praveenk-chintatejdeepreddy-report

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[ ]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
sns.set()
```

[3]:
```
df = pd.read_csv(r"C:
↪\Users\Praveen\Desktop\ASSIGNMENTSEM-III\DS\ACTUAL\Mobile_Recommendation_System-main\mainDa
↪csv",encoding = "ISO-8859-1")
```

[4]:
```
print(df.shape)
```

```
(961, 15)
```

[5]:
```
print(df)
```

```
                                                 Name  Rating Price Rs  RAM Gb  \
0             Realme Narzo 20 (Victory Blue, 128 GB)     4.5   11,499       4
1              Realme Narzo 20 (Victory Blue, 64 GB)     4.5   10,499       4
2             Realme Narzo 20 (Glory Sliver, 128 GB)     4.5   11,499       4
3              Realme Narzo 20 (Glory Sliver, 64 GB)     4.5   10,499       4
4                       POCO M2 (Pitch Black, 64 GB)     4.4   10,999       6
..                                                ...     ...      ...     ...
956                  Vivo U20 (Racing Black, 64 GB)     4.4   14,499       4
957  Samsung Galaxy S7 Edge (Silver Titanium, 32 GB)     4.4   41,900       4
958              Asus Zenfone 2 Laser (Black, 16 GB)     4.1   12,999       3
959                          Homtom H5 (Gold, 32 GB)     3.5    6,499       3
960                   LG G7 ThinQ (Platinum, 64 GB)     4.4   53,000       4

     ROM Gb  Expandable GB  Size Cm  Size Inch  R1 Cam MP  R2 Cam MP  \
0       128          256.0    16.56       6.52       48.0        8.0
1        64          256.0    16.56       6.52       48.0        8.0
2       128          256.0    16.56       6.52       48.0        8.0
3        64          256.0    16.56       6.52       48.0        8.0
4        64          512.0    16.59       6.53       13.0        8.0
..      ...            ...      ...        ...        ...        ...
```

```
956      64            NaN    16.59       6.53       16.0        NaN
957      32          200.0    13.97       5.50       12.0        NaN
958      16          128.0    13.97       5.50       13.0        NaN
959      32            NaN    13.97       5.50       16.0        NaN
960      64            2.0    15.49       6.10       16.0       16.0

    R3 Cam MP  R4 Cam MP  Battery Mah  \
0           2        NaN         6000
1           2        NaN         6000
2           2        NaN         6000
3           2        NaN         6000
4           5        2.0         5000
..        …        …           …
956       NaN        NaN         5000
957       NaN        NaN         3600
958       NaN        NaN         3000
959       NaN        NaN         3300
960       NaN        NaN         3000

                                          Processor  \
0                        MediaTek Helio G85 Processor
1                        MediaTek Helio G85 Processor
2                        MediaTek Helio G85 Processor
3                        MediaTek Helio G85 Processor
4                        MediaTek Helio G80 Processor
..                                                 …
956                  Qualcomm Snapdragon 665 Processor
957                               Exynos 8890 Processor
958  Qualcomm Snapdragon 615 Octa Core 1.5GHz Proce…
959                                 Quadcore Processor
960                  Qualcomm Snapdragon 845 Processor

                                                 Image
0    https://rukminim1.flixcart.com/image/312/312/k…
1    https://rukminim1.flixcart.com/image/312/312/k…
2    https://rukminim1.flixcart.com/image/312/312/k…
3    https://rukminim1.flixcart.com/image/312/312/k…
4    https://rukminim1.flixcart.com/image/312/312/k…
..                                                 …
956  https://img1a.flixcart.com/www/linchpin/fk-cp-…
957  https://img1a.flixcart.com/www/linchpin/fk-cp-…
958  https://img1a.flixcart.com/www/linchpin/fk-cp-…
959  https://img1a.flixcart.com/www/linchpin/fk-cp-…
960  https://img1a.flixcart.com/www/linchpin/fk-cp-…

