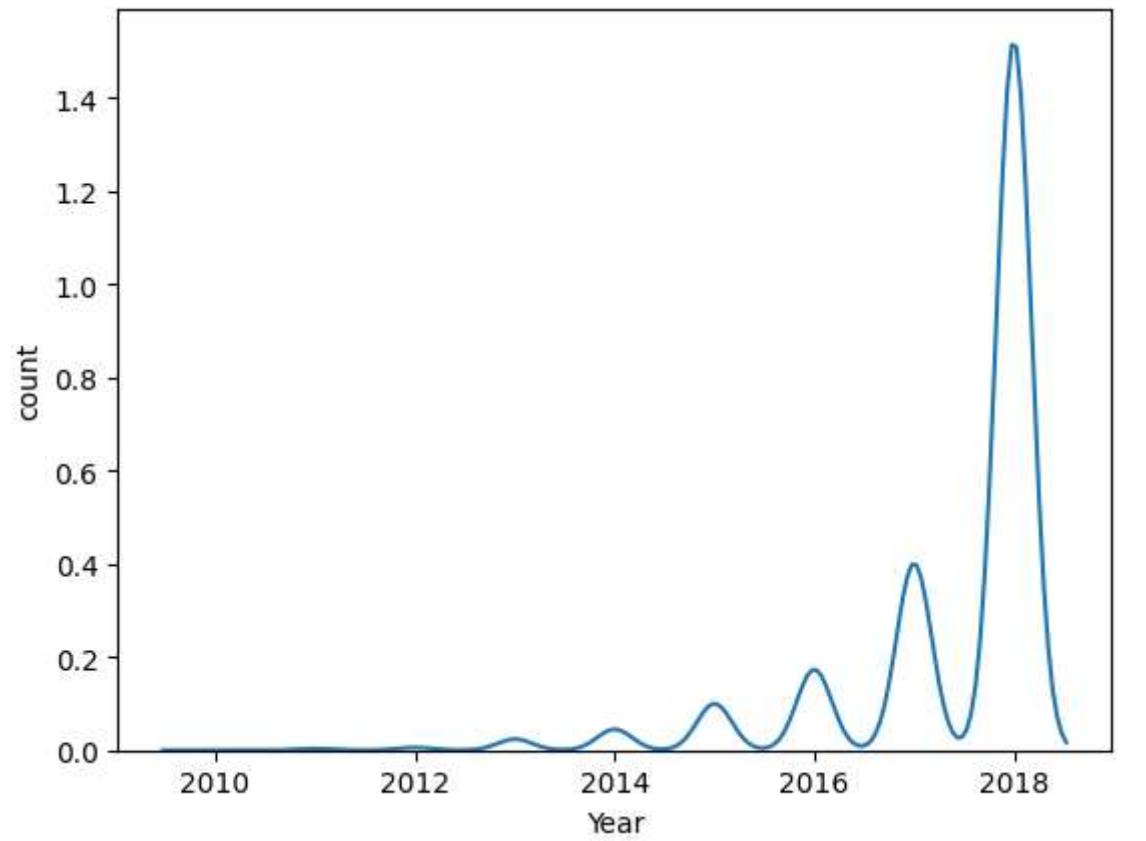
```
[sns.kdeplot(num_df[i]),plt.xlabel(i),plt.ylabel("count"),plt.show()] for i in num_df.columns ]
```











```
Out[24]: [(<AxesSubplot: xlabel='Rating', ylabel='count'>,
    Text(0.5, 24.0, 'Rating'),
    Text(24.000000000000007, 0.5, 'count'),
    None),
(<AxesSubplot: xlabel='Reviews', ylabel='count'>,
    Text(0.5, 24.0, 'Reviews'),
    Text(24.000000000000007, 0.5, 'count'),
    None),
(<AxesSubplot: xlabel='Size', ylabel='count'>,
    Text(0.5, 24.0, 'Size'),
    Text(24.0, 0.5, 'count'),
    None),
(<AxesSubplot: xlabel='Installs', ylabel='count'>,
    Text(0.5, 24.0, 'Installs'),
    Text(24.000000000000007, 0.5, 'count'),
    None),
(<AxesSubplot: xlabel='Price', ylabel='count'>,
    Text(0.5, 24.0, 'Price'),
    Text(24.000000000000007, 0.5, 'count'),
    None),
(<AxesSubplot: xlabel='Day', ylabel='count'>,
    Text(0.5, 24.0, 'Day'),
    Text(24.0, 0.5, 'count'),
    None),
(<AxesSubplot: xlabel='Month', ylabel='count'>,
    Text(0.5, 24.0, 'Month'),
    Text(24.000000000000007, 0.5, 'count'),
    None),
(<AxesSubplot: xlabel='Year', ylabel='count'>,
    Text(0.5, 24.0, 'Year'),
    Text(24.000000000000007, 0.5, 'count'),
    None)]
```

Conclusion-rating and year is left skewed graph

Review, size, price, install right skewed

In [25]:

```
cat_df
```

Out[25]:

	App	Category	Type	Content Rating	Genres	Last Updated	Current Ver	Android Ver
0	Photo Editor & Candy Camera & Grid & ScrapBook	ART_AND DESIGN	Free	Everyone	Art & Design	2018-01-07	1.0.0	4.0.3 and up
1	Coloring book moana	ART_AND DESIGN	Free	Everyone	Art & Design;Pretend Play	2018-01-15	2.0.0	4.0.3 and up
2	U Launcher Lite – FREE Live Cool Themes, Hide ...	ART_AND DESIGN	Free	Everyone	Art & Design	2018-08-01	1.2.4	4.0.3 and up
3	Sketch - Draw & Paint	ART_AND DESIGN	Free	Teen	Art & Design	2018-06-08	Varies with device	4.2 and up
4	Pixel Draw - Number Art Coloring Book	ART_AND DESIGN	Free	Everyone	Art & Design;Creativity	2018-06-20	1.1	4.4 and up
...
10835	Sya9a Maroc - FR	FAMILY	Free	Everyone	Education	2017-07-25	1.48	4.1 and up
10836	Fr. Mike Schmitz Audio Teachings	FAMILY	Free	Everyone	Education	2018-07-06	1	4.1 and up
10837	Parkinson Exercises FR	MEDICAL	Free	Everyone	Medical	2017-01-20	1	2.2 and up
10838	The SCP Foundation DB fr nn5n	BOOKS_AND_REFERENCE	Free	Mature 17+	Books & Reference	2015-01-19	Varies with device	Varies with device
10839	iHoroscope - 2018 Daily Horoscope & Astrology	LIFESTYLE	Free	Everyone	Lifestyle	2018-07-25	Varies with device	Varies with device

10357 rows × 8 columns

In [26]:

```
cat_df["Type"].value_counts()
```

Out[26]:

```
Free    9591
```

```
Paid     765
```

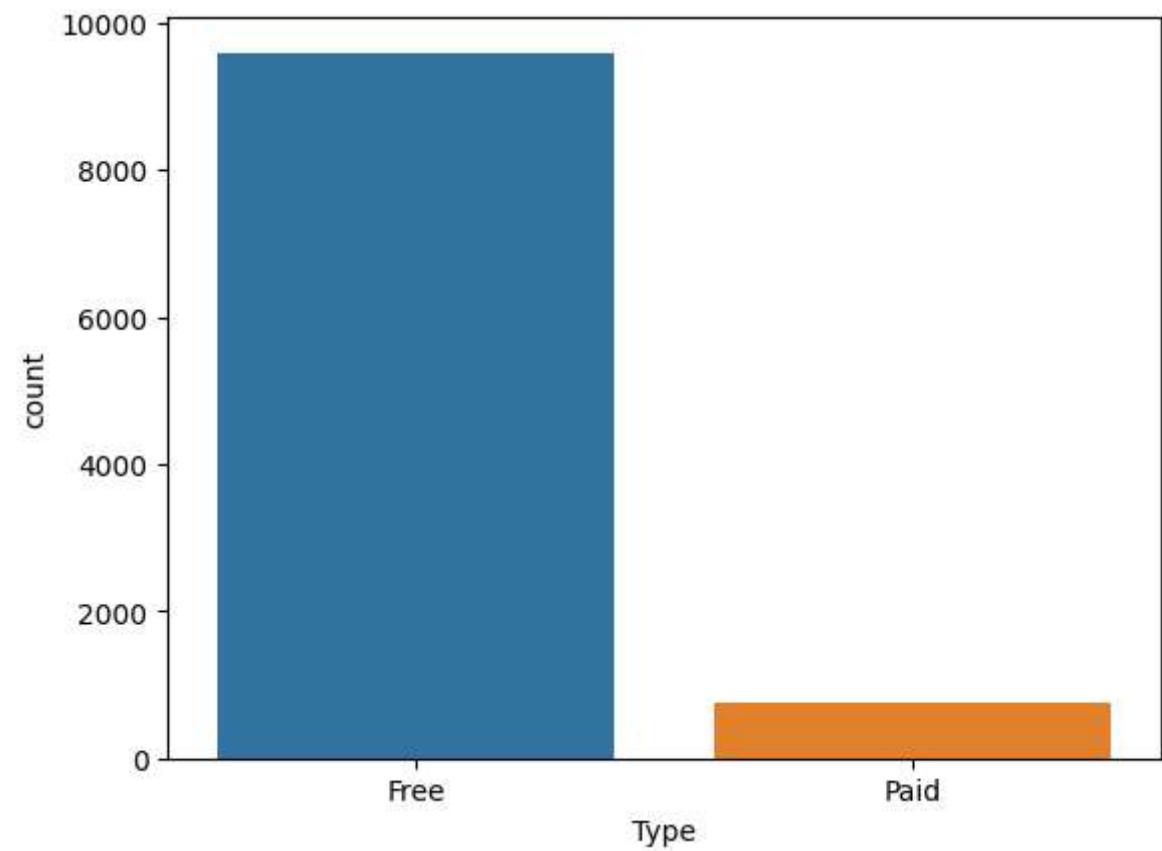
```
Name: Type, dtype: int64
```

In [27]:

```
sns.countplot(data=cat_df, x='Type')
```

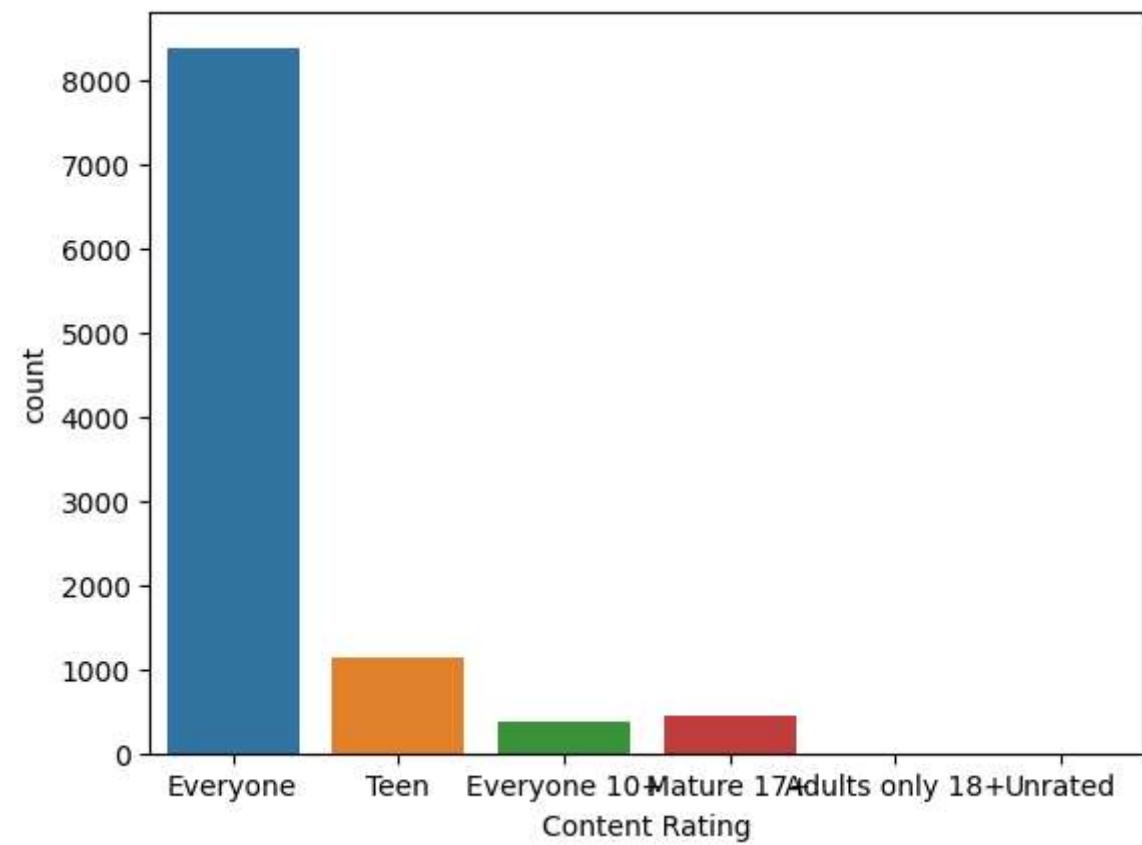
Out[27]:

```
<AxesSubplot: xlabel='Type', ylabel='count'>
```



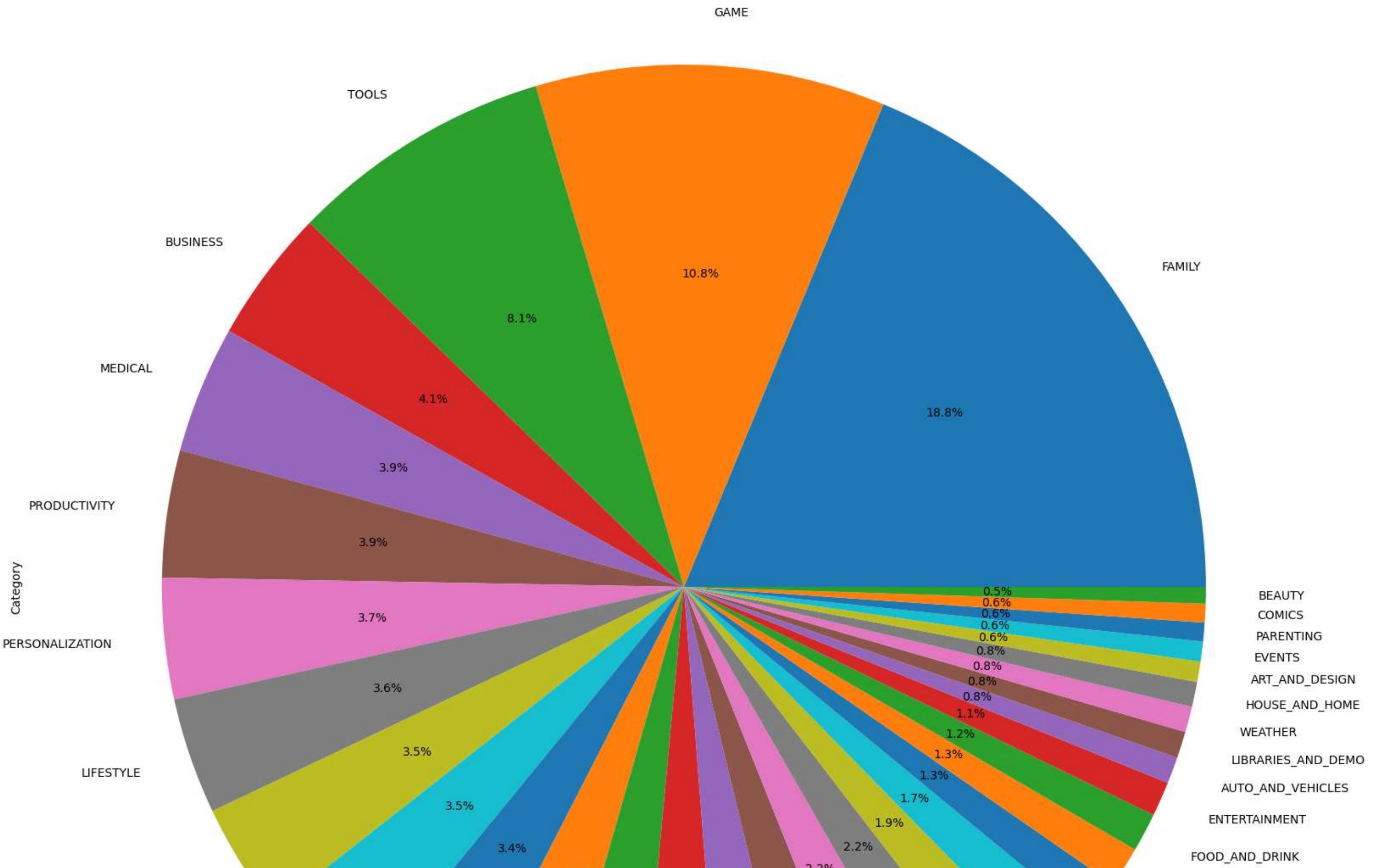
```
In [28]: sns.countplot(data=cat_df, x='Content Rating')
```

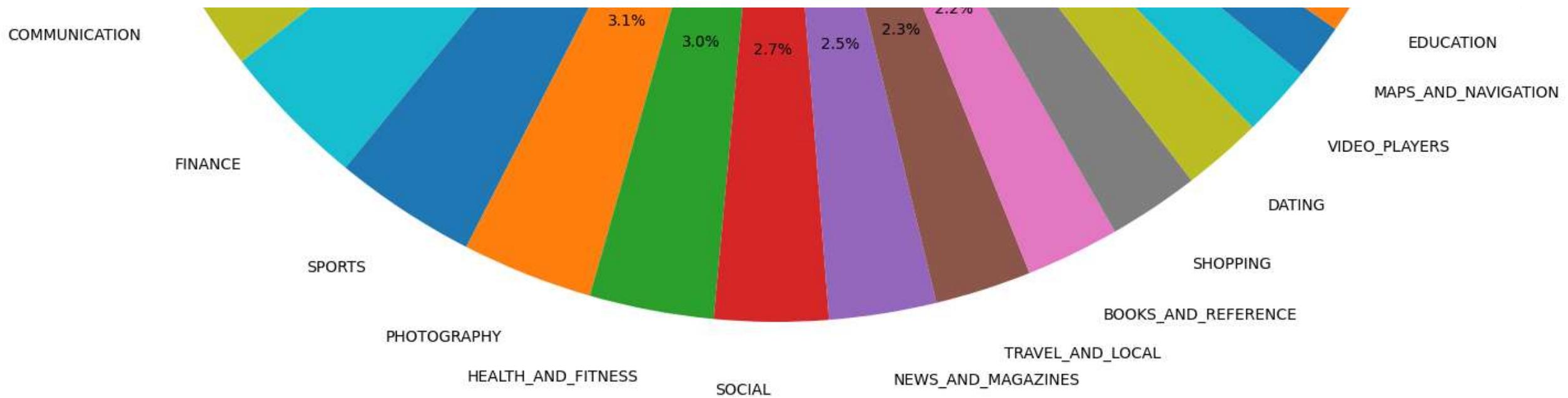
```
Out[28]: <AxesSubplot: xlabel='Content Rating', ylabel='count'>
```



```
In [29]: cat_df["Category"].value_counts().plot.pie(figsize=(20,20), autopct='%.1f%%')
```

```
Out[29]: <AxesSubplot: ylabel='Category'>
```

