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ФАКУЛЬТЕТ «Радиотехнический»

КАФЕДРА ИУ-5 «Системы обработки информации и управления»

Рубежный контроль по курсу

Технологии машинного обучения

Тема работы: "Технологии разведочного анализа и обработки данных."

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Подпись: _____

Проверил:

Дата проверки: «__» _____ 2021 г.

Подпись: _____

Москва, 2021 г.

In [75]:
```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
sns.set(style="ticks")
```

In [76]:
```
data = pd.read_csv('googleplaystore.csv', sep = ",")
```

In [77]:
```
data.shape
```

Out[77]:
```
(10841, 13)
```

In [78]:
```
data.dtypes
```

Out[78]:
```
App               object
Category          object
Rating           float64
Reviews           object
Size              object
Installs          object
Type              object
Price             object
Content Rating    object
Genres            object
Last Updated      object
Current Ver       object
Android Ver       object
dtype: object
```

Как мы можем видеть, все значения кроме рейтинга являются объектами, хотя не должны (из-за миллионов в виде буквы M, запятых, разделяющих тысячи и плюсов в загрузках), что мы должны преобразовать.

In [79]:
```
data.isnull().sum()
```

Out[79]:
```
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
```

In [80]:
```
for i in range(len(data['Reviews'])):
    if data['Reviews'][i][-1] == 'M':
        print(data['Reviews'][i])
        data['Reviews'][i] = str(int(float(data['Reviews'][i][0:-1])) * 1000000)
        print(data['Reviews'][i])

3.0M
3000000
<ipython-input-80-f4e0b22d392a>:4: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  data['Reviews'][i] = str(int(float(data['Reviews'][i][0:-1])) * 1000000)
```

In [81]:
```
data['Reviews'] = data['Reviews'].astype(str).astype(int)
```

In [82]:
```
for i in range(len(data['Installs'])):
    if(data['Installs'][i] == 'Free'):
        data['Installs'][i] = 0
        continue
    data['Installs'][i] = data['Installs'][i].replace(",", "")
    data['Installs'][i] = data['Installs'][i].replace("+", "")
    data['Installs'][i] = str(int(float(data['Installs'][i])))
```

```
<ipython-input-82-9c6f0fc030bc>:5: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  data['Installs'][i] = data['Installs'][i].replace(",", "")
<ipython-input-82-9c6f0fc030bc>:6: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  data['Installs'][i] = data['Installs'][i].replace("+", "")
<ipython-input-82-9c6f0fc030bc>:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  data['Installs'][i] = str(int(float(data['Installs'][i])))
<ipython-input-82-9c6f0fc030bc>:3: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  data['Installs'][i] = 0
```

In [83]:
```
data['Installs'] = data['Installs'].astype(str).astype(int)
```

In [84]:
```
data.dtypes
```

Out[84]:
```
App               object
Category          object
Rating           float64
Reviews            int64
Size              object
Installs           int64
Type              object
Price             object
Content Rating    object
Genres            object
Last Updated      object
Current Ver       object
Android Ver       object
dtype: object
```

In [85]:
```
data.head()
```

Out[85]:

	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	10000	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	500000	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	5000000	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	50000000	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	100000	Free	0	Everyone	Art & Design;Creativity	June 20, 2018	1.1	4.4 and up

In [86]:
```
data.describe()
```

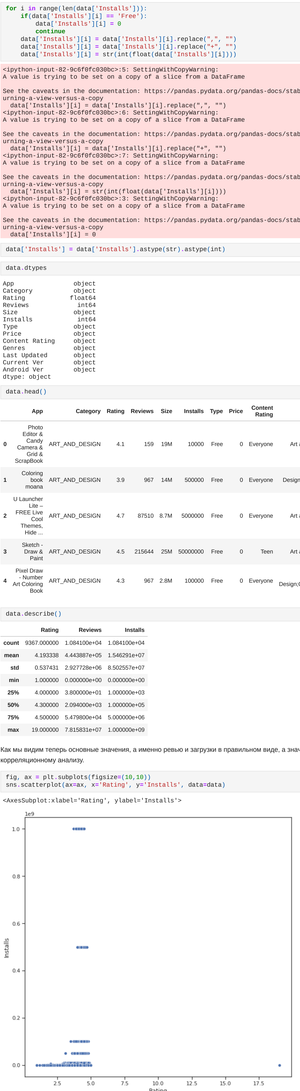
Out[86]:

	Rating	Reviews	Installs
count	9367.000000	1.084100e+04	1.084100e+04
mean	4.193338	4.443887e+05	1.546291e+07
std	0.537431	2.927728e+06	8.502557e+07
min	1.000000	0.000000e+00	0.000000e+00
25%	4.000000	3.800000e+01	1.000000e+03
50%	4.300000	2.094000e+03	1.000000e+05
75%	4.500000	5.479800e+04	5.000000e+06
max	19.000000	7.815831e+07	1.000000e+09

Как мы видим теперь основные значения, а именно ревью и загрузки в правильном виде, а значит можем перейти к корреляционному анализу.

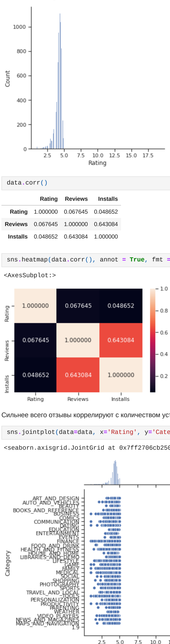
In [87]:
```
fig, ax = plt.subplots(figsize=(10,10))
sns.scatterplot(ax=ax, x='Rating', y='Installs', data=data)
```

Out[87]:
```
<AxesSubplot:xlabel='Rating', ylabel='Installs'>
```



In [88]:
```
sns.displot(data['Rating'])
```

Out[88]:
```
<seaborn.axisgrid.FacetGrid at 0x7ff28c6a9490>
```



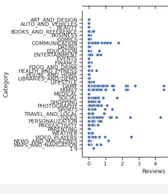
In [89]:
```
data.corr()
```

Out[89]:

	Rating	Reviews	Installs
Rating	1.000000	0.067645	0.048652
Reviews	0.067645	1.000000	0.643084
Installs	0.048652	0.643084	1.000000

In [90]:
```
sns.heatmap(data.corr(), annot = True, fmt = '.6f')
```

Out[90]:
```
<AxesSubplot:>
```



Сильнее всего отзывы коррелируют с количеством установок, при этом рейтинг не коррелирует практически ни с чем.

In [91]:
```
sns.jointplot(data=data, x='Rating', y='Category')
```

Out[91]:
```
<seaborn.axisgrid.JointGrid at 0x7ff2706cb250>
```


In [92]:
```
sns.jointplot(data=data, x='Reviews', y='Category')
```

Out[92]:
```
<seaborn.axisgrid.JointGrid at 0x7ff26f8a06d0>
```


In [ ]:
```
```