[961 rows x 15 columns]
```

[6]:
```
df.head()
```

[6]:

	Name	Rating	Price Rs	RAM Gb	ROM Gb
0	Realme Narzo 20 (Victory Blue, 128 GB)	4.5	11,499	4	128
1	Realme Narzo 20 (Victory Blue, 64 GB)	4.5	10,499	4	64
2	Realme Narzo 20 (Glory Sliver, 128 GB)	4.5	11,499	4	128
3	Realme Narzo 20 (Glory Sliver, 64 GB)	4.5	10,499	4	64
4	POCO M2 (Pitch Black, 64 GB)	4.4	10,999	6	64

	Expandable GB	Size Cm	Size Inch	R1 Cam MP	R2 Cam MP	R3 Cam MP
0	256.0	16.56	6.52	48.0	8.0	2
1	256.0	16.56	6.52	48.0	8.0	2
2	256.0	16.56	6.52	48.0	8.0	2
3	256.0	16.56	6.52	48.0	8.0	2
4	512.0	16.59	6.53	13.0	8.0	5

	R4 Cam MP	Battery Mah	Processor
0	NaN	6000	MediaTek Helio G85 Processor
1	NaN	6000	MediaTek Helio G85 Processor
2	NaN	6000	MediaTek Helio G85 Processor
3	NaN	6000	MediaTek Helio G85 Processor
4	2.0	5000	MediaTek Helio G80 Processor

	Image
0	https://rukminim1.flixcart.com/image/312/312/k…
1	https://rukminim1.flixcart.com/image/312/312/k…
2	https://rukminim1.flixcart.com/image/312/312/k…
3	https://rukminim1.flixcart.com/image/312/312/k…
4	https://rukminim1.flixcart.com/image/312/312/k…

[7]:
```
df.describe()
```

[7]:

	Rating	RAM Gb	ROM Gb	Expandable GB	Size Cm
count	936.000000	961.000000	961.000000	715.000000	961.000000
mean	4.227137	4.500520	78.817898	298.641958	15.682352
std	0.368420	2.094201	65.408979	151.091947	1.162916
min	2.300000	2.000000	16.000000	1.000000	12.700000
25%	4.200000	3.000000	32.000000	256.000000	15.210000
50%	4.300000	4.000000	64.000000	256.000000	16.000000
75%	4.400000	6.000000	128.000000	512.000000	16.510000
max	5.000000	12.000000	512.000000	512.000000	17.780000

	Size Inch	R1 Cam MP	R2 Cam MP	R4 Cam MP	Battery Mah
count	961.000000	961.000000	619.000000	205.000000	961.000000
mean	6.173996	26.071176	6.707916	2.409756	4045.348595
std	0.457630	20.892832	5.038164	1.114918	864.281378
min	5.000000	5.000000	0.300000	2.000000	2200.000000

```
25%      5.990000   13.000000    2.000000    2.000000  3300.000000
50%      6.300000   13.000000    8.000000    2.000000  4000.000000
75%      6.500000   48.000000    8.000000    2.000000  5000.000000
max      7.000000  108.000000   48.000000    8.000000  6000.000000
```

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

[8]:
```
      Name  Rating  Price Rs  RAM Gb  ROM Gb  Expandable GB  Size Cm  \
0    False   False     False   False   False          False    False
1    False   False     False   False   False          False    False
2    False   False     False   False   False          False    False
3    False   False     False   False   False          False    False
4    False   False     False   False   False          False    False
..     …       …       …       …       …              …        …
956  False   False     False   False   False           True    False
957  False   False     False   False   False          False    False
958  False   False     False   False   False          False    False
959  False   False     False   False   False           True    False
960  False   False     False   False   False          False    False

     Size Inch  R1 Cam MP  R2 Cam MP  R3 Cam MP  R4 Cam MP  Battery Mah  \
0        False      False      False      False       True        False
1        False      False      False      False       True        False
2        False      False      False      False       True        False
3        False      False      False      False       True        False
4        False      False      False      False      False        False
..         …          …          …          …          …            …
956      False      False       True       True       True        False
957      False      False       True       True       True        False
958      False      False       True       True       True        False
959      False      False       True       True       True        False
960      False      False      False       True       True        False

     Processor  Image
0        False  False
1        False  False
2        False  False
3        False  False
4        False  False
..         …      …
956      False  False
957      False  False
958      False  False
959      False  False
960      False  False

[961 rows x 15 columns]
```

[9]:
```
#This Gives the count of all the null values in each features
#df.isnull().sum()
```

[9]:
```
Name              0
Rating           25
Price Rs          2
RAM Gb            0
ROM Gb            0
Expandable GB   246
Size Cm           0
Size Inch         0
R1 Cam MP         0
R2 Cam MP       342
R3 Cam MP       599
R4 Cam MP       756
Battery Mah       0
Processor         0
Image             0
dtype: int64
```

[16]:
```
#Here we are dropping all the records where the values are null
df2 = df.dropna()
print(df2)
```