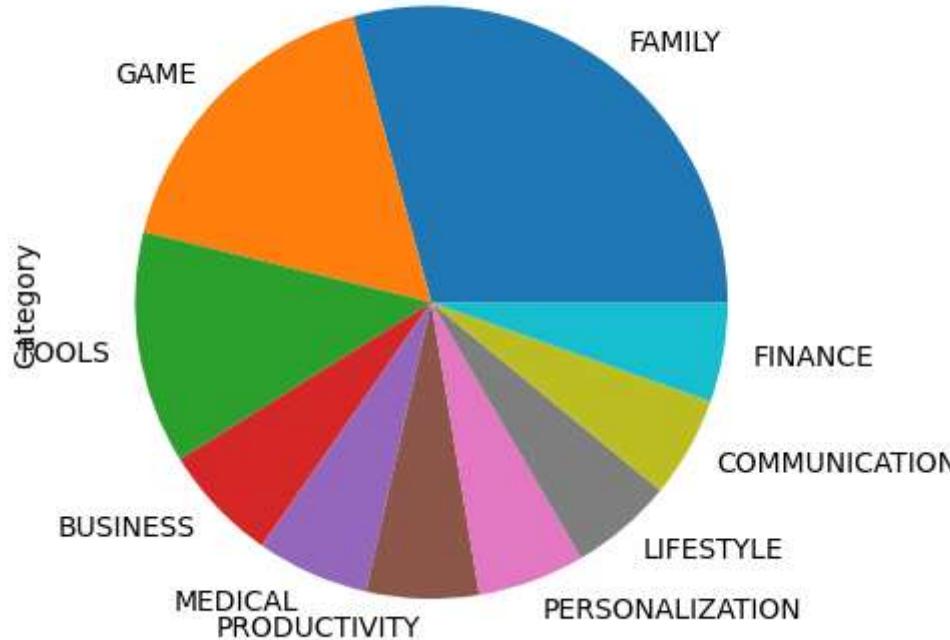




top 10 Category

```
In [30]: cat_df["Category"].value_counts()[0:10].plot.pie()
```

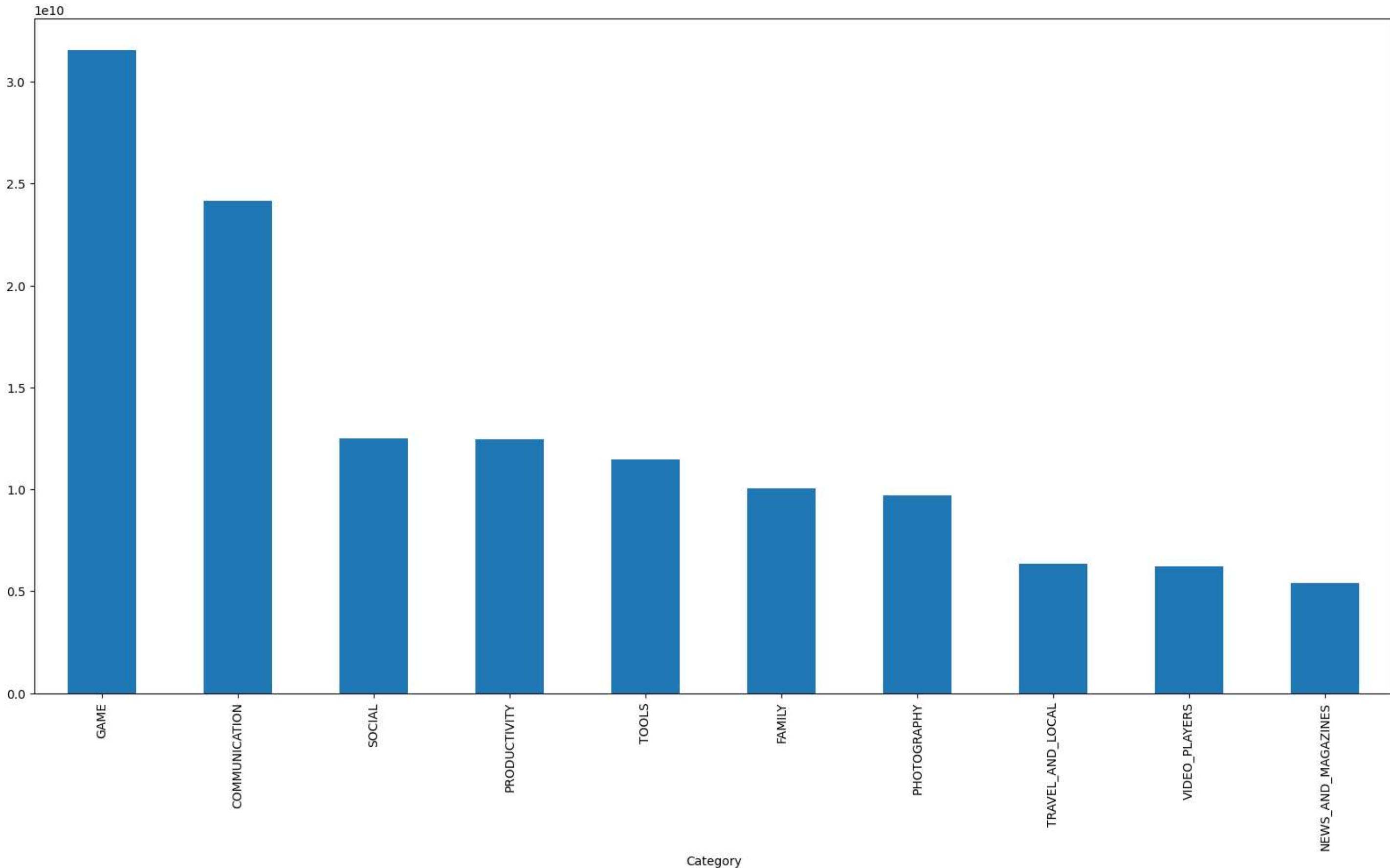
```
Out[30]: <AxesSubplot: ylabel='Category'>
```



which category has largest no of installation

```
In [31]: df.groupby(["Category"])["Installs"].sum().nlargest(10).plot(kind="bar", figsize=(20,10))
```

```
Out[31]: <AxesSubplot: xlabel='Category'>
```



In [32]:

```
## How many apps are there on google play store which get 5 rating?  
## Does size of the application has any impact on its popularity?  
## What are the top 5 most installed app in each category?
```

```
## Which category app users are reviewing the most?
## Which kind of app user are downloading the most free/paid?
```

In [33]:

df

Out[33]:

	App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver	Day	Month	Year
0	Photo Editor & Candy Camera & Grid & ScrapBook	ART_AND DESIGN	4.1	159	19.0	10000	Free	0.0	Everyone	Art & Design	2018-01-07	1.0.0	4.0.3 and up	7	1	2018
1	Coloring book moana	ART_AND DESIGN	3.9	967	14.0	500000	Free	0.0	Everyone	Art & Design;Pretend Play	2018-01-15	2.0.0	4.0.3 and up	15	1	2018
2	U Launcher Lite – FREE Live Cool Themes, Hide ...	ART_AND DESIGN	4.7	87510	8.7	5000000	Free	0.0	Everyone	Art & Design	2018-08-01	1.2.4	4.0.3 and up	1	8	2018
3	Sketch - Draw & Paint	ART_AND DESIGN	4.5	215644	25.0	50000000	Free	0.0	Teen	Art & Design	2018-06-08	Varies with device	4.2 and up	8	6	2018
4	Pixel Draw - Number Art Coloring Book	ART_AND DESIGN	4.3	967	2.8	100000	Free	0.0	Everyone	Art & Design;Creativity	2018-06-20	1.1	4.4 and up	20	6	2018
...
10835	Sya9a Maroc - FR	FAMILY	4.5	38	53.0	5000	Free	0.0	Everyone	Education	2017-07-25	1.48	4.1 and up	25	7	2017
10836	Fr. Mike Schmitz Audio Teachings	FAMILY	5.0	4	3.6	100	Free	0.0	Everyone	Education	2018-07-06	1	4.1 and up	6	7	2018
10837	Parkinson Exercices FR	MEDICAL	NaN	3	9.5	1000	Free	0.0	Everyone	Medical	2017-01-20	1	2.2 and up	20	1	2017
10838	The SCP Foundation DB fr nn5n	BOOKS_AND_REFERENCE	4.5	114	Nan	1000	Free	0.0	Mature 17+	Books & Reference	2015-01-19	Varies with device	Varies with device	19	1	2015
10839	iHoroscope - 2018 Daily Horoscope & Astrology	LIFESTYLE	4.5	398307	19.0	10000000	Free	0.0	Everyone	Lifestyle	2018-07-25	Varies with device	Varies with device	25	7	2018

10357 rows × 16 columns

In [34]:

df[df["Rating"]==5.0]

Out[34]:

		App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver	Day	Month	Year
329	Hojiboy Tojiboyev Life Hacks	COMICS	5.0	15	37.0	1000	Free	0.0	Everyone	Comics	2018-06-26	2	4.0.3 and up	26	6	2018	
612	American Girls Mobile Numbers	DATING	5.0	5	4.4	1000	Free	0.0	Mature 17+	Dating	2018-07-17	3	4.0.3 and up	17	7	2018	
615	Awake Dating	DATING	5.0	2	70.0	100	Free	0.0	Mature 17+	Dating	2018-07-24	2.2.9	4.4 and up	24	7	2018	
633	Spine- The dating app	DATING	5.0	5	9.3	500	Free	0.0	Teen	Dating	2018-07-14	4	4.0.3 and up	14	7	2018	
636	Girls Live Talk - Free Text and Video Chat	DATING	5.0	6	5.0	100	Free	0.0	Mature 17+	Dating	2018-08-01	8.2	4.0.3 and up	1	8	2018	
...	
10720	Mad Dash Fo' Cash	GAME	5.0	14	16.0	100	Free	0.0	Everyone	Arcade	2017-06-19	2.5a	4.1 and up	19	6	2017	
10741	GKPB FP Online Church	LIFESTYLE	5.0	32	7.9	1000	Free	0.0	Everyone	Lifestyle	2017-12-31	0.7.1	4.4 and up	31	12	2017	
10775	Monster Ride Pro	GAME	5.0	1	24.0	10	Free	0.0	Everyone	Racing	2018-03-05	2	2.3 and up	5	3	2018	
10819	Fr. Daoud Lamei	FAMILY	5.0	22	8.6	1000	Free	0.0	Teen	Education	2018-06-27	3.8.0	4.1 and up	27	6	2018	
10836	Fr. Mike Schmitz Audio Teachings	FAMILY	5.0	4	3.6	100	Free	0.0	Everyone	Education	2018-07-06	1	4.1 and up	6	7	2018	

271 rows × 16 columns

271 Apps have 5 Ratings

In [35]:

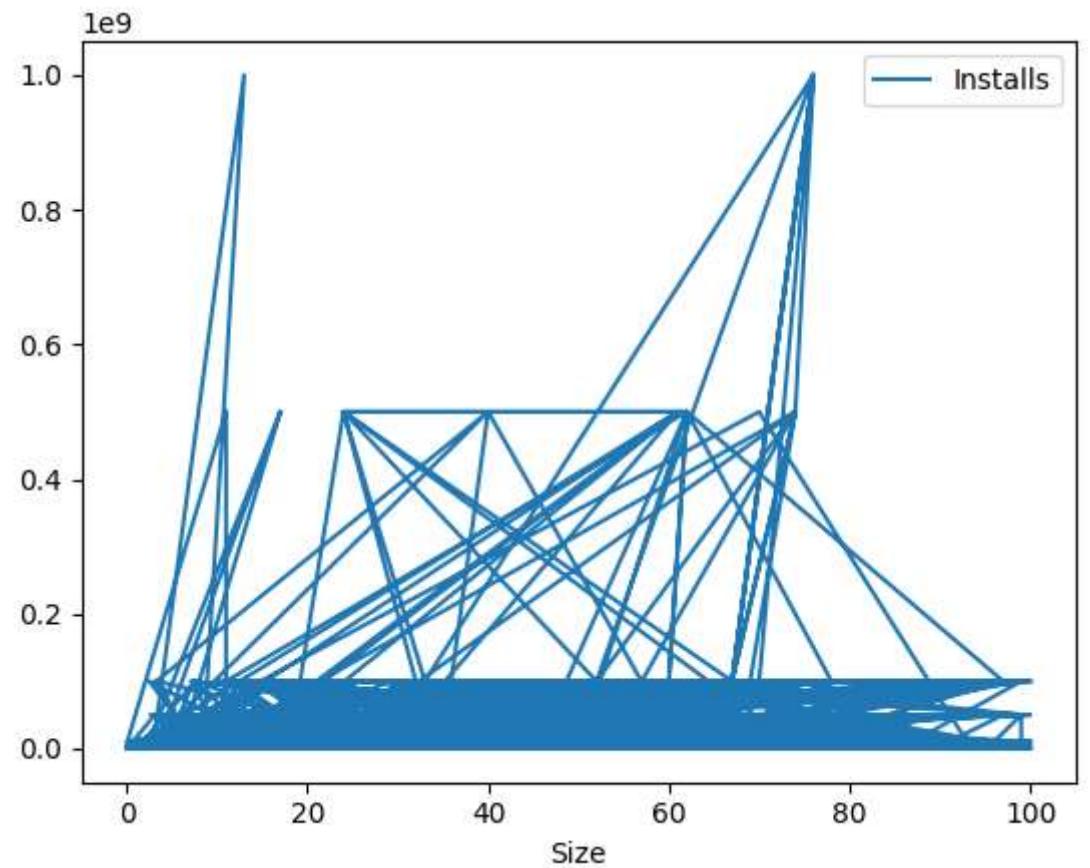
```
len(df[df["Rating"]==5.0])
```

Out[35]: 271

In [36]:

```
df.plot(x="Size",y="Installs")
```

Out[36]: <AxesSubplot: xlabel='Size'>

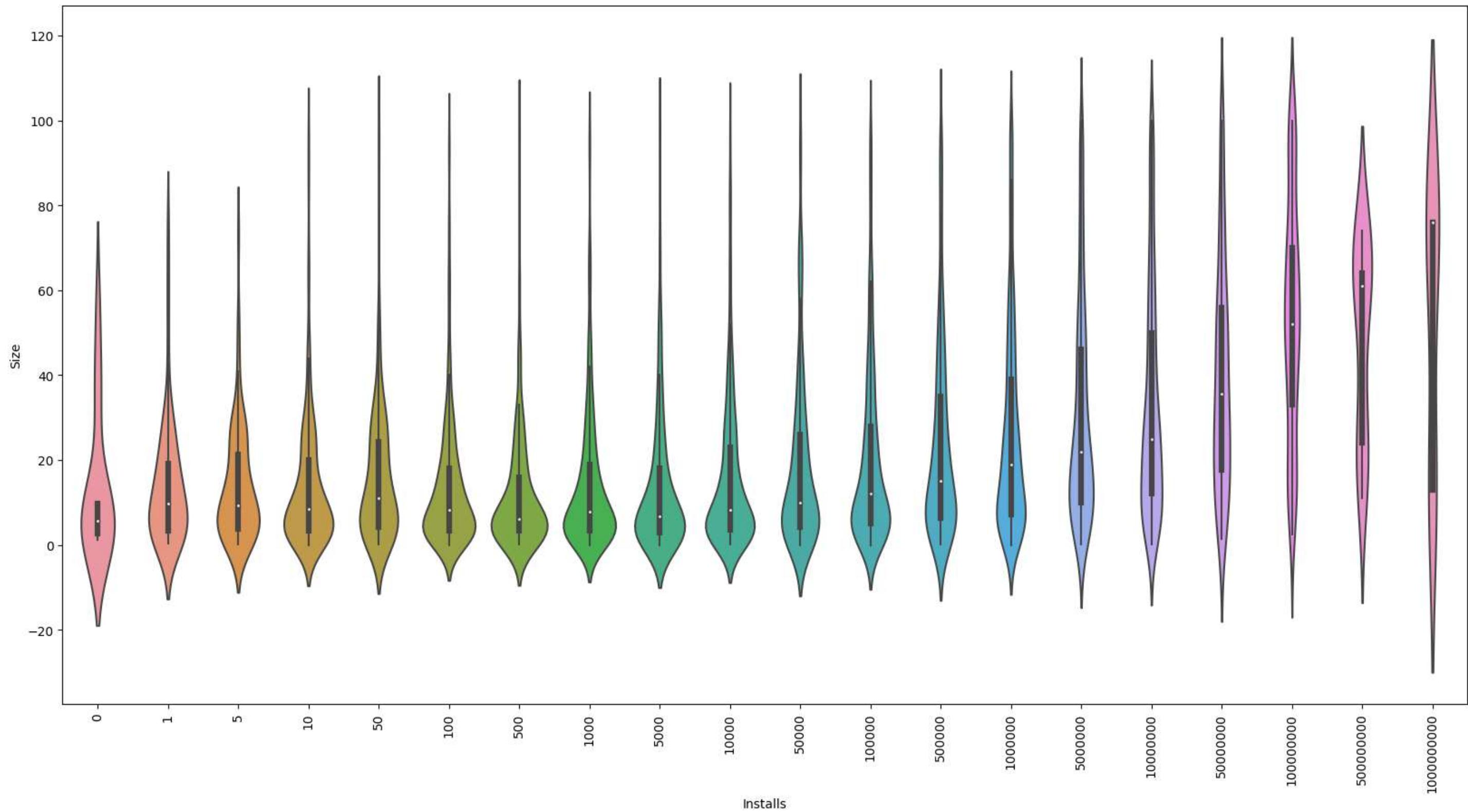


Relation between size of the app and its popularity(No of installs or Ratings)

In [37]: `df.corr()`

	Rating	Reviews	Size	Installs	Price	Day	Month	Year
Rating	1.000000	0.068732	0.082187	0.050886	-0.022355	-0.010102	0.016999	0.136547
Reviews	0.068732	1.000000	0.237880	0.634997	-0.009417	-0.024677	0.044681	0.075744
Size	0.082187	0.237880	1.000000	0.168883	-0.023729	-0.004368	0.036932	0.217284
Installs	0.050886	0.634997	0.168883	1.000000	-0.011147	-0.043546	0.053847	0.087380
Price	-0.022355	-0.009417	-0.023729	-0.011147	1.000000	-0.008480	0.006490	-0.005627
Day	-0.010102	-0.024677	-0.004368	-0.043546	-0.008480	1.000000	-0.074367	-0.015239
Month	0.016999	0.044681	0.036932	0.053847	0.006490	-0.074367	1.000000	-0.190497
Year	0.136547	0.075744	0.217284	0.087380	-0.005627	-0.015239	-0.190497	1.000000

In [88]: `# Using violin plot to plot the relation
plt.figure(figsize=(20,10))
sns.violinplot(x=df.Installs, y=df.Size)
plt.xticks(rotation = 90)
plt.show()`



In []:

"""Insights

We can observe from the plot that there is a large impact by the size of the app on the number of installations.

