

# EDA ON GOOGLE PLAY STORE DATASET

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In [49]:

```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline-
```

In [2]:

```
google_data=pd.read_excel('C:\\Users\\astha\\OneDrive\\Desktop\\Task1 data set.xlsx')
```

```
C:\Users\astha\anaconda3\lib\site-packages\openpyxl\worksheet\_reader.py:2
11: UserWarning: Cell L8294 is marked as a date but the serial value -1219
151744 is outside the limits for dates. The cell will be treated as an err
or.
    warn(msg)
```

In [3]:

```
google_data.head(10)
```

Out[3]:

	App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating
0	Photo Editor & Candy Camera & Grid & ScrapBook	ART_AND_DESIGN	4.1	159	19M	10,000+	Free	0	Everyone
1	Coloring book moana	ART_AND_DESIGN	3.9	967	14M	500,000+	Free	0	Everyone
2	U Launcher Lite – FREE Live Cool Themes, Hide ...	ART_AND_DESIGN	4.7	87510	8.7M	5,000,000+	Free	0	Everyone
3	Sketch - Draw & Paint	ART_AND_DESIGN	4.5	215644	25M	50,000,000+	Free	0	Teen
4	Pixel Draw - Number Art Coloring Book	ART_AND_DESIGN	4.3	967	2.8M	100,000+	Free	0	Everyone
5	Paper flowers instructions	ART_AND_DESIGN	4.4	167	5.6M	50,000+	Free	0	Everyone
6	Smoke Effect Photo Maker - Smoke Editor	ART_AND_DESIGN	3.8	178	19M	50,000+	Free	0	Everyone
7	Infinite Painter	ART_AND_DESIGN	4.1	36815	29M	1,000,000+	Free	0	Everyone
8	Garden Coloring Book	ART_AND_DESIGN	4.4	13791	33M	1,000,000+	Free	0	Everyone
9	Kids Paint Free - Drawing Fun	ART_AND_DESIGN	4.7	121	3.1M	10,000+	Free	0	Everyone

In [4]:

```
google_data.tail(10)
```

Out[4]:

	App	Category	Rating	Reviews	Size	Insta
10831	payemonstationnement.fr	MAPS_AND_NAVIGATION	NaN	38	9.8M	5,00
10832	FR Tides	WEATHER	3.8	1195	582k	100,00
10833	Chemin (fr)	BOOKS_AND_REFERENCE	4.8	44	619k	1,00
10834	FR Calculator	FAMILY	4.0	7	2.6M	50
10835	FR Forms	BUSINESS	NaN	0	9.6M	1
10836	Sya9a Maroc - FR	FAMILY	4.5	38	53M	5,00
10837	Fr. Mike Schmitz Audio Teachings	FAMILY	5.0	4	3.6M	10
10838	Parkinson Exercices FR	MEDICAL	NaN	3	9.5M	1,00
10839	The SCP Foundation DB fr nn5n	BOOKS_AND_REFERENCE	4.5	114	Varies with device	1,00
10840	iHoroscope - 2018 Daily Horoscope & Astrology	LIFESTYLE	4.5	398307	19M	10,000,00

In [5]:

```
google_data.shape
```

Out[5]:

(10841, 13)

In [6]:

```
google_data.describe()
```

Out[6]:

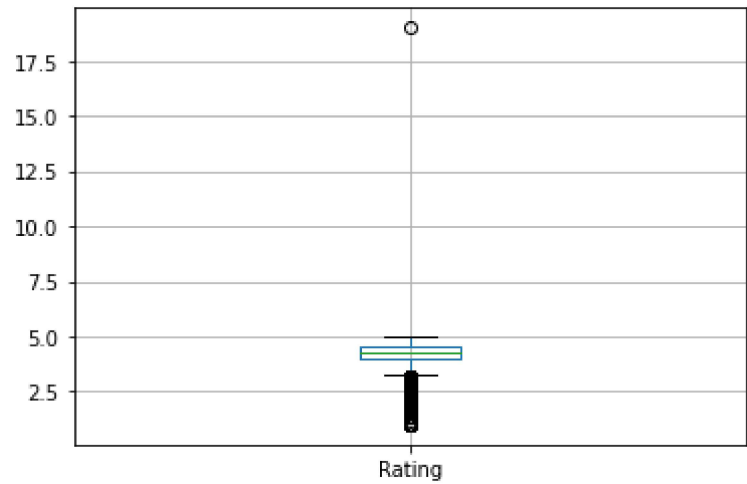
	Rating
count	9367.000000
mean	4.193338
std	0.537431
min	1.000000
25%	4.000000
50%	4.300000
75%	4.500000
max	19.000000