```
                                              Name  Rating Price Rs  RAM Gb  \
4                        POCO M2 (Pitch Black, 64 GB)     4.4   10,999       6
9                         POCO M2 (Slate Blue, 64 GB)     4.4   10,999       6
10           Realme Narzo 20 Pro (White Knight, 64 GB)     4.7   14,999       6
11          Realme Narzo 20 Pro (White Knight, 128 GB)     4.5   16,999       8
17           Realme Narzo 20 Pro (Black Ninja, 128 GB)     4.5   16,999       8
..                                                 …     …       …     …
610                OPPO Reno3 Pro (Sky White, 128 GB)     4.4   27,990       8
642            Samsung Galaxy M31 (Space Black, 64 GB)     4.3   18,105       6
833                      Lenovo Z6 Pro (Black, 128 GB)     3.8   26,999       8
868  Samsung Galaxy A71 (Prism Crush Silver, 128 GB)     4.4   33,990       8
943                Samsung Galaxy M30s (Black, 128 GB)     4.1   18,199       6

     ROM Gb  Expandable GB  Size Cm  Size Inch  R1 Cam MP  R2 Cam MP  \
4        64          512.0    16.59       6.53       13.0        8.0
9        64          512.0    16.59       6.53       13.0        8.0
10       64          256.0    16.51       6.50       48.0        8.0
11      128          256.0    16.51       6.50       48.0        8.0
17      128          256.0    16.51       6.50       48.0        8.0
..      …            …      …         …        …         …
610     128          256.0    16.26       6.40       64.0       13.0
642      64          512.0    16.26       6.40       64.0        8.0
833     128          512.0    16.23       6.39       48.0        2.0
```

```
868     128          512.0    17.02       6.70       64.0       12.0
943     128          512.0    16.26       6.40       48.0       48.0

    R3 Cam MP  R4 Cam MP  Battery Mah                          Processor  \
4           5        2.0         5000          MediaTek Helio G80 Processor
9           5        2.0         5000          MediaTek Helio G80 Processor
10          2        2.0         4500          MediaTek Helio G95 Processor
11          2        2.0         4500          MediaTek Helio G95 Processor
17          2        2.0         4500          MediaTek Helio G95 Processor
..        …        …           …                                       …
610         8        2.0         4025          MediaTek Helio P95 Processor
642         5        5.0         6000  Samsung Exynos 9 Octa 9611 Processor
833        16        8.0         4000             Qualcomm SDM855 Processor
868         5        5.0         4500             Qualcomm SM7150 Processor
943         8        5.0         6000                 Exynos 9611 Processor

                                                  Image
4    https://rukminim1.flixcart.com/image/312/312/k…
9    https://img1a.flixcart.com/www/linchpin/fk-cp-…
10   https://img1a.flixcart.com/www/linchpin/fk-cp-…
11   https://img1a.flixcart.com/www/linchpin/fk-cp-…
17   https://img1a.flixcart.com/www/linchpin/fk-cp-…
..                                                 …
610  https://img1a.flixcart.com/www/linchpin/fk-cp-…
642  https://img1a.flixcart.com/www/linchpin/fk-cp-…
833  https://img1a.flixcart.com/www/linchpin/fk-cp-…
868  https://img1a.flixcart.com/www/linchpin/fk-cp-…
943  https://img1a.flixcart.com/www/linchpin/fk-cp-…

[155 rows x 15 columns]
```

[17]:
```
#Now we are checking the mean,median,std after dropping the records
df2.describe()
```

[17]:
```
           Rating      RAM Gb      ROM Gb  Expandable GB     Size Cm  \
count  155.000000  155.000000  155.000000     155.000000  155.000000
mean     4.383871    6.316129  114.993548     373.277419   16.507613
std      0.108403    1.497855   47.784350     134.413325    0.278719
min      3.800000    3.000000   32.000000       1.000000   16.000000
25%      4.300000    6.000000   64.000000     256.000000   16.260000
50%      4.400000    6.000000  128.000000     256.000000   16.510000
75%      4.400000    8.000000  128.000000     512.000000   16.590000
max      4.700000    8.000000  256.000000     512.000000   17.020000