The tiny white circle in middle of each plot shows the median value of each value of installations.

Across the plot, we can see the median grows steadily higher.

Initially on Install axis, there is a higher number of outliers with respect to the size of the apps.

As we progress across the Install axis, the number of outliers decreases and the number of installations increases.

As the number of installations reaches the maximum value, we see that the app size has reached the lowest values, peaking at possibly, 100 -110 MB.

From this we can conclude that bigger the app, lesser the chance for it to be installed"""

top 5 most installed app in each category

```
In [84]: top_apps = df.groupby(['Category']).apply(lambda x: x.nlargest(5, 'Installs'))
```

```
In [85]: pd.set_option('display.max_rows', None)
```

```
In [86]: top_apps
```

Out[86]:

		App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver	Day	Month	Year
Category																	
ART_AND DESIGN	3	Sketch - Draw & Paint	ART_AND DESIGN	4.5	215644	25.000	50000000	Free	0.0	Teen	Art & Design	2018-06-08	Varies with device	4.2 and up	8	6	2018
	12	Tattoo Name On My Photo Editor	ART_AND DESIGN	4.2	44829	20.000	10000000	Free	0.0	Teen	Art & Design	2018-04-02	3.8	4.1 and up	2	4	2018
	19	ibis Paint X	ART_AND DESIGN	4.6	224399	31.000	10000000	Free	0.0	Everyone	Art & Design	2018-07-30	5.5.4	4.1 and up	30	7	2018
	42	Textgram - write on photos	ART_AND DESIGN	4.4	295221	Nan	10000000	Free	0.0	Everyone	Art & Design	2018-07-30	Varies with device	Varies with device	30	7	2018
	45	Canva: Poster, banner, card maker & graphic de...	ART_AND DESIGN	4.7	174531	24.000	10000000	Free	0.0	Everyone	Art & Design	2018-07-31	1.6.1	4.1 and up	31	7	2018
AUTO_AND_VEHICLES	72	Android Auto - Maps, Media, Messaging & Voice	AUTO_AND_VEHICLES	4.2	271920	16.000	10000000	Free	0.0	Teen	Auto & Vehicles	2018-07-11	Varies with device	5.0 and up	11	7	2018
	8289	AutoScout24 - used car finder	AUTO_AND_VEHICLES	4.4	186648	42.000	10000000	Free	0.0	Everyone	Auto & Vehicles	2018-08-02	9.3.52	4.2 and up	2	8	2018
	67	Ulysse Speedometer	AUTO_AND_VEHICLES	4.3	40211	Nan	5000000	Free	0.0	Everyone	Auto & Vehicles	2018-07-30	Varies with device	Varies with device	30	7	2018
	69	Used cars for sale - Trovit	AUTO_AND_VEHICLES	4.2	52530	7.000	5000000	Free	0.0	Everyone	Auto & Vehicles	2018-07-16	4.47.3	4.0.3 and up	16	7	2018
	70	Fines of the State Traffic Safety Inspectorate...	AUTO_AND_VEHICLES	4.8	116986	35.000	5000000	Free	0.0	Everyone	Auto & Vehicles	2018-08-02	1.9.7	4.0.3 and up	2	8	2018
BEAUTY	117	Beauty Camera - Selfie Camera	BEAUTY	4.0	113715	Nan	10000000	Free	0.0	Everyone	Beauty	2017-08-03	Varies with device	Varies with device	3	8	2017
	7021	Best Hairstyles step by step	BEAUTY	4.5	45452	9.200	5000000	Free	0.0	Everyone	Beauty	2018-07-19	1.25	4.0 and up	19	7	2018
	99	ipsy: Makeup, Beauty, and Tips	BEAUTY	4.9	49790	14.000	1000000	Free	0.0	Everyone	Beauty	2017-11-09	2.3.0	4.1 and up	9	11	2017
	102	Mirror - Zoom & Exposure -	BEAUTY	3.9	32090	Nan	1000000	Free	0.0	Everyone	Beauty	2016-10-24	Varies with device	Varies with device	24	10	2016
	105	Filters for Selfie	BEAUTY	4.3	8572	25.000	1000000	Free	0.0	Everyone	Beauty	2018-05-10	1.1.0	4.0 and up	10	5	2018
BOOKS_AND_REFERENCE	152	Google Play Books	BOOKS_AND_REFERENCE	3.9	1433233	Nan	1000000000	Free	0.0	Teen	Books & Reference	2018-08-03	Varies with device	Varies with device	3	8	2018
	139	Wattpad 📚 Free Books	BOOKS_AND_REFERENCE	4.6	2914724	Nan	100000000	Free	0.0	Teen	Books & Reference	2018-08-01	Varies with device	Varies with device	1	8	2018
	143	Amazon Kindle	BOOKS_AND_REFERENCE	4.2	814080	Nan	100000000	Free	0.0	Teen	Books & Reference	2018-07-27	Varies with device	Varies with device	27	7	2018
	3941	Bible	BOOKS_AND_REFERENCE	4.7	2440695	Nan	100000000	Free	0.0	Teen	Books & Reference	2018-08-02	Varies with device	Varies with device	2	8	2018
	4083	Amazon Kindle	BOOKS_AND_REFERENCE	4.2	814151	Nan	100000000	Free	0.0	Teen	Books & Reference	2018-07-27	Varies with device	Varies with device	27	7	2018

			App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver	Day	Month	Year
Category																		
BUSINESS	194	OfficeSuite : Free Office + PDF Editor		BUSINESS	4.3	1002861	35.000	1000000000	Free	0.0	Everyone	Business	2018-08-02	9.7.14188	4.1 and up	2	8	2018
	293	OfficeSuite : Free Office + PDF Editor		BUSINESS	4.3	1002859	35.000	1000000000	Free	0.0	Everyone	Business	2018-08-02	9.7.14188	4.1 and up	2	8	2018
	10253	File Commander - File Manager/Explorer		BUSINESS	4.3	758590	12.000	1000000000	Free	0.0	Everyone	Business	2018-08-02	Varies with device	4.1 and up	2	8	2018
	188	Indeed Job Search		BUSINESS	4.3	674730	Nan	50000000	Free	0.0	Everyone	Business	2018-05-21	Varies with device	Varies with device	21	5	2018
	192	Docs To Go™ Free Office Suite		BUSINESS	4.1	217730	Nan	50000000	Free	0.0	Everyone	Business	2018-04-02	Varies with device	Varies with device	2	4	2018
	297	LINE WEBTOON - Free Comics		COMICS	4.5	1013635	Nan	10000000	Free	0.0	Teen	Comics	2018-07-31	Varies with device	Varies with device	31	7	2018
COMICS	4724	LINE WEBTOON - Free Comics		COMICS	4.5	1013944	Nan	10000000	Free	0.0	Teen	Comics	2018-07-31	Varies with device	Varies with device	31	7	2018
	311	comico Popular Original Cartoon Updated Everyd...		COMICS	3.2	93965	15.000	5000000	Free	0.0	Teen	Comics	2018-07-03	6.3.0	4.0.3 and up	3	7	2018
	320	Narrator's Voice		COMICS	4.5	564387	Nan	5000000	Free	0.0	Everyone	Comics	2018-07-05	Varies with device	Varies with device	5	7	2018
	330	Perfect Viewer		COMICS	4.4	51981	Nan	5000000	Free	0.0	Everyone	Comics	2018-08-01	4.2.0.2	2.3 and up	1	8	2018
	335	Messenger – Text and Video Chat for Free		COMMUNICATION	4.0	56642847	Nan	10000000000	Free	0.0	Everyone	Communication	2018-08-01	Varies with device	Varies with device	1	8	2018
	336	WhatsApp Messenger		COMMUNICATION	4.4	69119316	Nan	10000000000	Free	0.0	Everyone	Communication	2018-08-03	Varies with device	Varies with device	3	8	2018
COMMUNICATION	338	Google Chrome: Fast & Secure		COMMUNICATION	4.3	9642995	Nan	10000000000	Free	0.0	Everyone	Communication	2018-08-01	Varies with device	Varies with device	1	8	2018
	340	Gmail		COMMUNICATION	4.3	4604324	Nan	10000000000	Free	0.0	Everyone	Communication	2018-08-02	Varies with device	Varies with device	2	8	2018
	341	Hangouts		COMMUNICATION	4.0	3419249	Nan	10000000000	Free	0.0	Everyone	Communication	2018-07-21	Varies with device	Varies with device	21	7	2018
	482	Zoosk Dating App: Meet Singles		DATING	4.0	516801	Nan	10000000	Free	0.0	Mature 17+	Dating	2018-08-02	Varies with device	Varies with device	2	8	2018
	483	OkCupid Dating		DATING	4.1	285726	15.000	10000000	Free	0.0	Mature 17+	Dating	2018-07-30	11.10.1	4.1 and up	30	7	2018
	484	Match™ Dating - Meet Singles		DATING	3.7	76646	Nan	10000000	Free	0.0	Mature 17+	Dating	2018-07-23	Varies with device	Varies with device	23	7	2018
DATING	489	Moco - Chat, Meet People		DATING	4.2	313724	Nan	10000000	Free	0.0	Mature 17+	Dating	2018-08-04	2.6.141	4.1 and up	4	8	2018
	491	Hot or Not - Find someone right now		DATING	4.1	305708	Nan	10000000	Free	0.0	Mature 17+	Dating	2018-08-02	Varies with device	Varies with device	2	8	2018

GoogleplaystoreEDA2

			App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver	Day	Month	Year
Category																		
EDUCATION	699	Duolingo: Learn Languages Free		EDUCATION	4.7	6289924	NaN	100000000	Free	0.0	Everyone	Education;Education	2018-08-01	Varies with device	Varies with device	1	8	2018
	784	Duolingo: Learn Languages Free		EDUCATION	4.7	6290507	NaN	100000000	Free	0.0	Everyone	Education;Education	2018-08-01	Varies with device	Varies with device	1	8	2018
	700	TED		EDUCATION	4.6	181893	18.000	10000000	Free	0.0	Everyone 10+	Education	2018-07-27	3.2.5	4.1 and up	27	7	2018
	703	Learn English with Wlingua		EDUCATION	4.7	314299	3.300	10000000	Free	0.0	Everyone	Education	2018-05-02	1.94.9	4.0 and up	2	5	2018
	717	Babbel – Learn Languages		EDUCATION	4.3	266948	21.000	10000000	Free	0.0	Everyone	Education	2018-07-30	20.7.2	4.4 and up	30	7	2018
ENTERTAINMENT	865	Google Play Games		ENTERTAINMENT	4.3	7165362	NaN	1000000000	Free	0.0	Teen	Entertainment	2018-07-16	Varies with device	Varies with device	16	7	2018
	855	Netflix		ENTERTAINMENT	4.4	5456208	NaN	100000000	Free	0.0	Teen	Entertainment	2018-07-31	Varies with device	Varies with device	31	7	2018
	866	Hotstar		ENTERTAINMENT	4.3	4885646	NaN	100000000	Free	0.0	Teen	Entertainment	2018-08-03	Varies with device	Varies with device	3	8	2018
	874	Talking Angela		ENTERTAINMENT	3.7	1828284	52.000	100000000	Free	0.0	Everyone	Entertainment	2018-07-12	2.8.2	4.1 and up	12	7	2018
	888	IMDb Movies & TV		ENTERTAINMENT	4.2	501498	12.000	100000000	Free	0.0	Teen	Entertainment	2018-07-26	Varies with device	Varies with device	26	7	2018
EVENTS	1005	Ticketmaster Event Tickets		EVENTS	4.0	40113	36.000	5000000	Free	0.0	Everyone	Events	2018-07-23	Varies with device	Varies with device	23	7	2018
	1008	StubHub - Tickets to Sports, Concerts & Events		EVENTS	4.0	26089	NaN	5000000	Free	0.0	Everyone	Events	2018-08-02	4.2.1	Varies with device	2	8	2018
	1009	Fever		EVENTS	4.0	20611	12.000	1000000	Free	0.0	Teen	Events	2018-07-18	4.3.6	4.1 and up	18	7	2018
	1011	SeatGeek – Tickets to Sports, Concerts, Broadway		EVENTS	4.4	15558	26.000	1000000	Free	0.0	Everyone	Events	2018-08-03	2018.07.31229	5.0 and up	3	8	2018
	1014	Vivid Seats – Event Tickets		EVENTS	4.6	8232	53.000	1000000	Free	0.0	Everyone	Events	2018-07-31	Varies with device	5.0 and up	31	7	2018
FAMILY	5856	Google Play Games		FAMILY	4.3	7168735	NaN	1000000000	Free	0.0	Teen	Entertainment	2018-07-16	Varies with device	Varies with device	16	7	2018
	3879	Pou		FAMILY	4.3	10483141	24.000	500000000	Free	0.0	Everyone	Casual	2018-05-25	1.4.77	4.0 and up	25	5	2018
	3888	My Talking Tom		FAMILY	4.5	14885236	NaN	500000000	Free	0.0	Everyone	Casual	2018-07-19	4.8.0.132	4.1 and up	19	7	2018
	3994	Candy Crush Saga		FAMILY	4.4	22419455	74.000	500000000	Free	0.0	Everyone	Casual	2018-07-05	1.129.0.2	4.1 and up	5	7	2018
	2016	ROBLOX		FAMILY	4.5	4449910	67.000	100000000	Free	0.0	Everyone 10+	Adventure;Action & Adventure	2018-07-31	2.347.225742	4.1 and up	31	7	2018

			App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver	Day	Month	Year
Category																		
FINANCE	1083	Google Pay	FINANCE	4.2	347838	NaN	100000000	Free	0.0	Everyone	Finance	2018-07-26	2.70.206190089	Varies with device	26	7	2018	
	1163	Google Pay	FINANCE	4.2	347874	NaN	100000000	Free	0.0	Everyone	Finance	2018-07-26	2.70.206190089	Varies with device	26	7	2018	
	5601	Google Pay	FINANCE	4.2	348132	NaN	100000000	Free	0.0	Everyone	Finance	2018-07-26	2.70.206190089	Varies with device	26	7	2018	
	1076	PayPal	FINANCE	4.3	659741	47.000	50000000	Free	0.0	Everyone	Finance	2018-07-18	6.28.0	4.4 and up	18	7	2018	
	1156	PayPal	FINANCE	4.3	659760	47.000	50000000	Free	0.0	Everyone	Finance	2018-07-18	6.28.0	4.4 and up	18	7	2018	
	1176	McDonald's	FOOD_AND_DRINK	3.6	145323	42.000	10000000	Free	0.0	Everyone	Food & Drink	2018-07-31	5.15.0	4.4 and up	31	7	2018	
FOOD_AND_DRINK	1178	Cookpad - FREE recipe search makes fun cooking...	FOOD_AND_DRINK	4.1	64784	13.000	10000000	Free	0.0	Everyone	Food & Drink	2018-08-02	18.6.0.10	5.0 and up	2	8	2018	
	1183	Tastely	FOOD_AND_DRINK	4.7	611136	19.000	10000000	Free	0.0	Everyone	Food & Drink	2018-07-13	3.2.0d	4.0.3 and up	13	7	2018	
	1186	McDonald's - McDonald's Japan	FOOD_AND_DRINK	3.4	109784	64.000	10000000	Free	0.0	Everyone	Food & Drink	2018-08-03	4.0.30	4.0.3 and up	3	8	2018	
	1197	Starbucks	FOOD_AND_DRINK	4.5	455377	35.000	10000000	Free	0.0	Everyone	Food & Drink	2018-08-01	4.11.1	4.4 and up	1	8	2018	
	1654	Subway Surfers	GAME	4.5	27722264	76.000	1000000000	Free	0.0	Everyone 10+	Arcade	2018-07-12	1.90.0	4.1 and up	12	7	2018	
	1700	Subway Surfers	GAME	4.5	27723193	76.000	1000000000	Free	0.0	Everyone 10+	Arcade	2018-07-12	1.90.0	4.1 and up	12	7	2018	
GAME	1750	Subway Surfers	GAME	4.5	27724094	76.000	1000000000	Free	0.0	Everyone 10+	Arcade	2018-07-12	1.90.0	4.1 and up	12	7	2018	
	1872	Subway Surfers	GAME	4.5	27725352	76.000	1000000000	Free	0.0	Everyone 10+	Arcade	2018-07-12	1.90.0	4.1 and up	12	7	2018	
	3896	Subway Surfers	GAME	4.5	27711703	76.000	1000000000	Free	0.0	Everyone 10+	Arcade	2018-07-12	1.90.0	4.1 and up	12	7	2018	
	5596	Samsung Health	HEALTH_AND_FITNESS	4.3	480208	70.000	500000000	Free	0.0	Everyone	Health & Fitness	2018-07-31	5.17.2.009	5.0 and up	31	7	2018	
	1360	Period Tracker - Period Calendar Ovulation Tra...	HEALTH_AND_FITNESS	4.8	4559407	NaN	100000000	Free	0.0	Everyone	Health & Fitness	2018-08-01	Varies with device	Varies with device	1	8	2018	
	1286	Calorie Counter - MyFitnessPal	HEALTH_AND_FITNESS	4.6	1873516	NaN	50000000	Free	0.0	Everyone	Health & Fitness	2018-07-31	Varies with device	Varies with device	31	7	2018	
HEALTH_AND_FITNESS	1362	Calorie Counter - MyFitnessPal	HEALTH_AND_FITNESS	4.6	1873523	NaN	50000000	Free	0.0	Everyone	Health & Fitness	2018-07-31	Varies with device	Varies with device	31	7	2018	
	1386	Calorie Counter - MyFitnessPal	HEALTH_AND_FITNESS	4.6	1873520	NaN	50000000	Free	0.0	Everyone	Health & Fitness	2018-07-31	Varies with device	Varies with device	31	7	2018	