In [7]:

```
google_data.boxplot()
```

Out[7]:

<AxesSubplot:>

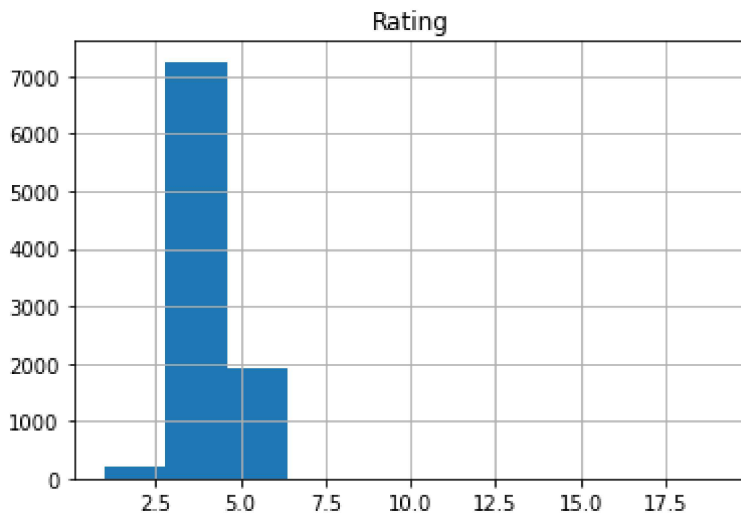


In [8]:

```
google_data.hist()
```

Out[8]:

```
array([[<AxesSubplot:title={'center':'Rating'}>]], dtype=object)
```



In [9]:

```
google_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10841 entries, 0 to 10840
Data columns (total 13 columns):
 #   Column                Non-Null Count  Dtype  
---  -
 0   App                   10839 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           10832 non-null  object  
12   Android Ver           10838 non-null  object  
dtypes: float64(1), object(12)
memory usage: 1.1+ MB
```

# FINDING THE NULL VALUE

In [10]:

```
google_data.isnull()
```

Out[10]:

	App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	Genres	Upd
0	False	False	False	False	False	False	False	False	False	False	F
1	False	False	False	False	False	False	False	False	False	False	F
2	False	False	False	False	False	False	False	False	False	False	F
3	False	False	False	False	False	False	False	False	False	False	F
4	False	False	False	False	False	False	False	False	False	False	F
...	...	...	...	...	...	...	...	...	...	...	
10836	False	False	False	False	False	False	False	False	False	False	F
10837	False	False	False	False	False	False	False	False	False	False	F
10838	False	False	True	False	False	False	False	False	False	False	F
10839	False	False	False	False	False	False	False	False	False	False	F
10840	False	False	False	False	False	False	False	False	False	False	F

10841 rows × 13 columns

# COUNT THE NO OF MISSING VALUE

In [11]:

```
google_data.isnull().sum()
```

Out[11]:

App	2
Category	0
Rating	1474
Reviews	0
Size	0
Installs	0
Type	1
Price	0
Content Rating	1
Genres	0
Last Updated	0
Current Ver	9
Android Ver	3
dtype:	int64

CHECKING RATING

In [12]:

```
google_data[google_data.Rating > 5]
```

Out[12]:

	App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating	
10472	Life Made WI-Fi Touchscreen Photo Frame		1.9	19.0	3.0M	1,000+	Free	0	Everyone	NaN

In [13]:

```
google_data.drop([10472],inplace=True)
```

In [14]:

```
google_data[10470:10477]
```

Out[14]:

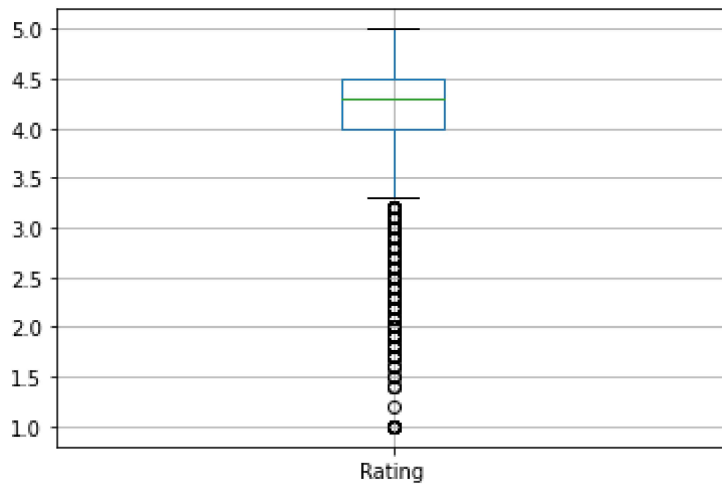
	App	Category	Rating	Reviews	Size	Installs	Type	Price	Con Ra
10470	Jazz Wi-Fi	COMMUNICATION	3.4	49	4.0M	10,000+	Free	0	Every
10471	Xposed Wi-Fi-Pwd	PERSONALIZATION	3.5	1042	404k	100,000+	Free	0	Every
10473	osmino Wi-Fi: free WiFi	TOOLS	4.2	134203	4.1M	10,000,000+	Free	0	Every
10474	Sat-Fi Voice	COMMUNICATION	3.4	37	14M	1,000+	Free	0	Every
10475	Wi-Fi Visualizer	TOOLS	3.9	132	2.6M	50,000+	Free	0	Every
10476	Lennox iComfort Wi-Fi	LIFESTYLE	3.0	552	7.6M	50,000+	Free	0	Every
10477	Sci-Fi Sounds and Ringtones	PERSONALIZATION	3.6	128	11M	10,000+	Free	0	Every

In [15]:

```
google_data.boxplot()
```

Out[15]:

<AxesSubplot:>

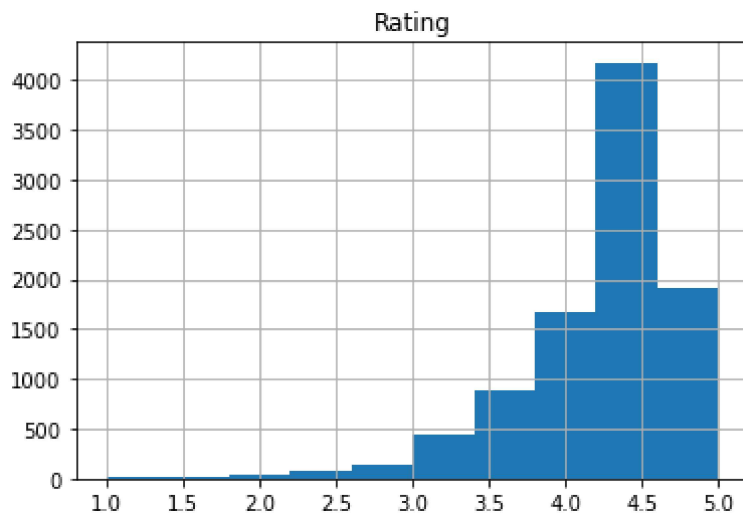


In [16]:

```
google_data.hist()
```

Out[16]:

array([[<AxesSubplot:title={'center':'Rating'}>]], dtype=object)



## FILL THE NULL VALUE WITH APPORPRIATE VALUE USING AGGRIATE FUNCTION SUCH AS MEAN MEDIAN MODE

In [17]:

```
def impute_median(series):  
    return series.fillna(series .median())
```



In [18]:

```
google_data.Rating=google_data["Rating"].transform(impute_median)
```

In [19]:

```
## Count the no of null value in each column
```

```
google_data.isnull().sum()
```

Out[19]:

```
App                2
Category           0
Rating             0
Reviews            0
Size               0
Installs           0
Type               1
Price              0
Content Rating     0
Genres             0
Last Updated       0
Current Ver        9
Android Ver        2
dtype: int64
```