        Size Inch   R1 Cam MP   R2 Cam MP   R4 Cam MP  Battery Mah
count  155.000000  155.000000  155.000000  155.000000   155.000000
mean     6.498774   49.632258    8.819355    2.406452  4592.483871
```

```
std      0.110138   14.517352    3.539152    1.085302   508.409914
min      6.300000   12.000000    2.000000    2.000000  4000.000000
25%      6.400000   48.000000    8.000000    2.000000  4035.000000
50%      6.500000   48.000000    8.000000    2.000000  4500.000000
75%      6.530000   64.000000    8.000000    2.000000  5000.000000
max      6.700000   64.000000   48.000000    8.000000  6000.000000
```

[18]:
```
df3 = df
print(df3)
```

```
                                                 Name  Rating Price Rs  RAM Gb  \
0             Realme Narzo 20 (Victory Blue, 128 GB)     4.5   11,499       4
1              Realme Narzo 20 (Victory Blue, 64 GB)     4.5   10,499       4
2             Realme Narzo 20 (Glory Sliver, 128 GB)     4.5   11,499       4
3              Realme Narzo 20 (Glory Sliver, 64 GB)     4.5   10,499       4
4                       POCO M2 (Pitch Black, 64 GB)     4.4   10,999       6
..                                                ...     ...      ...     ...
956                  Vivo U20 (Racing Black, 64 GB)     4.4   14,499       4
957  Samsung Galaxy S7 Edge (Silver Titanium, 32 GB)     4.4   41,900       4
958              Asus Zenfone 2 Laser (Black, 16 GB)     4.1   12,999       3
959                          Homtom H5 (Gold, 32 GB)     3.5    6,499       3
960                    LG G7 ThinQ (Platinum, 64 GB)     4.4   53,000       4

     ROM Gb  Expandable GB  Size Cm  Size Inch  R1 Cam MP  R2 Cam MP  \
0       128          256.0    16.56       6.52       48.0        8.0
1        64          256.0    16.56       6.52       48.0        8.0
2       128          256.0    16.56       6.52       48.0        8.0
3        64          256.0    16.56       6.52       48.0        8.0
4        64          512.0    16.59       6.53       13.0        8.0
..      ...            ...      ...        ...        ...        ...
956      64            NaN    16.59       6.53       16.0        NaN
957      32          200.0    13.97       5.50       12.0        NaN
958      16          128.0    13.97       5.50       13.0        NaN
959      32            NaN    13.97       5.50       16.0        NaN
960      64            2.0    15.49       6.10       16.0       16.0

    R3 Cam MP  R4 Cam MP  Battery Mah  \
0           2        NaN         6000
1           2        NaN         6000
2           2        NaN         6000
3           2        NaN         6000
4           5        2.0         5000
..        ...        ...          ...
956       NaN        NaN         5000
957       NaN        NaN         3600
958       NaN        NaN         3000
959       NaN        NaN         3300
```

```
960       NaN        NaN         3000

                                          Processor  \
0                       MediaTek Helio G85 Processor
1                       MediaTek Helio G85 Processor
2                       MediaTek Helio G85 Processor
3                       MediaTek Helio G85 Processor
4                       MediaTek Helio G80 Processor
..                                                 …
956                 Qualcomm Snapdragon 665 Processor
957                            Exynos 8890 Processor
958  Qualcomm Snapdragon 615 Octa Core 1.5GHz Proce…
959                               Quadcore Processor
960                 Qualcomm Snapdragon 845 Processor

                                                 Image
0    https://rukminim1.flixcart.com/image/312/312/k…
1    https://rukminim1.flixcart.com/image/312/312/k…
2    https://rukminim1.flixcart.com/image/312/312/k…
3    https://rukminim1.flixcart.com/image/312/312/k…
4    https://rukminim1.flixcart.com/image/312/312/k…
..                                                 …
956  https://img1a.flixcart.com/www/linchpin/fk-cp-…
957  https://img1a.flixcart.com/www/linchpin/fk-cp-…
958  https://img1a.flixcart.com/www/linchpin/fk-cp-…
959  https://img1a.flixcart.com/www/linchpin/fk-cp-…
960  https://img1a.flixcart.com/www/linchpin/fk-cp-…