			App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver	Day	Month	Year
Category																		
HOUSE_AND_HOME	1446	Zillow: Find Houses for Sale & Apartments for ...	HOUSE_AND_HOME	4.5	417907	34.000	10000000	Free	0.0	Everyone	House & Home	2018-08-01	9.8.1.7425	4.4 and up	1	8	2018	
	1449	Realtor.com Real Estate: Homes for Sale and Rent	HOUSE_AND_HOME	4.5	162243	12.000	10000000	Free	0.0	Everyone	House & Home	2018-07-26	8.18	4.0.3 and up	26	7	2018	
	1454	Trulia Real Estate & Rentals	HOUSE_AND_HOME	4.5	175293	NaN	10000000	Free	0.0	Everyone	House & Home	2018-07-24	Varies with device	Varies with device	24	7	2018	
	1456	Houzz Interior Design Ideas	HOUSE_AND_HOME	4.6	353799	NaN	10000000	Free	0.0	Everyone	House & Home	2018-08-01	Varies with device	Varies with device	1	8	2018	
	1496	Houzz Interior Design Ideas	HOUSE_AND_HOME	4.6	353800	NaN	10000000	Free	0.0	Everyone	House & Home	2018-08-01	Varies with device	Varies with device	1	8	2018	
LIBRARIES_AND_DEMO	1523	Aviary Stickers: Free Pack	LIBRARIES_AND_DEMO	3.5	126862	0.624	10000000	Free	0.0	Everyone	Libraries & Demo	2012-01-17	1	2.2 and up	17	1	2012	
	1535	Cardboard	LIBRARIES_AND_DEMO	4.2	130272	50.000	10000000	Free	0.0	Everyone	Libraries & Demo	2016-03-14	1.8	4.1 and up	14	3	2016	
	6679	Cardboard	LIBRARIES_AND_DEMO	4.2	130287	50.000	10000000	Free	0.0	Everyone	Libraries & Demo	2016-03-14	1.8	4.1 and up	14	3	2016	
	10728	MX Player Codec (ARMv7)	LIBRARIES_AND_DEMO	4.3	332083	6.300	10000000	Free	0.0	Everyone	Libraries & Demo	2018-04-23	1.9.19	4.0 and up	23	4	2018	
LIFESTYLE	1521	Aviary Effects: Classic	LIBRARIES_AND_DEMO	3.8	67007	0.232	5000000	Free	0.0	Everyone	Libraries & Demo	2013-03-06	1.2.0	2.2 and up	6	3	2013	
	4587	Tinder	LIFESTYLE	4.0	2789775	68.000	100000000	Free	0.0	Mature 17+	Lifestyle	2018-08-02	9.5.0	4.4 and up	2	8	2018	
	1584	Samsung+	LIFESTYLE	4.5	82145	30.000	50000000	Free	0.0	Everyone	Lifestyle	2018-07-05	10.19.0.0	4.4 and up	5	7	2018	
	1563	metroZONE	LIFESTYLE	4.1	47497	34.000	10000000	Free	0.0	Everyone	Lifestyle	2018-06-08	5.3.0.54.7	5.0 and up	8	6	2018	
	1565	Talking Babsy Baby: Baby Games	LIFESTYLE	4.0	140995	100.000	10000000	Free	0.0	Everyone	Lifestyle;Pretend Play	2018-07-16	9	4.0 and up	16	7	2018	
MAPS_AND_NAVIGATION	1570	Horoscopes – Daily Zodiac Horoscope and Astrology	LIFESTYLE	4.6	161143	11.000	10000000	Free	0.0	Everyone 10+	Lifestyle	2018-06-25	5.2.4(881)	4.0.3 and up	25	6	2018	
	3820	Waze - GPS, Maps, Traffic Alerts & Live Naviga...	MAPS_AND_NAVIGATION	4.6	7232629	NaN	100000000	Free	0.0	Everyone	Maps & Navigation	2018-07-29	Varies with device	Varies with device	29	7	2018	
	3827	Uber	MAPS_AND_NAVIGATION	4.2	4928420	NaN	100000000	Free	0.0	Everyone	Maps & Navigation	2018-08-06	Varies with device	Varies with device	6	8	2018	
	4634	Uber	MAPS_AND_NAVIGATION	4.2	4921866	NaN	100000000	Free	0.0	Everyone	Maps & Navigation	2018-08-02	Varies with device	Varies with device	2	8	2018	
	4717	Waze - GPS, Maps, Traffic Alerts & Live Naviga...	MAPS_AND_NAVIGATION	4.6	7231017	NaN	100000000	Free	0.0	Everyone	Maps & Navigation	2018-07-29	Varies with device	Varies with device	29	7	2018	
	3828	GPS Navigation & Offline Maps Sygic	MAPS_AND_NAVIGATION	4.4	1421884	33.000	50000000	Free	0.0	Everyone	Maps & Navigation	2018-07-26	17.4.11	4.0.3 and up	26	7	2018	

			App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver	Day	Month	Year
Category																		
MEDICAL	2310	Blood Pressure		MEDICAL	4.2	33033	7.400	5000000	Free	0.0	Everyone	Medical	2018-07-24	3.27.3	4.1 and up	24	7	2018
	2319	My Calendar - Period Tracker		MEDICAL	4.7	156410	14.000	5000000	Free	0.0	Everyone	Medical	2018-08-03	5.9.6	4.1 and up	3	8	2018
	2303	GoodRx Drug Prices and Coupons		MEDICAL	4.8	59158	11.000	1000000	Free	0.0	Everyone	Medical	2018-07-26	5.4.8	4.1 and up	26	7	2018
	2304	MyChart		MEDICAL	4.2	19473	Nan	1000000	Free	0.0	Everyone	Medical	2018-07-24	Varies with device	Varies with device	24	7	2018
	2305	FollowMyHealth®		MEDICAL	4.6	73118	37.000	1000000	Free	0.0	Everyone	Medical	2018-05-10	3.3	4.4 and up	10	5	2018
NEWS AND MAGAZINES	3736	Google News	NEWS_AND_MAGAZINES	3.9	877635	13.000	10000000000	Free	0.0	Teen	News & Magazines	2018-08-01	5.2.0	4.4 and up	1	8	2018	
	3816	Google News	NEWS_AND_MAGAZINES	3.9	877643	13.000	10000000000	Free	0.0	Teen	News & Magazines	2018-08-01	5.2.0	4.4 and up	1	8	2018	
	9844	Google News	NEWS_AND_MAGAZINES	3.9	878065	13.000	10000000000	Free	0.0	Teen	News & Magazines	2018-08-01	5.2.0	4.4 and up	1	8	2018	
	3739	Twitter	NEWS_AND_MAGAZINES	4.3	11667403	Nan	500000000	Free	0.0	Mature 17+	News & Magazines	2018-08-06	Varies with device	Varies with device	6	8	2018	
	3755	Flipboard: News For Our Time	NEWS_AND_MAGAZINES	4.4	1284017	Nan	500000000	Free	0.0	Everyone 10+	News & Magazines	2018-08-03	Varies with device	Varies with device	3	8	2018	
PARENTING	7229	Pregnancy Tracker & Countdown to Baby Due Date		PARENTING	4.7	658087	62.000	10000000	Free	0.0	Everyone	Parenting	2018-05-24	3.15.1	5.0 and up	24	5	2018
	3576	My baby Piano		PARENTING	3.9	17941	Nan	5000000	Free	0.0	Everyone	Parenting;Music & Video	2018-05-27	Varies with device	Varies with device	27	5	2018
	3578	My baby Game (Balloon POP!)		PARENTING	3.8	3614	3.300	1000000	Free	0.0	Everyone	Parenting;Brain Games	2018-05-28	2.15.2714	4.0 and up	28	5	2018
	3584	Baby Panda Learns Shapes		PARENTING	4.0	3789	42.000	1000000	Free	0.0	Everyone	Parenting;Education	2018-06-21	8.25.10.00	4.0.3 and up	21	6	2018
	3588	My baby firework		PARENTING	3.7	4976	2.800	1000000	Free	0.0	Everyone	Parenting;Education	2018-05-28	2.04.2714	4.0 and up	28	5	2018
PERSONALIZATION	3354	ZEDGE™ Ringtones & Wallpapers		PERSONALIZATION	4.6	6466641	Nan	100000000	Free	0.0	Teen	Personalization	2018-07-19	Varies with device	Varies with device	19	7	2018
	3360	CM Launcher 3D - Theme, Wallpapers, Efficient		PERSONALIZATION	4.6	6702776	17.000	100000000	Free	0.0	Teen	Personalization	2018-08-03	5.41.0	4.0.3 and up	3	8	2018
	3374	APUS Launcher - Theme, Wallpaper, Hide Apps		PERSONALIZATION	4.5	5783441	14.000	100000000	Free	0.0	Everyone	Personalization	2018-08-06	3.9.7	4.0.3 and up	6	8	2018
	3385	Hola Launcher-Theme,Wallpaper		PERSONALIZATION	4.5	3277209	7.600	100000000	Free	0.0	Everyone	Personalization	2018-05-09	3.2.5	4.0 and up	9	5	2018
	3425	Backgrounds HD (Wallpapers)		PERSONALIZATION	4.6	2390185	Nan	100000000	Free	0.0	Teen	Personalization	2018-08-04	Varies with device	Varies with device	4	8	2018

			App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver	Day	Month	Year
Category																		
PHOTOGRAPHY	2808	Google Photos	PHOTOGRAPHY	4.5	10858556	NaN	1000000000	Free	0.0	Everyone	Photography	2018-08-06	Varies with device	Varies with device	6	8	2018	
	2853	Google Photos	PHOTOGRAPHY	4.5	10858538	NaN	1000000000	Free	0.0	Everyone	Photography	2018-08-06	Varies with device	Varies with device	6	8	2018	
	2884	Google Photos	PHOTOGRAPHY	4.5	10859051	NaN	1000000000	Free	0.0	Everyone	Photography	2018-08-06	Varies with device	Varies with device	6	8	2018	
	5395	Google Photos	PHOTOGRAPHY	4.5	10847682	NaN	1000000000	Free	0.0	Everyone	Photography	2018-08-01	Varies with device	Varies with device	1	8	2018	
	2816	B612 - Beauty & Filter Camera	PHOTOGRAPHY	4.4	5282578	NaN	100000000	Free	0.0	Everyone	Photography	2018-07-30	7.6.5	4.3 and up	30	7	2018	
PRODUCTIVITY	3454	Google Drive	PRODUCTIVITY	4.4	2731171	NaN	1000000000	Free	0.0	Everyone	Productivity	2018-08-06	Varies with device	Varies with device	6	8	2018	
	3523	Google Drive	PRODUCTIVITY	4.4	2731211	NaN	1000000000	Free	0.0	Everyone	Productivity	2018-08-06	Varies with device	Varies with device	6	8	2018	
	4170	Google Drive	PRODUCTIVITY	4.4	2728941	NaN	1000000000	Free	0.0	Everyone	Productivity	2018-07-30	Varies with device	Varies with device	30	7	2018	
	3450	Microsoft Word	PRODUCTIVITY	4.5	2084126	NaN	500000000	Free	0.0	Everyone	Productivity	2018-07-11	16.0.10325.20043	4.4 and up	11	7	2018	
	3473	Dropbox	PRODUCTIVITY	4.4	1861310	61.000	500000000	Free	0.0	Everyone	Productivity	2018-08-01	Varies with device	Varies with device	1	8	2018	
SHOPPING	2655	Wish - Shopping Made Fun	SHOPPING	4.5	6210998	15.000	100000000	Free	0.0	Everyone	Shopping	2018-08-03	4.20.5	4.1 and up	3	8	2018	
	2660	AliExpress - Smarter Shopping, Better Living	SHOPPING	4.6	5916606	NaN	100000000	Free	0.0	Teen	Shopping	2018-08-06	Varies with device	Varies with device	6	8	2018	
	2662	eBay: Buy & Sell this Summer - Discover Deals ...	SHOPPING	4.4	2788923	NaN	100000000	Free	0.0	Teen	Shopping	2018-07-30	Varies with device	Varies with device	30	7	2018	
	2664	Amazon Shopping	SHOPPING	4.3	909226	42.000	100000000	Free	0.0	Teen	Shopping	2018-07-31	16.14.0.100	4.4 and up	31	7	2018	
	2698	Flipkart Online Shopping App	SHOPPING	4.4	6012719	NaN	100000000	Free	0.0	Teen	Shopping	2018-08-06	Varies with device	Varies with device	6	8	2018	
SOCIAL	2544	Facebook	SOCIAL	4.1	78158306	NaN	1000000000	Free	0.0	Teen	Social	2018-08-03	Varies with device	Varies with device	3	8	2018	
	2545	Instagram	SOCIAL	4.5	66577313	NaN	1000000000	Free	0.0	Teen	Social	2018-07-31	Varies with device	Varies with device	31	7	2018	
	2554	Google+	SOCIAL	4.2	4831125	NaN	1000000000	Free	0.0	Teen	Social	2018-07-26	Varies with device	Varies with device	26	7	2018	
	2604	Instagram	SOCIAL	4.5	66577446	NaN	1000000000	Free	0.0	Teen	Social	2018-07-31	Varies with device	Varies with device	31	7	2018	
	3909	Instagram	SOCIAL	4.5	66509917	NaN	1000000000	Free	0.0	Teen	Social	2018-07-31	Varies with device	Varies with device	31	7	2018	

			App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver	Day	Month	Year
Category																		
SPORTS	3953	8 Ball Pool	SPORTS	4.5	14184910	52.000	1000000000	Free	0.0	Everyone	Sports	2018-07-31	4.0.0	4.0.3 and up	31	7	2018	
	4054	3D Bowling	SPORTS	4.1	1076243	13.000	1000000000	Free	0.0	Everyone	Sports	2018-01-18	3.1	2.0.1 and up	18	1	2018	
	4056	Dream League Soccer 2018	SPORTS	4.6	9873470	74.000	1000000000	Free	0.0	Everyone	Sports	2018-07-16	5.064	4.4 and up	16	7	2018	
	8445	FIFA Soccer	SPORTS	4.2	3909032	51.000	1000000000	Free	0.0	Everyone	Sports	2018-07-31	10.5.00	4.1 and up	31	7	2018	
	2963	NFL	SPORTS	4.1	459795	NaN	500000000	Free	0.0	Everyone	Sports	2018-08-02	Varies with device	Varies with device	2	8	2018	
TOOLS	3234	Google	TOOLS	4.4	8033493	NaN	10000000000	Free	0.0	Everyone	Tools	2018-08-03	Varies with device	Varies with device	3	8	2018	
	4150	Google	TOOLS	4.4	8021623	NaN	10000000000	Free	0.0	Everyone	Tools	2018-08-03	Varies with device	Varies with device	3	8	2018	
	3235	Google Translate	TOOLS	4.4	5745093	NaN	5000000000	Free	0.0	Everyone	Tools	2018-08-04	Varies with device	Varies with device	4	8	2018	
	3255	SHAREit - Transfer & Share	TOOLS	4.6	7790693	17.000	5000000000	Free	0.0	Everyone	Tools	2018-07-30	4.5.28_ww	4.1 and up	30	7	2018	
	3265	Gboard - the Google Keyboard	TOOLS	4.2	1859115	NaN	5000000000	Free	0.0	Everyone	Tools	2018-07-31	Varies with device	Varies with device	31	7	2018	
TRAVEL_AND_LOCAL	3117	Maps - Navigate & Explore	TRAVEL_AND_LOCAL	4.3	9235155	NaN	10000000000	Free	0.0	Everyone	Travel & Local	2018-07-31	Varies with device	Varies with device	31	7	2018	
	3127	Google Street View	TRAVEL_AND_LOCAL	4.2	2129689	NaN	10000000000	Free	0.0	Everyone	Travel & Local	2018-08-06	Varies with device	Varies with device	6	8	2018	
	3223	Maps - Navigate & Explore	TRAVEL_AND_LOCAL	4.3	9235373	NaN	10000000000	Free	0.0	Everyone	Travel & Local	2018-07-31	Varies with device	Varies with device	31	7	2018	
	3232	Google Street View	TRAVEL_AND_LOCAL	4.2	2129707	NaN	10000000000	Free	0.0	Everyone	Travel & Local	2018-08-06	Varies with device	Varies with device	6	8	2018	
	4098	Maps - Navigate & Explore	TRAVEL_AND_LOCAL	4.3	9231613	NaN	10000000000	Free	0.0	Everyone	Travel & Local	2018-07-31	Varies with device	Varies with device	31	7	2018	
VIDEO_PLAYERS	3665	YouTube	VIDEO_PLAYERS	4.3	25655305	NaN	10000000000	Free	0.0	Teen	Video Players & Editors	2018-08-02	Varies with device	Varies with device	2	8	2018	
	3687	Google Play Movies & TV	VIDEO_PLAYERS	3.7	906384	NaN	10000000000	Free	0.0	Teen	Video Players & Editors	2018-08-06	Varies with device	Varies with device	6	8	2018	
	3928	YouTube	VIDEO_PLAYERS	4.3	25623548	NaN	10000000000	Free	0.0	Teen	Video Players & Editors	2018-08-02	Varies with device	Varies with device	2	8	2018	
	3703	MX Player	VIDEO_PLAYERS	4.5	6474426	NaN	5000000000	Free	0.0	Everyone	Video Players & Editors	2018-08-06	Varies with device	Varies with device	6	8	2018	
	3711	MX Player	VIDEO_PLAYERS	4.5	6474672	NaN	5000000000	Free	0.0	Everyone	Video Players & Editors	2018-08-06	Varies with device	Varies with device	6	8	2018	

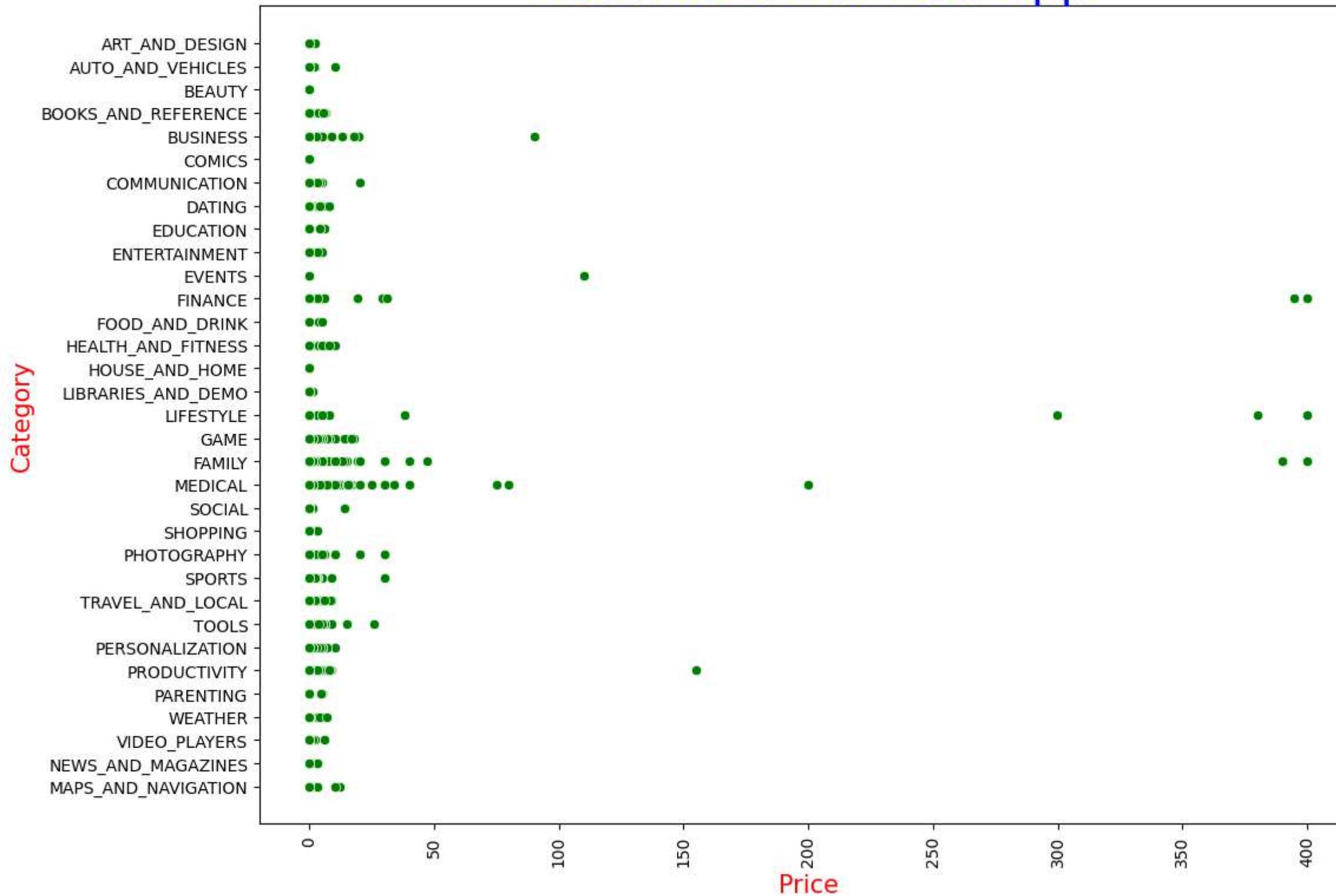
			App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver	Day	Month	Year
			Category															
WEATHER	3626	The Weather Channel: Rain Forecast & Storm Alerts	WEATHER	WEATHER	4.4	1558437	NaN	50000000	Free	0.0	Everyone	Weather	2018-08-01	Varies with device	Varies with device	1	8	2018
	3628	AccuWeather: Daily Forecast & Live Weather Rep...	WEATHER	WEATHER	4.4	2053404	NaN	50000000	Free	0.0	Everyone	Weather	2018-08-06	Varies with device	Varies with device	6	8	2018
	3649	GO Weather - Widget, Theme, Wallpaper, Efficient	WEATHER	WEATHER	4.5	1422858	NaN	50000000	Free	0.0	Everyone	Weather	2018-08-03	Varies with device	Varies with device	3	8	2018
	4725	Weather & Clock Widget for Android	WEATHER	WEATHER	4.4	2371543	11.000	50000000	Free	0.0	Everyone	Weather	2018-06-04	5.9.4.0	4.0.3 and up	4	6	2018
	5512	AccuWeather: Daily Forecast & Live Weather Rep...	WEATHER	WEATHER	4.4	2052407	NaN	50000000	Free	0.0	Everyone	Weather	2018-08-02	Varies with device	Varies with device	2	8	2018

Which kind of app user are downloading the most free/paid?

In [98]:

```
plt.figure(figsize=(12,9))
sns.scatterplot(data=df,y="Category",x='Price',color="g")
plt.xticks(rotation='vertical',size=10)
plt.yticks(size=10)
plt.xlabel("Price",size=15,c="r")
plt.ylabel("Category",size=15,c="r")
plt.title("Visualization of Paid App",size=28,c="b")
plt.show()
```

Visualization of Paid App



```
In [ ]: """Insights
There are few Apps related to finance games and lifestyle are costly in paid category apps.
Paid apps are very very less.
0 indicate free apps."""
```

```
In [157]: df.value_counts(df['Type']=="Free")
```

```
Out[157]: Type  
True      9591  
False     766  
dtype: int64
```

```
In [172...  
Free_app_percentage=(9591/10357)*100  
Free_app_percentage
```

```
Out[172]: 92.6040359177368
```

```
In [174...  
paid_app_percentage=100-Free_app_percentage  
paid_app_percentage
```

```
Out[174]: 7.395964082263205
```

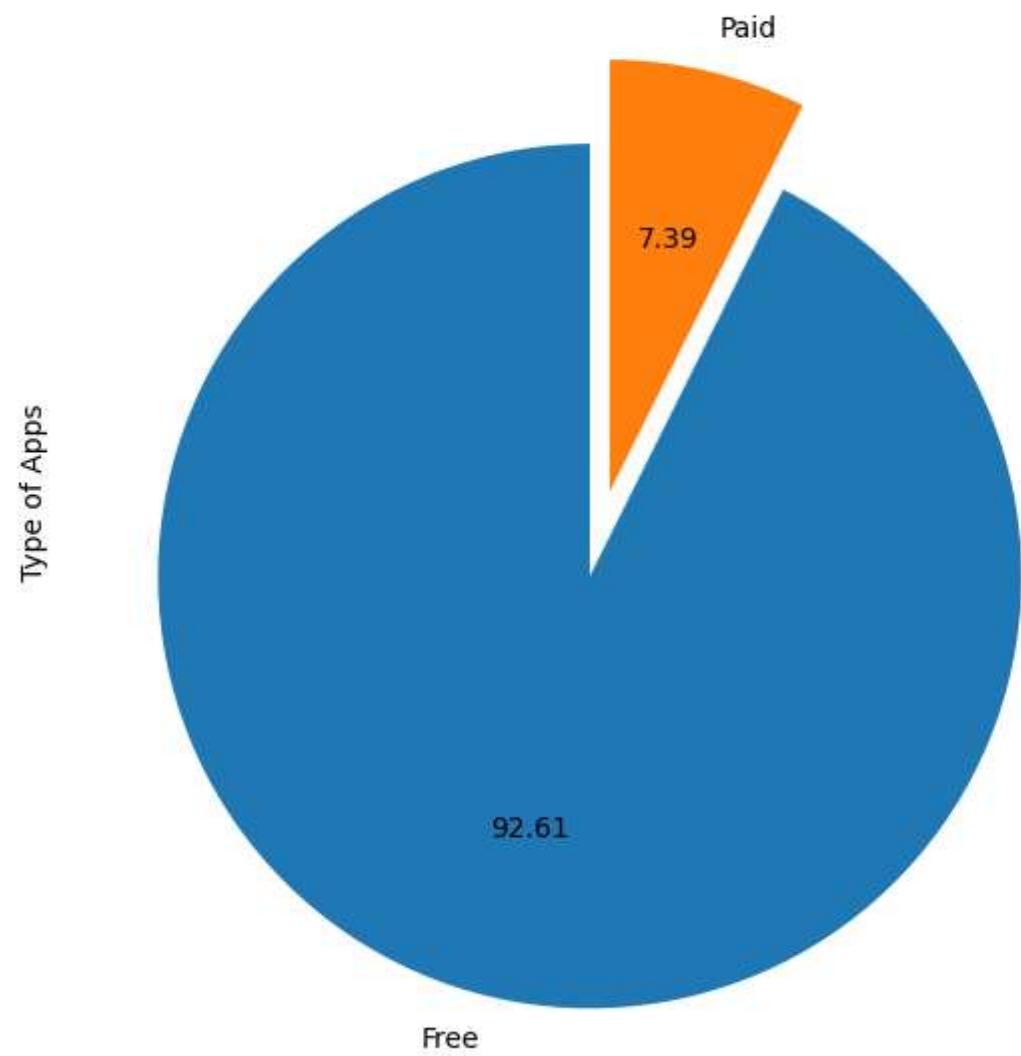
```
In [200...  
df_app_paid_nonpaid=pd.DataFrame({'Free_app_percentage':[92.6040359177368], 'paid_app_percentage':[7.395964082263205]})
```

```
In [222...  
df_app_paid_nonpaid=df_app_paid_nonpaid.reset_index(drop=True)
```

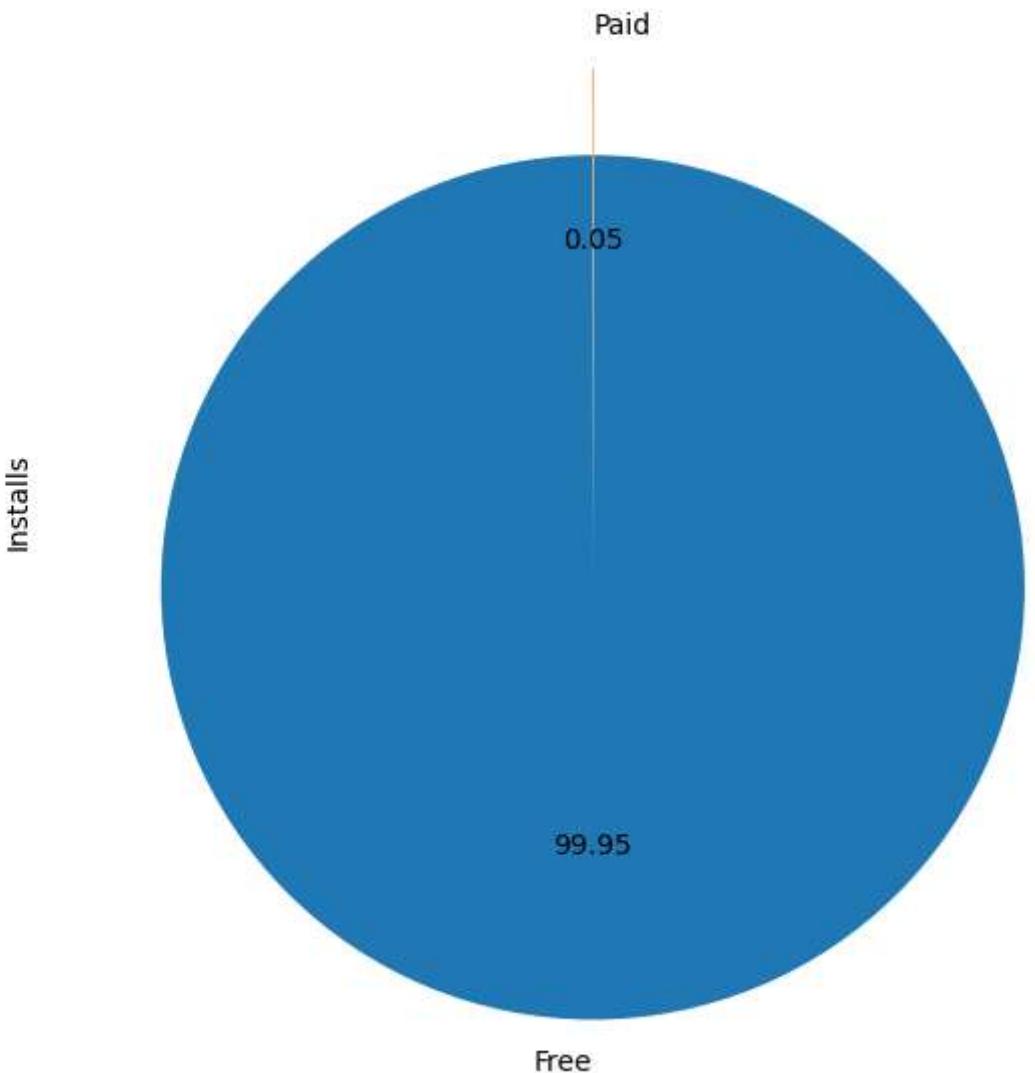
```
In [228...  
fig, ax = plt.subplots(1,2,figsize=(20,7))  
df.value_counts('Type').plot.pie(y='Type', startangle=90, explode=(0.2,0), title='Percentage of the Free App and Paid App', legend=False, autopct='%.2f', ax=ax[0])  
ax[0].set(ylabel='Type of Apps')  
df.groupby('Type').agg({'Installs':sum}).plot.pie(y='Installs', startangle=90, explode=(0.2,0), title='Percentage of Installs Number for Free App and Paid App', legend=False, autopct='%.2f', ax=ax[1])
```

```
Out[228]: <AxesSubplot: title={'center': 'Percentage of Installs Number for Free App and Paid App'}, ylabel='Installs'>
```

Percentage of the Free App and Paid App



Percentage of Installs Number for Free App and Paid App



In []:

```
"""Insights
More than 92% of the are free in Google Play Store.
More than 99% of installs belongs to free apps.
Most of the apps in the app store are free.
Only a small percentage of apps are paid apps."""
```

Which Category app users are reviewing the most ??

```
In [113... df_installs_reviews = df.groupby('Category').agg({'Installs':'sum', 'Reviews':'sum'})
```

```
In [121... df_installs_reviews['Reviews_rate']=(df_installs_reviews['Reviews']/df_installs_reviews['Installs'])*100
```

```
In [126... df_installs_reviews=df_installs_reviews.sort_values(ascending=False,by='Reviews_rate')
df_installs_reviews
```

Out[126]:

	Installs	Reviews	Reviews_rate
Category			
COMICS	56086150	3383276	6.032284
GAME	31544024415	1415536650	4.487495
EDUCATION	533952000	23165500	4.338499
SPORTS	1528574498	65322708	4.273440
SOCIAL	12513867902	533576829	4.263884
MAPS_AND_NAVIGATION	724281890	30659254	4.233055
FAMILY	10041692505	396771969	3.951246
SHOPPING	2573348785	94931162	3.689013
PERSONALIZATION	2074494782	75193163	3.624649
WEATHER	426100520	14604735	3.427533
MEDICAL	42204177	1396757	3.309523
PARENTING	31521110	958331	3.040283
FOOD_AND_DRINK	257898751	7671576	2.974646
DATING	206536107	5545397	2.684953
COMMUNICATION	24152276251	601273552	2.489511
LIFESTYLE	534823539	12820575	2.397160
TOOLS	11452771915	273185044	2.385318
HEALTH_AND_FITNESS	1361022512	30845186	2.266324
HOUSE_AND_HOME	125212461	2794772	2.232024
FINANCE	770348734	16999891	2.206779
AUTO_AND_VEHICLES	53130211	1163666	2.190215
PHOTOGRAPHY	9721247655	204297410	2.101555
ENTERTAINMENT	2455660000	47570716	1.937187
VIDEO_PLAYERS	6222002720	110380188	1.774030
LIBRARIES_AND_DEMO	62995910	1037118	1.646326
BEAUTY	27197050	396240	1.456923
BUSINESS	863664865	12358171	1.430899
ART_AND DESIGN	124338100	1714440	1.378853
BOOKS_AND_REFERENCE	1916469576	21873227	1.141329
EVENTS	15973161	161018	1.008053
TRAVEL_AND_LOCAL	6361887146	55565160	0.873407
PRODUCTIVITY	12463091369	102554498	0.822866

Installs Reviews Reviews_rate

Category

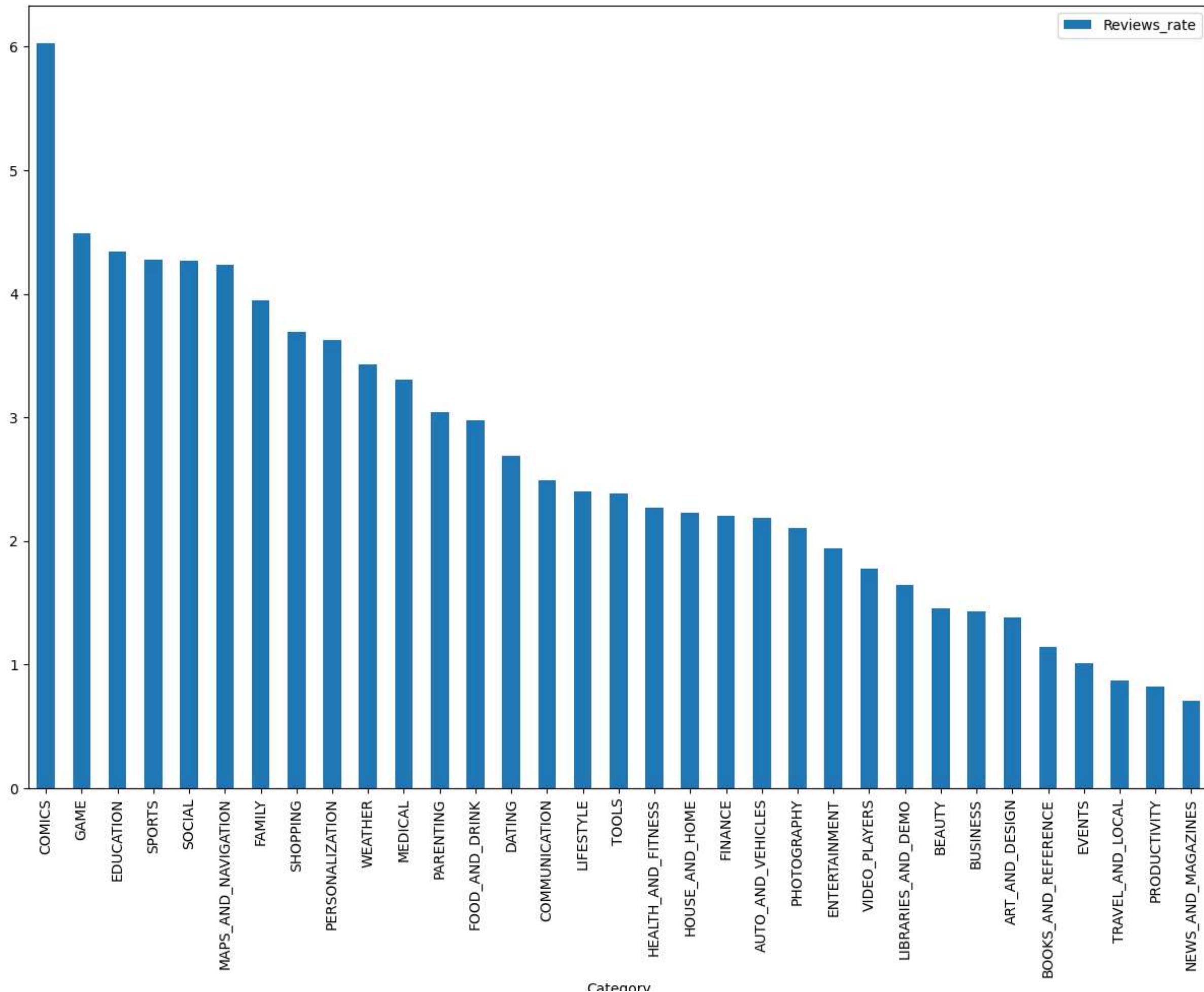
Category	Installs	Reviews	Reviews_rate
NEWS_AND_MAGAZINES	5393217760	38245873	0.709148

In [130]:

```
df_installs_reviews.plot(kind='bar',y='Reviews_rate',figsize =(15,10))
```

Out[130]:

```
<AxesSubplot: xlabel='Category'>
```



In []:

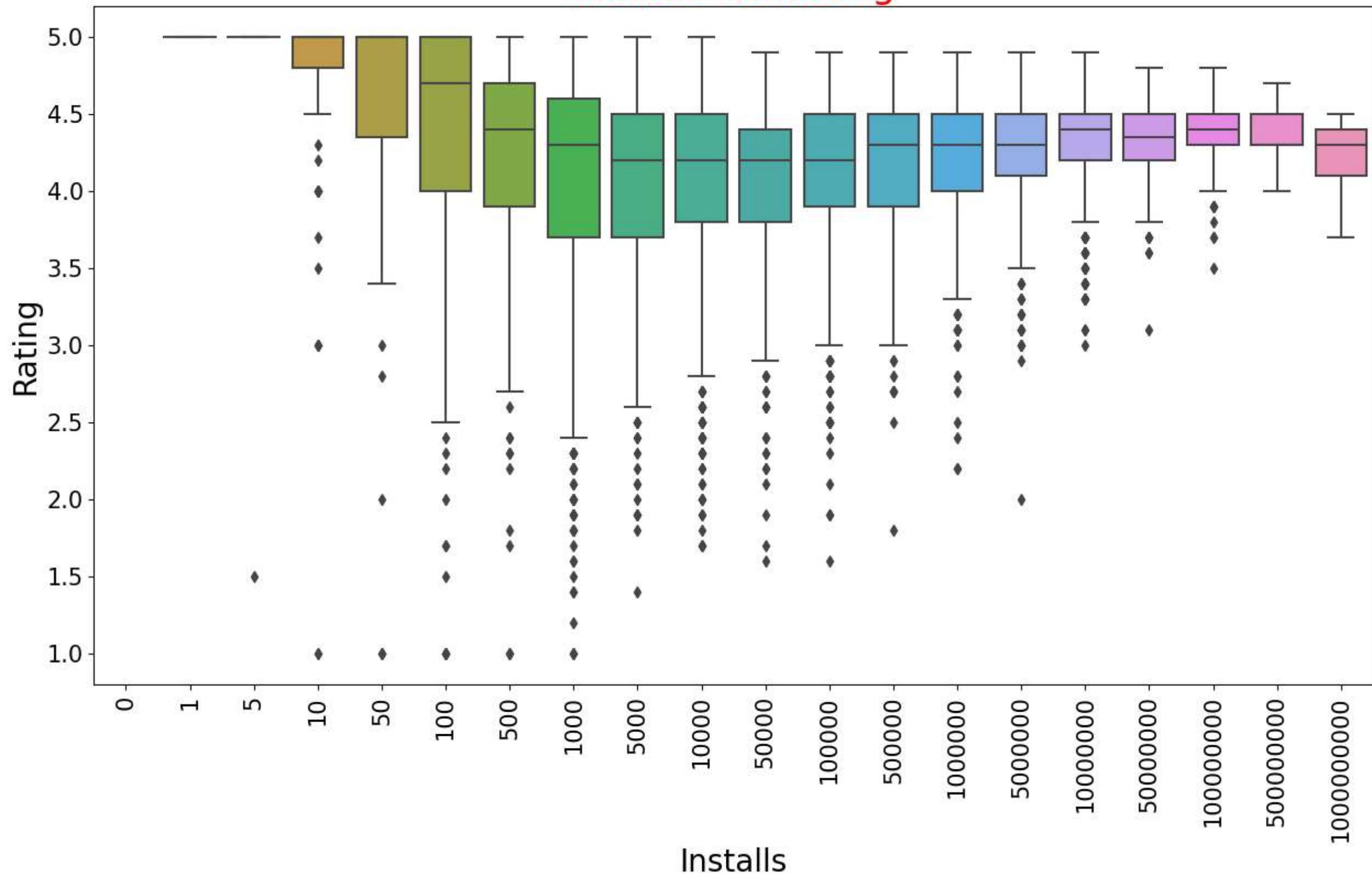
```
"""Insights
Users downloading "Comics" with higher rate to leave a review but with relative high spread of the rating comparing with others.
"Comic" ranks 6 in the number of installation.
The two categories with high download rate are having relatively low review rate."""
```

which apps has good ratings on google play store ??

In [230...]

```
#boxplot plot installs/rates
ax = plt.figure(figsize=(15,8))
sns.boxplot(x="Installs", y="Rating", data=df)
plt.title("Installs vs Rating",size=25,c="r")
plt.xticks(size=15,rotation=90)
plt.yticks(size=15)
plt.xlabel("Installs",size=20)
plt.ylabel("Rating",size=20)
plt.show()
```

Installs vs Rating



In []:

```
"""Insights  
Average rating of all apps is between 3 to 4.5.  
Highly installed apps having rating is also good."""
```

Which Category apps are of largest size ??

In [233...]

df.head(5)

Out[233]:

	App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver	Day	Month	Year
0	Photo Editor & Candy Camera & Grid & ScrapBook	ART_AND DESIGN	4.1	159	19.0	10000	Free	0.0	Everyone	Art & Design	2018-01-07	1.0.0	4.0.3 and up	7	1	2018
1	Coloring book moana	ART_AND DESIGN	3.9	967	14.0	500000	Free	0.0	Everyone	Art & Design;Pretend Play	2018-01-15	2.0.0	4.0.3 and up	15	1	2018
2	U Launcher Lite – FREE Live Cool Themes, Hide ...	ART_AND DESIGN	4.7	87510	8.7	5000000	Free	0.0	Everyone	Art & Design	2018-08-01	1.2.4	4.0.3 and up	1	8	2018
3	Sketch - Draw & Paint	ART_AND DESIGN	4.5	215644	25.0	50000000	Free	0.0	Teen	Art & Design	2018-06-08	Varies with device	4.2 and up	8	6	2018
4	Pixel Draw - Number Art Coloring Book	ART_AND DESIGN	4.3	967	2.8	100000	Free	0.0	Everyone	Art & Design;Creativity	2018-06-20	1.1	4.4 and up	20	6	2018

In [251...]

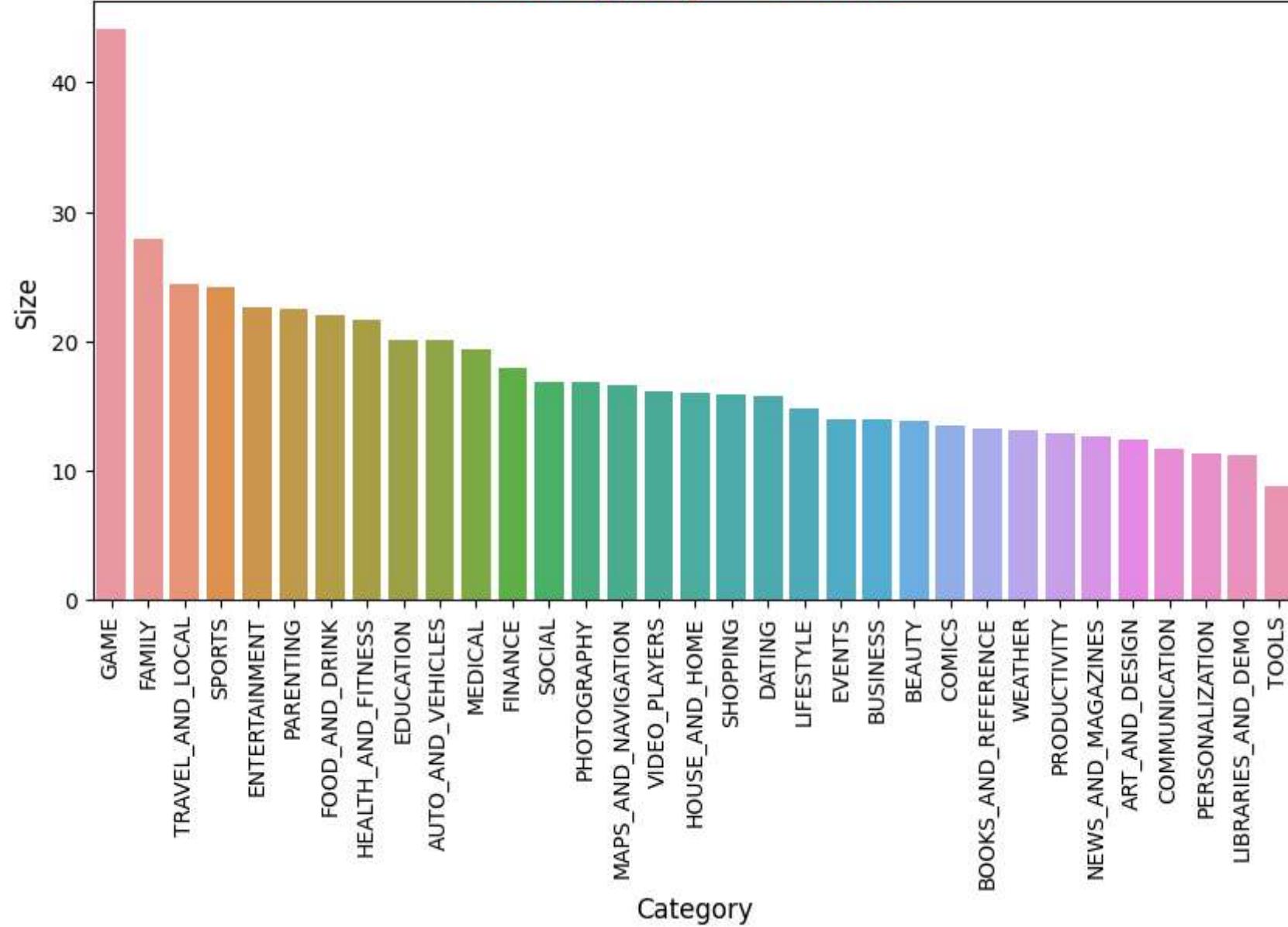
```
df1=df.groupby(["Category"])[['Size']].mean().sort_values(ascending=False)
df1=pd.DataFrame(df1)
df1=df1.reset_index()
df1
```

Out[251]:	Category	Size
0	GAME	44.126850
1	FAMILY	27.930436
2	TRAVEL_AND_LOCAL	24.460184
3	SPORTS	24.113693
4	ENTERTAINMENT	22.638806
5	PARENTING	22.512963
6	FOOD_AND_DRINK	22.056122
7	HEALTH_AND_FITNESS	21.643217
8	EDUCATION	20.076896
9	AUTO_AND_VEHICLES	20.037147
10	MEDICAL	19.357392
11	FINANCE	17.937730
12	SOCIAL	16.875828
13	PHOTOGRAPHY	16.790934
14	MAPS_AND_NAVIGATION	16.614713
15	VIDEO_PLAYERS	16.084580
16	HOUSE_AND_HOME	15.970258
17	SHOPPING	15.898127
18	DATING	15.769820
19	LIFESTYLE	14.827254
20	EVENTS	13.963754
21	BUSINESS	13.886478
22	BEAUTY	13.795745
23	COMICS	13.485353
24	BOOKS_AND_REFERENCE	13.189959
25	WEATHER	13.124246
26	PRODUCTIVITY	12.805314
27	NEWS_AND_MAGAZINES	12.646450
28	ART_AND DESIGN	12.370968
29	COMMUNICATION	11.658373
30	PERSONALIZATION	11.290517
31	LIBRARIES_AND_DEMO	11.186890
32	TOOLS	8.771250

In [257]:

```
#boxplot plot installs/rates
ax = plt.figure(figsize=(10,5))
sns.barplot(x="Category", y="Size", data=df1)
plt.title("Category vs Size",size=25,c="r")
plt.xticks(size=10,rotation=90)
plt.yticks(size=10)
plt.xlabel("Category",size=12)
plt.ylabel("Size",size=12)
plt.show()
```

Category vs Size



In []:

"""**Insights**
As is evident that GAME category has the largest size.
We have seen that an average game size exceeds 35MB. Some games are also in the order of GBs.
The FAMILY apps have the second largest size."""

Standard deviation of ratings with respect to Category

In [258...]

`df.describe()`

Out[258]:

	Rating	Reviews	Size	Installs	Price	Day	Month	Year
count	8892.000000	1.035700e+04	8831.000000	1.035700e+04	10357.000000	10357.000000	10357.000000	10357.000000
mean	4.187877	4.059046e+05	21.277437	1.415776e+07	1.030800	15.619098	6.397026	2017.382929
std	0.522377	2.696778e+06	22.547690	8.023955e+07	16.278625	9.528658	2.606359	1.112766
min	1.000000	0.000000e+00	0.010000	0.000000e+00	0.000000	1.000000	1.000000	2010.000000
25%	4.000000	3.200000e+01	4.700000	1.000000e+03	0.000000	6.000000	5.000000	2017.000000
50%	4.300000	1.680000e+03	13.000000	1.000000e+05	0.000000	16.000000	7.000000	2018.000000
75%	4.500000	4.641600e+04	29.000000	1.000000e+06	0.000000	24.000000	8.000000	2018.000000
max	5.000000	7.815831e+07	100.000000	1.000000e+09	400.000000	31.000000	12.000000	2018.000000

Standard deviation of Rating for entire data is 0.5223, however let me check for SD with respect to Category

In [281...]

```
df2=df.groupby(['Category'])['Rating'].std().sort_values(ascending=False)
df2=pd.DataFrame(df2)
df2
```

Out[281]:

Category	Rating
LIFESTYLE	0.701960
MEDICAL	0.682571
BUSINESS	0.652214
HEALTH_AND_FITNESS	0.650613
FINANCE	0.647026
DATING	0.621058
TOOLS	0.616143
NEWS_AND_MAGAZINES	0.557308
VIDEO_PLAYERS	0.551098
FOOD_AND_DRINK	0.549665
AUTO_AND_VEHICLES	0.543692
COMICS	0.537758
MAPS_AND_NAVIGATION	0.519926
TRAVEL_AND_LOCAL	0.518260
PARENTING	0.517845
PRODUCTIVITY	0.514472
FAMILY	0.511217
PHOTOGRAPHY	0.469713
SPORTS	0.446895
COMMUNICATION	0.438383
SHOPPING	0.431269
BOOKS_AND_REFERENCE	0.429861
SOCIAL	0.424575
EVENTS	0.419499
LIBRARIES_AND_DEMO	0.378522
HOUSE_AND_HOME	0.374471
GAME	0.367117
BEAUTY	0.362603
ART_AND DESIGN	0.358297
PERSONALIZATION	0.353962
WEATHER	0.331353
ENTERTAINMENT	0.321019

Rating**Category****EDUCATION** 0.260341

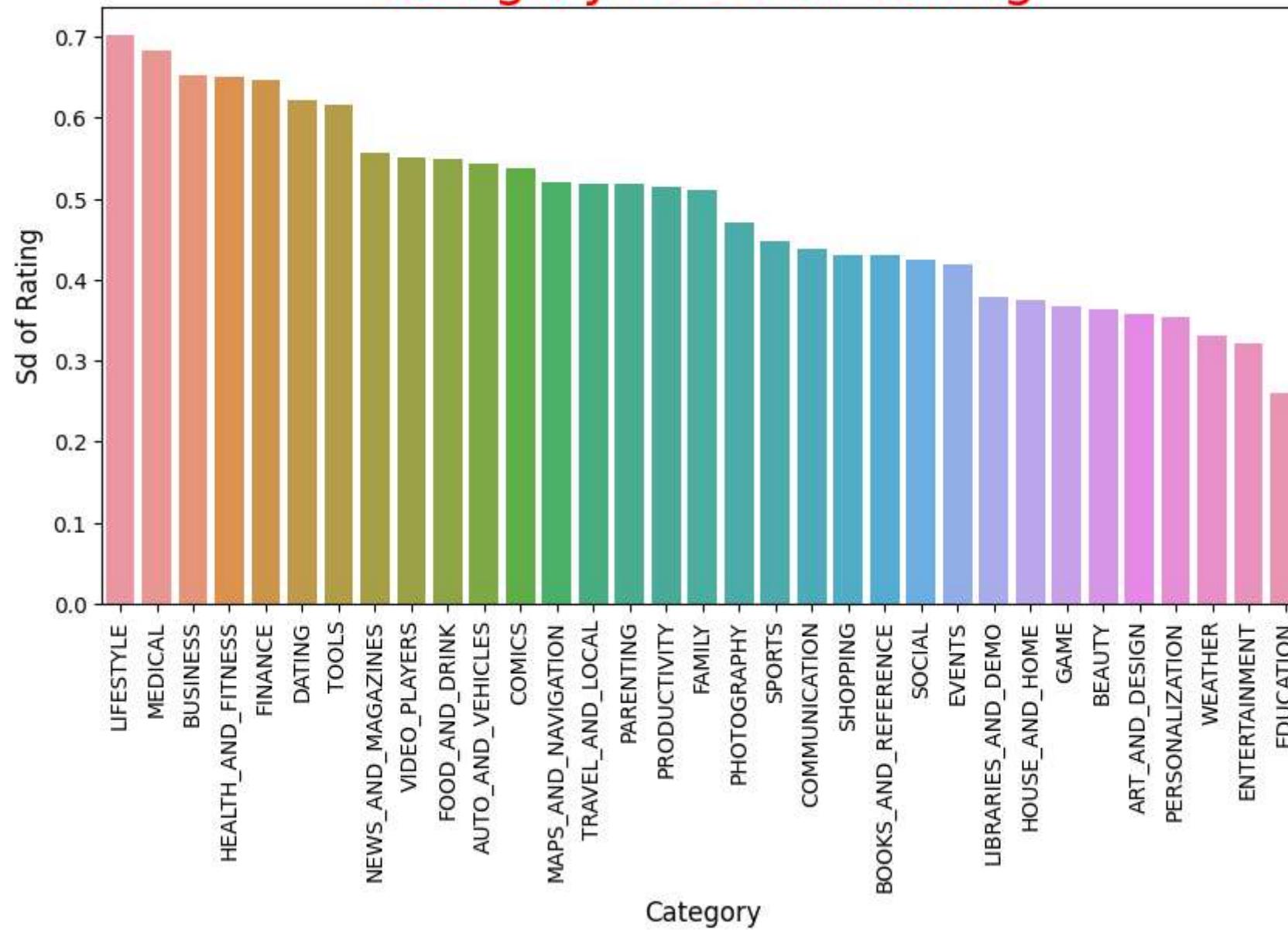
In [285...]

```
df2=df2.reset_index(drop=False)
```

In [288...]

```
#boxplot plot installs/rates
ax = plt.figure(figsize=(10,5))
sns.barplot(x="Category", y="Rating", data=df2)
plt.title("Category vs Sd of Rating",size=25,c="r")
plt.xticks(size=10,rotation=90)
plt.yticks(size=10)
plt.xlabel("Category",size=12)
plt.ylabel("Sd of Rating",size=12)
plt.show()
```

Category vs Sd of Rating



In []:

```
"""Insights
"Education" has the lowest standard deviation of the rating which means the spread of the rating in this category is narrower than others
"Lifestyle" is with the highest standard deviation."""
```

Does app size has any impact on Reviews and Ratings ?

In [289...]

```
df.corr()
```

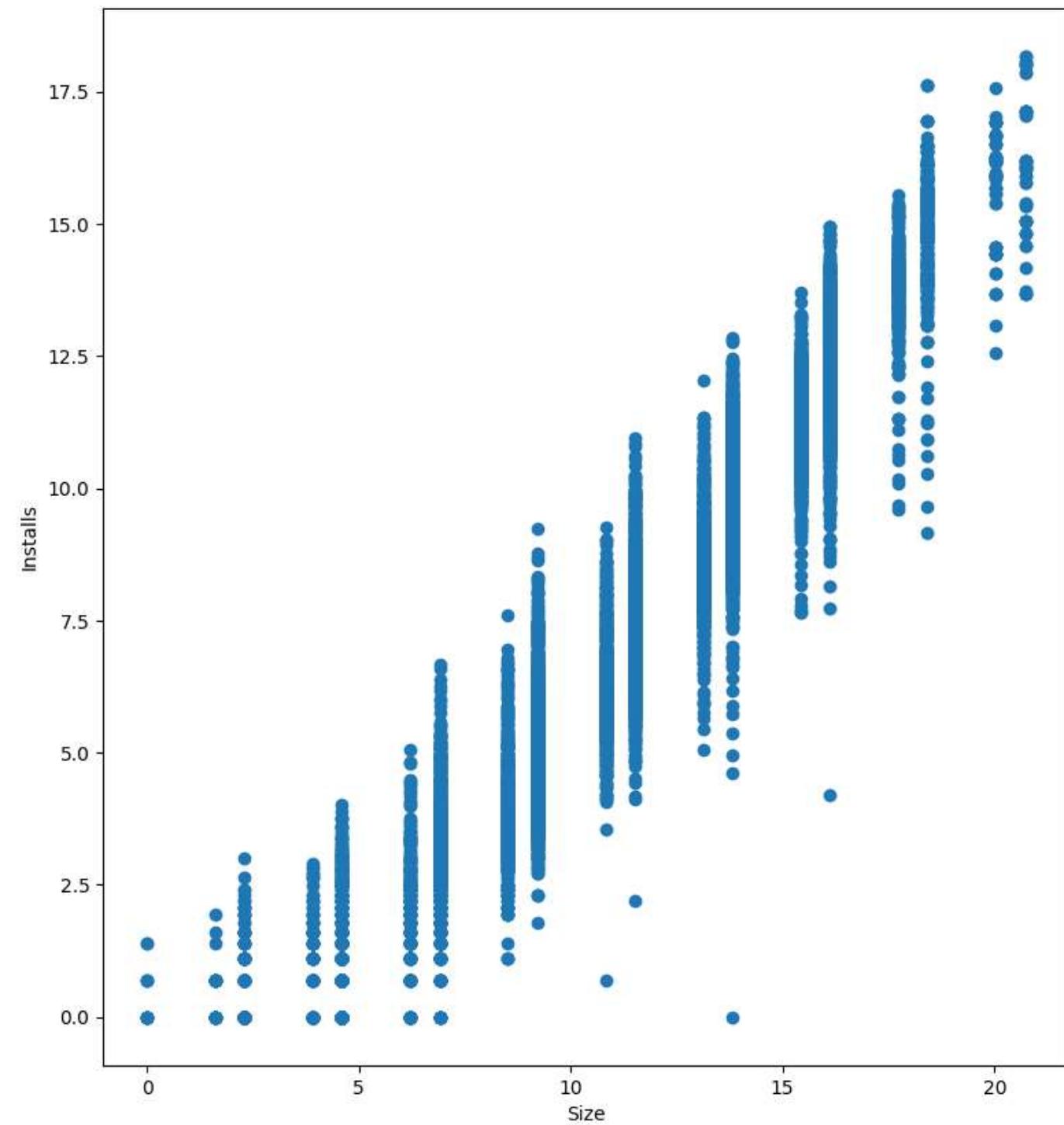
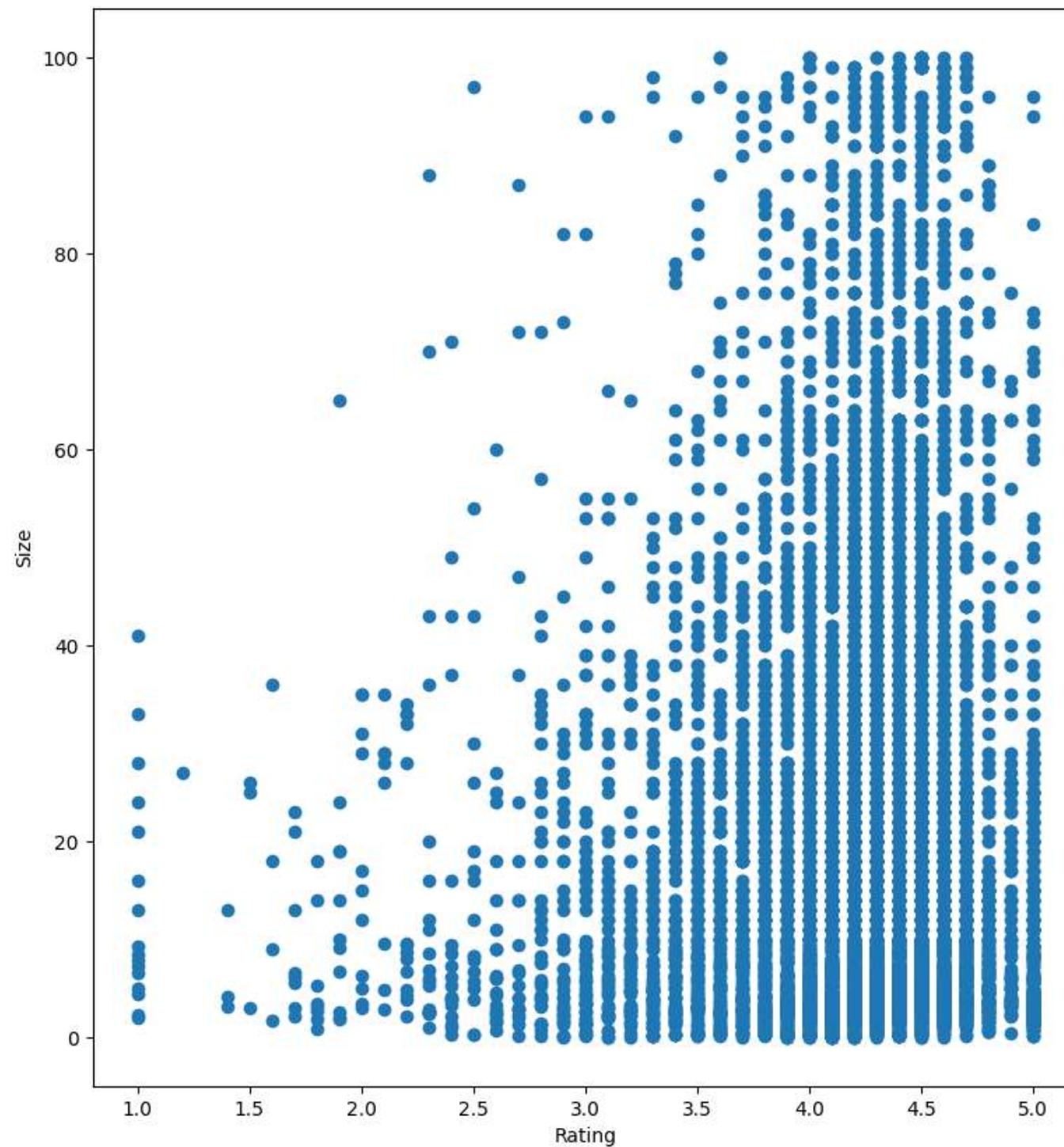
Out[289]:

	Rating	Reviews	Size	Installs	Price	Day	Month	Year
Rating	1.000000	0.068732	0.082187	0.050886	-0.022355	-0.010102	0.016999	0.136547
Reviews	0.068732	1.000000	0.237880	0.634997	-0.009417	-0.024677	0.044681	0.075744
Size	0.082187	0.237880	1.000000	0.168883	-0.023729	-0.004368	0.036932	0.217284
Installs	0.050886	0.634997	0.168883	1.000000	-0.011147	-0.043546	0.053847	0.087380
Price	-0.022355	-0.009417	-0.023729	-0.011147	1.000000	-0.008480	0.006490	-0.005627
Day	-0.010102	-0.024677	-0.004368	-0.043546	-0.008480	1.000000	-0.074367	-0.015239
Month	0.016999	0.044681	0.036932	0.053847	0.006490	-0.074367	1.000000	-0.190497
Year	0.136547	0.075744	0.217284	0.087380	-0.005627	-0.015239	-0.190497	1.000000

In [290...]

```
fig, ax = plt.subplots(1, 2, figsize=(20, 10))
ax[0].scatter(df['Rating'], df['Size'])
ax[0].set_xlabel('Rating')
ax[0].set_ylabel('Size')
ax[1].scatter(x=df['Installs'].apply(np.log), y = df['Reviews'].apply(np.log))
ax[1].set_xlabel('Installs')
ax[1].set_ylabel('Reviews')
```

Out[290]: Text(0.5, 0, 'Size')



In []:

```
"""Insights
- From first plot, We can observe that as the size increases the number of rating decreases.
- App less than size of 40MB is crowded with ratings comparatively.
- From second plot, we can observe a linear relationship"""

```

Which app with most number of reviews and its number of reviews??

In [291...]

```
df.head()
```

Out[291]:

	App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Last Updated	Current Ver	Android Ver	Day	Month	Year
0	Photo Editor & Candy Camera & Grid & ScrapBook	ART_AND DESIGN	4.1	159	19.0	10000	Free	0.0	Everyone	Art & Design	2018-01-07	1.0.0	4.0.3 and up	7	1	2018
1	Coloring book moana	ART_AND DESIGN	3.9	967	14.0	500000	Free	0.0	Everyone	Art & Design;Pretend Play	2018-01-15	2.0.0	4.0.3 and up	15	1	2018
2	U Launcher Lite – FREE Live Cool Themes, Hide ...	ART_AND DESIGN	4.7	87510	8.7	5000000	Free	0.0	Everyone	Art & Design	2018-08-01	1.2.4	4.0.3 and up	1	8	2018
3	Sketch - Draw & Paint	ART_AND DESIGN	4.5	215644	25.0	50000000	Free	0.0	Teen	Art & Design	2018-06-08	Varies with device	4.2 and up	8	6	2018
4	Pixel Draw - Number Art Coloring Book	ART_AND DESIGN	4.3	967	2.8	100000	Free	0.0	Everyone	Art & Design;Creativity	2018-06-20	1.1	4.4 and up	20	6	2018

In [331...]

```
df3=df.groupby(['App'])['Reviews'].sum().sort_values(ascending=False).reset_index(drop=False).head(5)
df3=pd.DataFrame(df3)
df3
```

Out[331]:

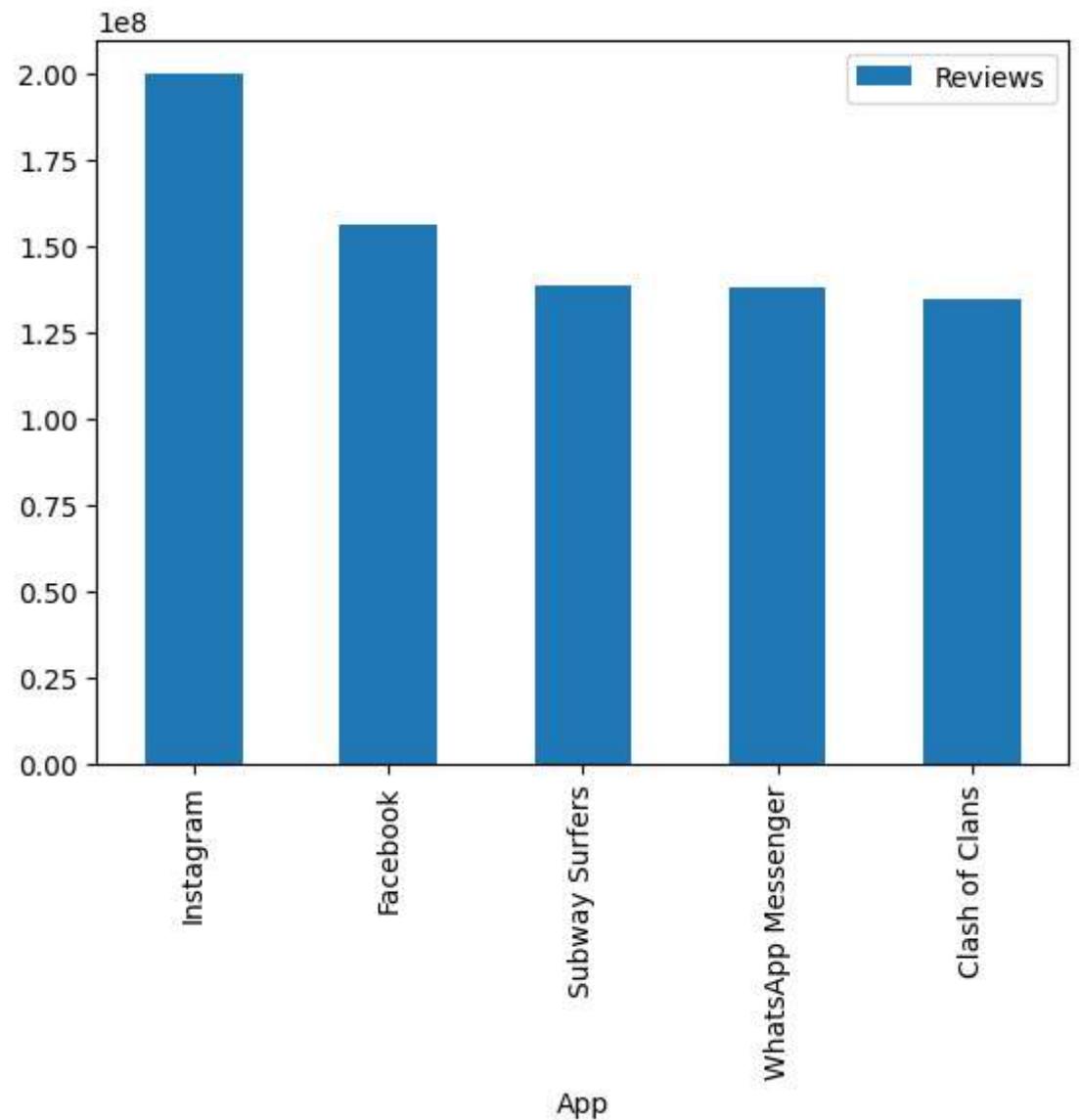
	App	Reviews
0	Instagram	199664676
1	Facebook	156286514
2	Subway Surfers	138606606
3	WhatsApp Messenger	138228988
4	Clash of Clans	134667058

In [334...]

```
df3.plot(kind='bar',x="App")
```

Out[334]:

<AxesSubplot: xlabel='App'>



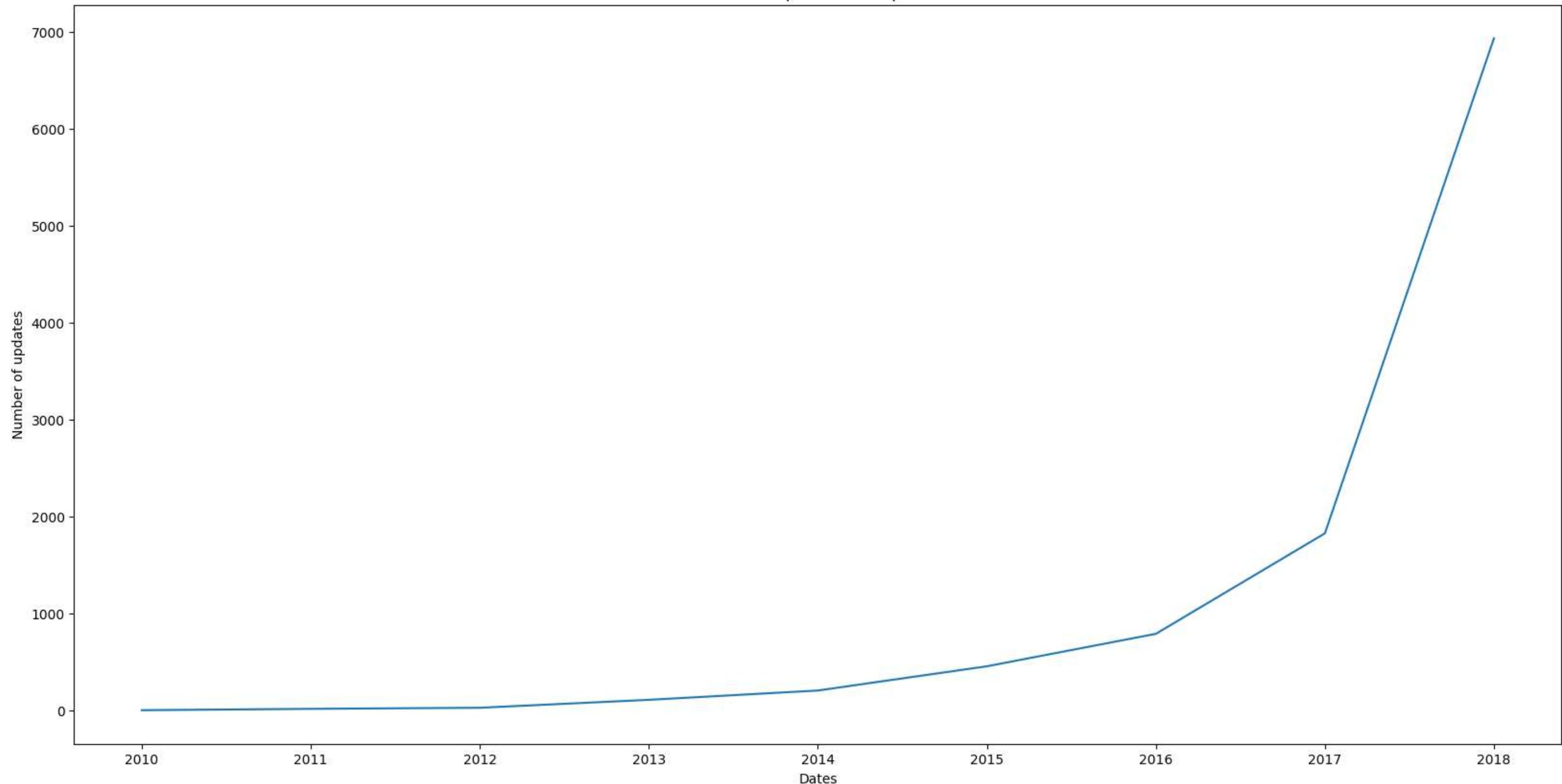
```
In [ ]: '''Insights  
Instagram has highest Reveiws  
Its reveiw is 199664676'''
```

Time series plot of last update

```
In [336]:  
plt.subplots(figsize=(20,10))  
freq= pd.Series()  
freq=df['Year'].value_counts()  
freq.plot()  
plt.xlabel("Dates")  
plt.ylabel("Number of updates")  
plt.title("Time series plot of Last Updates")
```

```
Out[336]: Text(0.5, 1.0, 'Time series plot of Last Updates')
```

Time series plot of Last Updates



In []:

```
"""Insights  
After 2012 , with year number of updates are also increasing"""
```

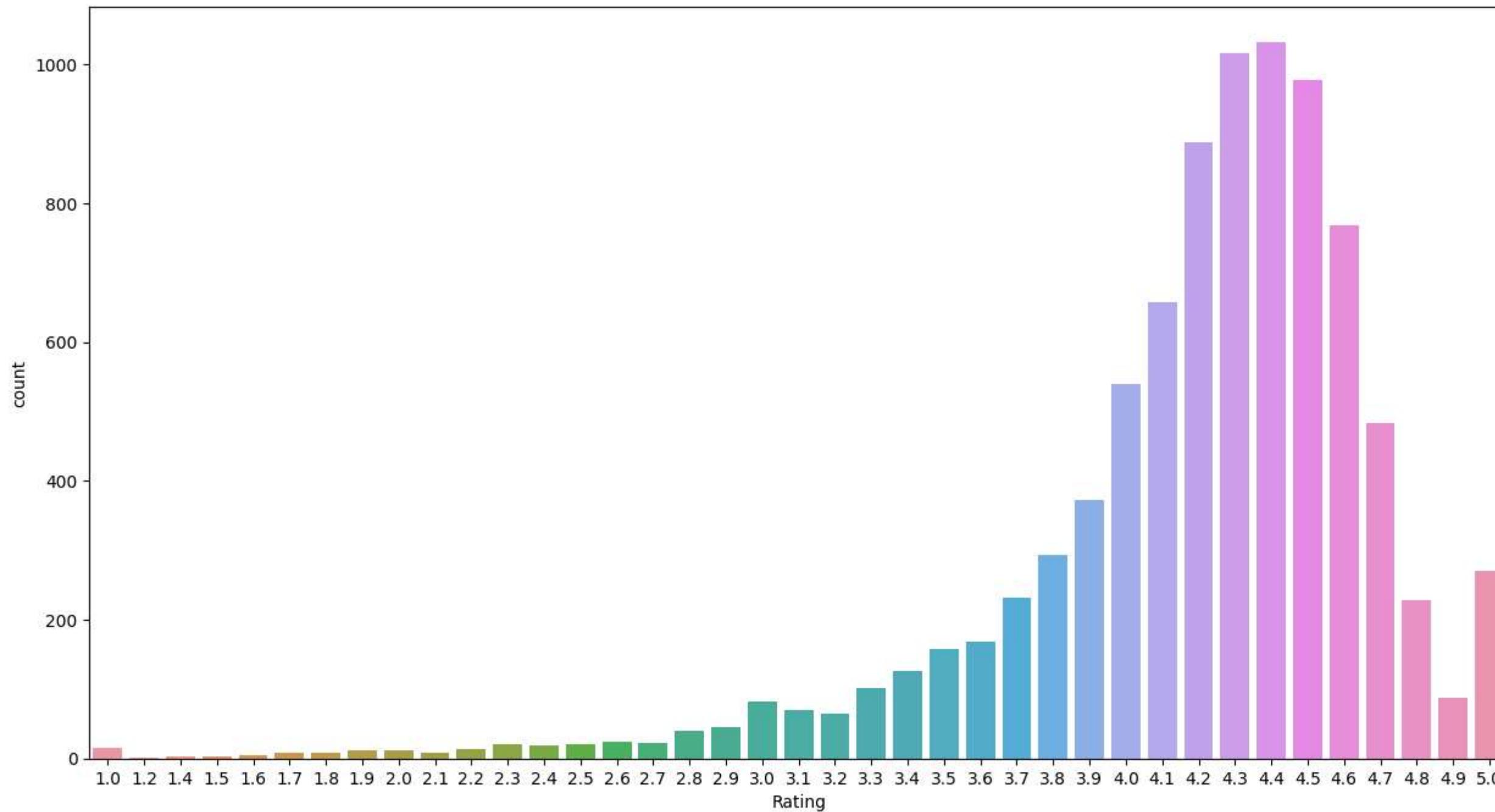
Distribution of Rating

In [340]:

```
plt.figure(figsize=(15,8))  
sns.countplot(data=df,x='Rating')
```

Out[340]:

```
<AxesSubplot: xlabel='Rating', ylabel='count'>
```



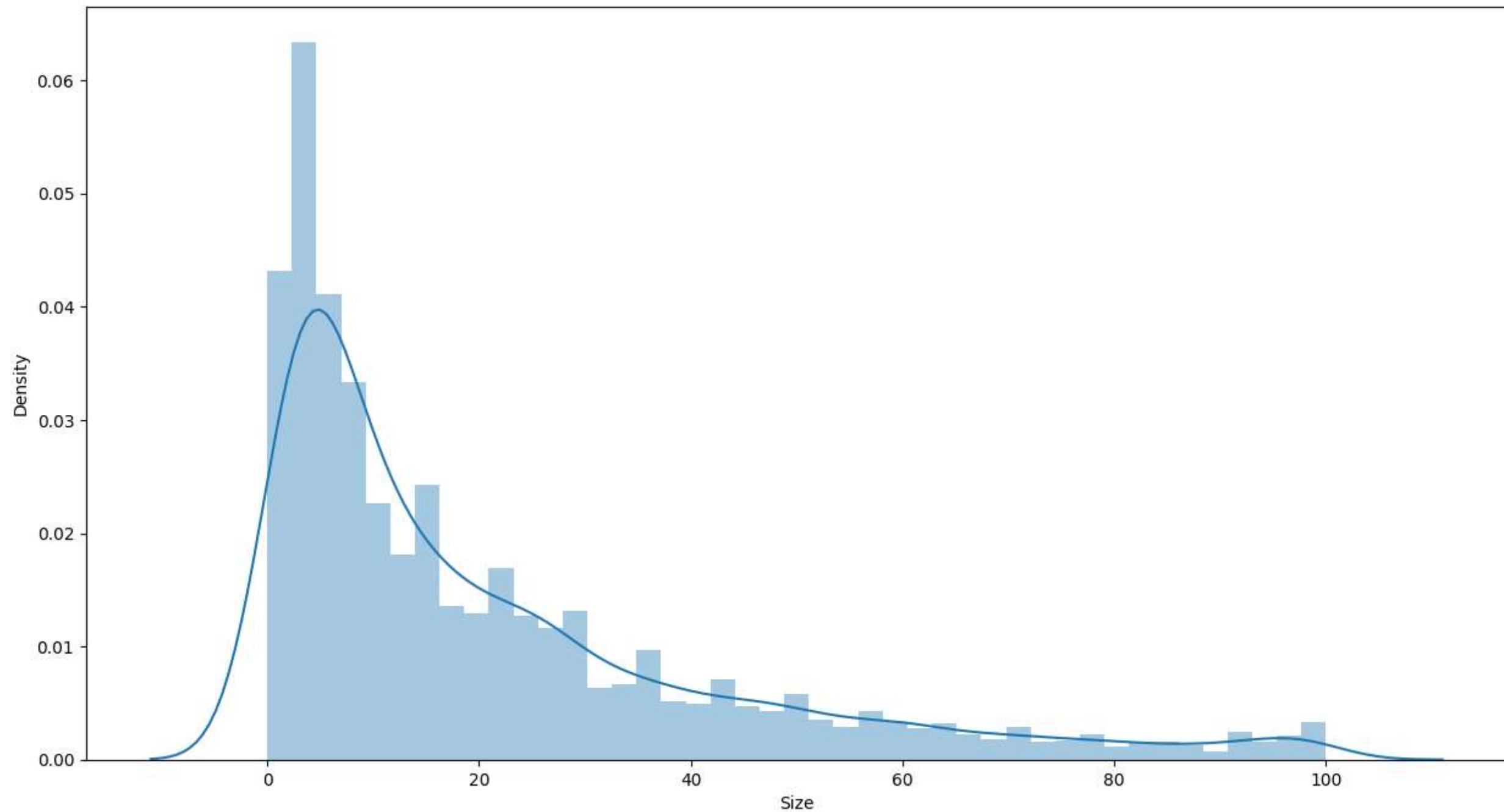
Distribution of App Size

In [346...]

```
plt.figure(figsize=(15,8))
sns.distplot(df['Size'])
```

Out[346]:

```
<AxesSubplot: xlabel='Size', ylabel='Density'>
```



```
In [355...]  
percentage_of_apps_below_4rating=(len(df[df['Rating']<=4])/len(df[df['Rating']>4]))*100  
percentage_of_apps_below_4rating
```

```
Out[355]: 38.764044943820224
```

```
In [359...]  
percentage_of_apps_above_4rating=100-percentage_of_apps_below_4rating  
percentage_of_apps_above_4rating
```

```
Out[359]: 61.235955056179776
```

Do expensive apps have higher rating?

```
In [368]: df[df['Type']=='Paid']['Rating'].mean()
```

```
Out[368]: 4.261500815660685
```

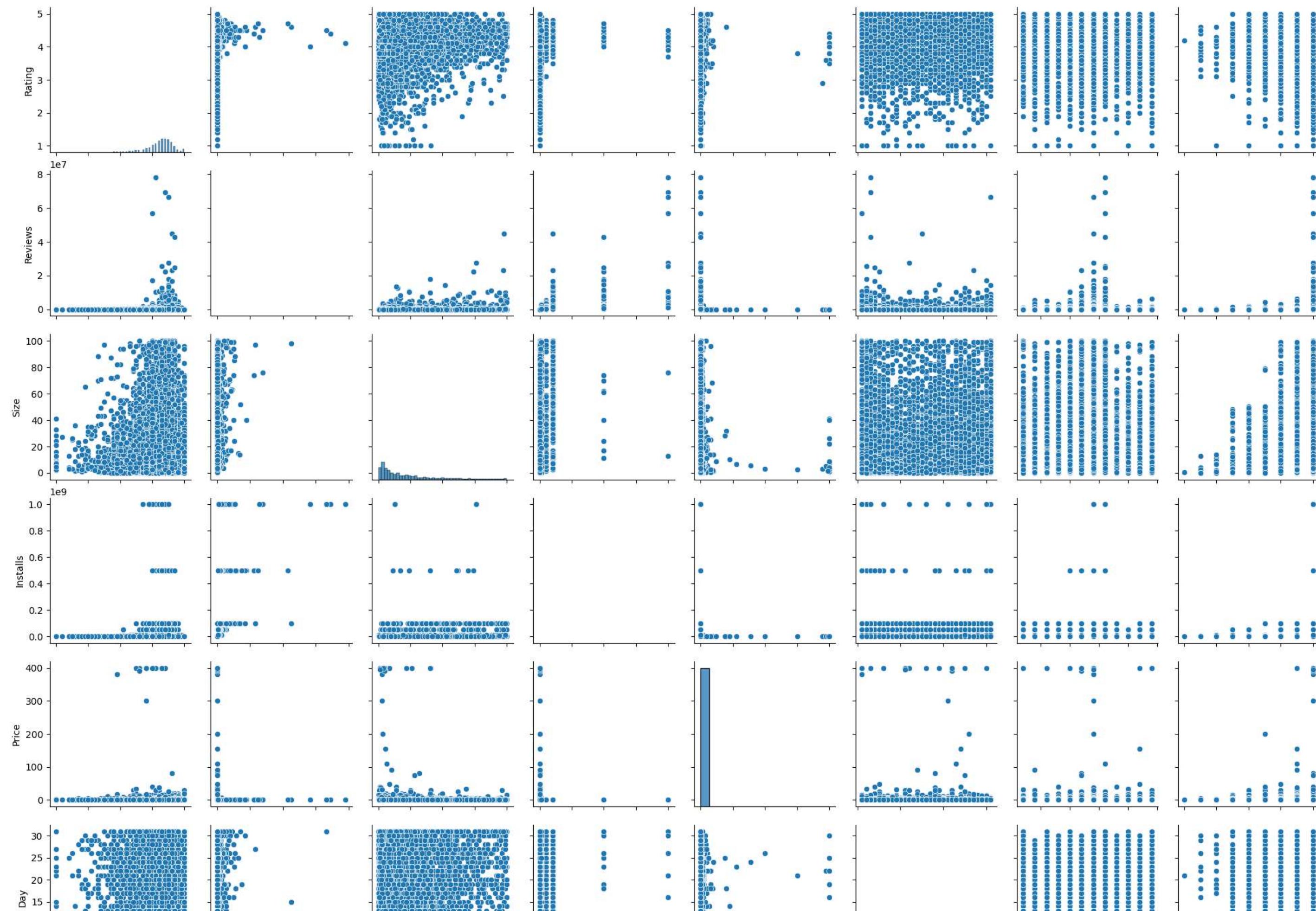
```
In [369]: df['Rating'].mean()
```

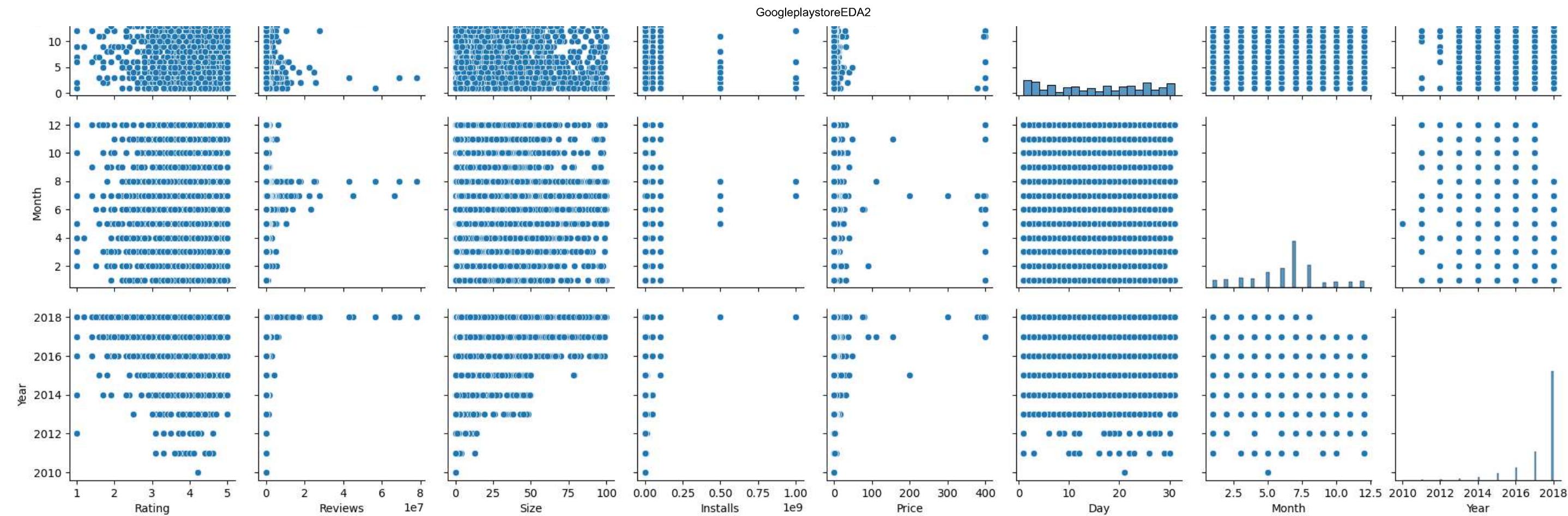
```
Out[369]: 4.187876743139902
```

```
In [ ]:  
#Insights  
#From this plot we can see a slight positive trend between price and rating: apps with higher prices tends to be slightly higher rated.
```

```
In [370]: sns.pairplot(df)
```

```
Out[370]: <seaborn.axisgrid.PairGrid at 0x1c23ae3bfa0>
```





In []:

```
'''Conclusions:
The higher the rating, more people will be inclined to download the app.
Better the Reviews more are the chances for the app to be downloaded by more people.
People are always inclined to download apps that are free of cost.
Apps that falls under the Content Rating, 'Everyone', 'Teens' and 'Everyone 10+' has the highest chance to be downloaded.
The apps with smaller sizes have more chance to be downloaded.
Subway surfer is the most downloaded app followed by Instagram, Hangouts and Google Drive
92.6% of the apps in the app store are free.'''
```