In [22]:

```
## Mode of categoriocal value
```

```
print(google_data["Type"].mode())
print(google_data["Current Ver"].mode())
print(google_data["Android Ver"].mode())
```

```
0    Free
dtype: object
0    Varies with device
dtype: object
0    4.1 and up
dtype: object
```

In [25]:

```
## Fill the mising catogrical value with modes
```

```
google_data["Type"].fillna(str(google_data["Type"].mode().values[0]),inplace=True)
google_data["Current Ver"].fillna(str(google_data["Current Ver"].mode().values[0]),inpla
google_data["Android Ver"].fillna(str(google_data["Android Ver"].mode().values[0]),inpla
```

In [27]:

```
google_data.isnull().sum()
```

Out[27]:

```
App                2
Category           0
Rating             0
Reviews            0
Size               0
Installs           0
Type               0
Price              0
Content Rating     0
Genres             0
Last Updated       0
Current Ver        0
Android Ver        0
dtype: int64
```

In [37]:

```
## Lets converts price,review. and rating into numerical values
```

```
google_data["Price"]=google_data["Price"].apply(lambda x : str(x).replace('$',''))if '$'i
google_data["Price"]=google_data["Price"].apply(lambda x : float(x))
google_data['Reviews']=pd.to_numeric(google_data['Reviews'],errors='coerce')
```

In [39]:

```
google_data['Installs']=google_data['Installs'].apply(lambda x:str(x).replace('+',''))if
google_data['Installs']=google_data['Installs'].apply(lambda x:str(x).replace(',',''))if
google_data['Installs']=google_data['Installs'].apply(lambda x:float(x))
```

In [40]:

```
google_data.head(10)
```

Out[40]:

	App	Category	Rating	Reviews	Size	Installs	Type	Price	Content Rating
0	Photo Editor & Candy Camera & Grid & ScrapBook	ART_AND_DESIGN	4.1	159	19M	10000.0	Free	0.0	Everyone
1	Coloring book moana	ART_AND_DESIGN	3.9	967	14M	500000.0	Free	0.0	Everyone
2	U Launcher Lite – FREE Live Cool Themes, Hide ...	ART_AND_DESIGN	4.7	87510	8.7M	5000000.0	Free	0.0	Everyone
3	Sketch - Draw & Paint	ART_AND_DESIGN	4.5	215644	25M	50000000.0	Free	0.0	Teen
4	Pixel Draw - Number Art Coloring Book	ART_AND_DESIGN	4.3	967	2.8M	100000.0	Free	0.0	Everyone
5	Paper flowers instructions	ART_AND_DESIGN	4.4	167	5.6M	50000.0	Free	0.0	Everyone
6	Smoke Effect Photo Maker - Smoke Editor	ART_AND_DESIGN	3.8	178	19M	50000.0	Free	0.0	Everyone
7	Infinite Painter	ART_AND_DESIGN	4.1	36815	29M	1000000.0	Free	0.0	Everyone
8	Garden Coloring Book	ART_AND_DESIGN	4.4	13791	33M	1000000.0	Free	0.0	Everyone
9	Kids Paint Free - Drawing Fun	ART_AND_DESIGN	4.7	121	3.1M	10000.0	Free	0.0	Everyone

In [42]:

```
google_data.describe()
```

Out[42]:

	Rating	Reviews	Installs	Price
count	10840.000000	1.084000e+04	1.084000e+04	10840.000000
mean	4.206476	4.441529e+05	1.546434e+07	1.027368
std	0.480342	2.927761e+06	8.502936e+07	15.949703
min	1.000000	0.000000e+00	0.000000e+00	0.000000
25%	4.100000	3.800000e+01	1.000000e+03	0.000000
50%	4.300000	2.094000e+03	1.000000e+05	0.000000
75%	4.500000	5.477550e+04	5.000000e+06	0.000000
max	5.000000	7.815831e+07	1.000000e+09	400.000000

In [47]:

```
## DATA VISUALIZATION
grp=google_data.groupby('Category')
x=grp['Rating'].agg(np.mean)
y=grp['Price'].agg(np.sum)
z=grp['Reviews'].agg(np.mean)
print(x)
print(y)
print(z)
```

Category	
ART_AND_DESIGN	4.355385
AUTO_AND_VEHICLES	4.205882
BEAUTY	4.283019
BOOKS_AND_REFERENCE	4.335498
BUSINESS	4.182391
COMICS	4.160000
COMMUNICATION	4.180103
DATING	4.025641
EDUCATION	4.388462
ENTERTAINMENT	4.126174
EVENTS	4.395313
FAMILY	4.204564
FINANCE	4.151639
FOOD_AND_DRINK	4.185827
GAME	4.286888
HEALTH_AND_FITNESS	4.280059
HOUSE_AND_HOME	4.211364
LIBRARIES_AND_DEMO	4.207059
LIFESTYLE	4.131414
MAPS_AND_NAVIGATION	4.075182
MEDICAL	4.216199
NEWS_AND_MAGAZINES	4.161837
PARENTING	4.300000
PERSONALIZATION	4.328827
PHOTOGRAPHY	4.197910
PRODUCTIVITY	4.226651
SHOPPING	4.263077
SOCIAL	4.261017
SPORTS	4.236458
TOOLS	4.080071
TRAVEL_AND_LOCAL	4.132946
VIDEO_PLAYERS	4.084000
WEATHER	4.248780

Name: Rating, dtype: float64

Category	
ART_AND_DESIGN	5.97
AUTO_AND_VEHICLES	13.47
BEAUTY	0.00
BOOKS_AND_REFERENCE	119.77
BUSINESS	185.27
COMICS	0.00
COMMUNICATION	83.14
DATING	31.43
EDUCATION	17.96
ENTERTAINMENT	7.98
EVENTS	109.99
FAMILY	2434.78
FINANCE	2900.83
FOOD_AND_DRINK	8.48
GAME	287.30
HEALTH_AND_FITNESS	67.34
HOUSE_AND_HOME	0.00
LIBRARIES_AND_DEMO	0.99
LIFESTYLE	2360.87
MAPS_AND_NAVIGATION	26.95
MEDICAL	1439.96
NEWS_AND_MAGAZINES	3.98
PARENTING	9.58
PERSONALIZATION	153.96
PHOTOGRAPHY	134.21

PRODUCTIVITY	250.93
SHOPPING	5.48
SOCIAL	15.97
SPORTS	100.00
TOOLS	267.25
TRAVEL_AND_LOCAL	49.95
VIDEO_PLAYERS	10.46
WEATHER	32.42

Name: Price, dtype: float64

Category

ART_AND_DESIGN	2.637600e+04
AUTO_AND_VEHICLES	1.369019e+04
BEAUTY	7.476226e+03
BOOKS_AND_REFERENCE	9.506090e+04
BUSINESS	3.033598e+04
COMICS	5.638793e+04
COMMUNICATION	2.107138e+06
DATING	3.115931e+04
EDUCATION	2.538191e+05
ENTERTAINMENT	3.971688e+05
EVENTS	2.515906e+03
FAMILY	2.080255e+05
FINANCE	4.795281e+04
FOOD_AND_DRINK	6.994748e+04
GAME	1.385859e+06
HEALTH_AND_FITNESS	1.111253e+05
HOUSE_AND_HOME	4.518619e+04
LIBRARIES_AND_DEMO	1.220139e+04
LIFESTYLE	3.372457e+04
MAPS_AND_NAVIGATION	2.237902e+05
MEDICAL	3.425432e+03
NEWS_AND_MAGAZINES	1.922292e+05
PARENTING	1.597218e+04
PERSONALIZATION	2.279238e+05
PHOTOGRAPHY	6.373631e+05
PRODUCTIVITY	2.691438e+05
SHOPPING	4.424662e+05
SOCIAL	2.105903e+06
SPORTS	1.844536e+05
TOOLS	3.240629e+05
TRAVEL_AND_LOCAL	2.427051e+05
VIDEO_PLAYERS	6.307439e+05
WEATHER	1.781065e+05

Name: Reviews, dtype: float64

In [52]:

```
plt.figure(figsize=(12,5))  
plt.plot(x, 'ro')  
plt.xticks(rotation=90)  
plt.show()
```