[961 rows x 15 columns]
```

[21]:
```
#Filling the null values with the mean Imputation
df3['Rating'] = df3['Rating'].fillna(df3['Rating'].mean())
print(df3['Rating'].mean())
#df3['Price Rs'] = df['Price Rs'].fillna(df['Price Rs'].mean())
#print(df3['Price Rs'].mean())
df3['R2 Cam MP'] = df3['R2 Cam MP'].fillna(df3['R2 Cam MP'].mean())
print(df3['R2 Cam MP'].mean())
df3['R4 Cam MP'] = df3['R4 Cam MP'].fillna(df3['R4 Cam MP'].mean())
print(df3['R4 Cam MP'].mean())
```

```
4.227136752136752
6.707915993537965
2.4097560975609755
```

[24]:
```
#Filling the null values with the median Imputation
df4 = df
df4['Rating'] = df4['Rating'].fillna(df4['Rating'].median())
```

```
print(df4['Rating'].median())
#df3['Price Rs'] = df['Price Rs'].fillna(df['Price Rs'].mean())
#print(df3['Price Rs'].mean())
df4['R2 Cam MP'] = df4['R2 Cam MP'].fillna(df4['R2 Cam MP'].median())
print(df4['R2 Cam MP'].median())
df4['R4 Cam MP'] = df4['R4 Cam MP'].fillna(df4['R4 Cam MP'].median())
print(df4['R4 Cam MP'].median())
```

```
4.3
6.707915993537964
2.4097560975609755
```

[25]:
```
def combineFeatures(row):
        return str(row['Price Rs'])+" "+str(row['RAM Gb'])+" "+str(row['ROM␣
↪Gb'])+" "+str(row['Size Inch'])+" "+str(row['R1 Cam MP'])+"␣
↪"+str(row['Battery Mah'])
```

[33]:
```
import eel
import json
import pandas as pd
import numpy as np
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.metrics.pairwise import cosine_similarity
```

[47]:
```
#Implementing Cosine Similarity
data={
    "Name":['Realme'],
    "Rating":['4.6'],
    "Price Rs":['12000'],
    "RAM Gb":['8'],
    "ROM Gb":['32'],
    "Expandable GB":['256'],
    "Size Cm":['16'],
    "Size Inch":['6'],
    "R1 Cam MP":['48'],
    "R2 Cam MP":['8'],
    "R3 Cam MP":['2'],
    "R4 Cam MP":['2'],
    "Battery Mah":['5500'],
    "Processor":'MediaTek',
    "Image":' '
    }
#We have taken user preferences here for trial
userDf=pd.DataFrame(data)
```

```
pf=pd.read_csv(r"C:
 ↪\Users\Praveen\Desktop\ASSIGNMENTSEM-III\DS\ACTUAL\Mobile_Recommendation_System-main\mainDa
 ↪csv",encoding= "ISO-8859-1")
#We are adding a new row vector which has the new row of data features at the␣
 ↪beginning
pf=userDf.append(df,ignore_index = True)
#We here created a new columns which has a new value which creates a string␣
 ↪with all the row values
pf["combinedFeatures"]=pf.apply(combineFeatures,axis=1)
cv=CountVectorizer()
#We here create matrix where each vector is count-vector.
countMatrix=cv.fit_transform(pf['combinedFeatures'])
#This creates a NxN matrix where each row is compared with all the rows and the␣
 ↪cosine similar values
#are stored in that index
similar=cosine_similarity(countMatrix)
#We check the first row because it has the similarity of all all the phones in␣
 ↪the databases with the user inputed phone.
similarPhones=list(enumerate(similar[0]))
#Sorting them according to the similarity value.
sortedSimilarPhones=sorted(similarPhones,key=lambda x:x[1], reverse=True)
for i in range(5):
    print(sortedSimilarPhones[i+1])
#The index of the values of the phones in the database along with their␣
 ↪probability found is printed
```

```
(186, 0.2886751345948129)
(275, 0.2886751345948129)
(618, 0.2886751345948129)
(802, 0.2886751345948129)
(828, 0.2886751345948129)
```

```
C:\Users\Praveen\AppData\Local\Temp\ipykernel_27484\3488052658.py:25:
FutureWarning: The frame.append method is deprecated and will be removed from
pandas in a future version. Use pandas.concat instead.
  pf=userDf.append(df,ignore_index = True)
```

[ ]:

[ ]: