google playstore

September 1, 2023

1 Problem Statement:

Google Play Store team is about to launch a new feature wherein, certain apps that are promising are boosted in visibility. The boost will manifest in multiple ways including higher priority in recommendations sections ("Similar apps", "You might also like", "New and updated games"). These will also get a boost in search results visibility. This feature will help bring more attention to newer apps that have the potential.

2 Analysis to be done:

The problem is to identify the apps that are going to be good for Google to promote. App ratings, which are provided by the customers, are always great indicators of the goodness of the app. The problem reduces to: predict which apps will have high ratings.

[1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection  import train_test_split
```

[2]:
```
# call the datset
google = pd.read_csv("googleplaystore.csv")
google.head()
```

[2]:

	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

```
                      Genres      Last Updated         Current Ver  \
0               Art_&_Design   January 7, 2018               1.0.0
1  Art_&_Design_Pretend_Play  January 15, 2018               2.0.0
2               Art_&_Design    August 1, 2018               1.2.4
3               Art_&_Design      June 8, 2018  Varies with device
4    Art_&_Design_Creativity     June 20, 2018                 1.1

    Android Ver
0  4.0.3 and up
1  4.0.3 and up
2  4.0.3 and up
3    4.2 and up
4    4.4 and up
```

[3]:
```
# lets check the null values
google.isnull().sum(axis=0)
```

[3]:
```
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
```

[4]:
```
#drop all the null values
google.dropna( how= "any", inplace=True)
google.isnull().sum(axis=0)
```

[4]:
```
App               0
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
```

[5]:
```
# check for dulicate values
google.duplicated().value_counts()
```

[5]:
```
False    8886
True      474
dtype: int64
```

Interpretation: we can see there are 474 duplicated rows :

[6]:
```
print("before droping the duplicate rows the shape of google dataset is{}".
 ↪format(google.shape))
google_1 =google.drop_duplicates()
print("After droping the duplicate rows the shape of google_1 dataset is{}".
 ↪format(google_1.shape))
```

```
before droping the duplicate rows the shape of google dataset is(9360, 13)
After droping the duplicate rows the shape of google_1 dataset is(8886, 13)
```

[7]:
```
# Some  variables are not arranged format way, lets do it:
google['Size'].unique()
```

[7]:
```
array(['19M', '14M', '8.7M', '25M', '2.8M', '5.6M', '29M', '33M', '3.1M',
       '28M', '12M', '20M', '21M', '37M', '5.5M', '17M', '39M', '31M',
       '4.2M', '23M', '6.0M', '6.1M', '4.6M', '9.2M', '5.2M', '11M',
       '24M', 'Varies with device', '9.4M', '15M', '10M', '1.2M', '26M',
       '8.0M', '7.9M', '56M', '57M', '35M', '54M', '201k', '3.6M', '5.7M',
       '8.6M', '2.4M', '27M', '2.7M', '2.5M', '7.0M', '16M', '3.4M',
       '8.9M', '3.9M', '2.9M', '38M', '32M', '5.4M', '18M', '1.1M',
       '2.2M', '4.5M', '9.8M', '52M', '9.0M', '6.7M', '30M', '2.6M',
       '7.1M', '22M', '6.4M', '3.2M', '8.2M', '4.9M', '9.5M', '5.0M',
       '5.9M', '13M', '73M', '6.8M', '3.5M', '4.0M', '2.3M', '2.1M',
       '42M', '9.1M', '55M', '23k', '7.3M', '6.5M', '1.5M', '7.5M', '51M',
       '41M', '48M', '8.5M', '46M', '8.3M', '4.3M', '4.7M', '3.3M', '40M',
       '7.8M', '8.8M', '6.6M', '5.1M', '61M', '66M', '79k', '8.4M',
       '3.7M', '118k', '44M', '695k', '1.6M', '6.2M', '53M', '1.4M',
       '3.0M', '7.2M', '5.8M', '3.8M', '9.6M', '45M', '63M', '49M', '77M',
       '4.4M', '70M', '9.3M', '8.1M', '36M', '6.9M', '7.4M', '84M', '97M',
       '2.0M', '1.9M', '1.8M', '5.3M', '47M', '556k', '526k', '76M',
       '7.6M', '59M', '9.7M', '78M', '72M', '43M', '7.7M', '6.3M', '334k',
       '93M', '65M', '79M', '100M', '58M', '50M', '68M', '64M', '34M',
       '67M', '60M', '94M', '9.9M', '232k', '99M', '624k', '95M', '8.5k',
       '41k', '292k', '80M', '1.7M', '10.0M', '74M', '62M', '69M', '75M',
       '98M', '85M', '82M', '96M', '87M', '71M', '86M', '91M', '81M',
```

```
       '92M', '83M', '88M', '704k', '862k', '899k', '378k', '4.8M',
       '266k', '375k', '1.3M', '975k', '980k', '4.1M', '89M', '696k',
       '544k', '525k', '920k', '779k', '853k', '720k', '713k', '772k',
       '318k', '58k', '241k', '196k', '857k', '51k', '953k', '865k',
       '251k', '930k', '540k', '313k', '746k', '203k', '26k', '314k',
       '239k', '371k', '220k', '730k', '756k', '91k', '293k', '17k',
       '74k', '14k', '317k', '78k', '924k', '818k', '81k', '939k', '169k',
       '45k', '965k', '90M', '545k', '61k', '283k', '655k', '714k', '93k',
       '872k', '121k', '322k', '976k', '206k', '954k', '444k', '717k',
       '210k', '609k', '308k', '306k', '175k', '350k', '383k', '454k',
       '1.0M', '70k', '812k', '442k', '842k', '417k', '412k', '459k',
       '478k', '335k', '782k', '721k', '430k', '429k', '192k', '460k',
       '728k', '496k', '816k', '414k', '506k', '887k', '613k', '778k',
       '683k', '592k', '186k', '840k', '647k', '373k', '437k', '598k',
       '716k', '585k', '982k', '219k', '55k', '323k', '691k', '511k',
       '951k', '963k', '25k', '554k', '351k', '27k', '82k', '208k',
       '551k', '29k', '103k', '116k', '153k', '209k', '499k', '173k',
       '597k', '809k', '122k', '411k', '400k', '801k', '787k', '50k',
       '643k', '986k', '516k', '837k', '780k', '20k', '498k', '600k',
       '656k', '221k', '228k', '176k', '34k', '259k', '164k', '458k',
       '629k', '28k', '288k', '775k', '785k', '636k', '916k', '994k',
       '309k', '485k', '914k', '903k', '608k', '500k', '54k', '562k',
       '847k', '948k', '811k', '270k', '48k', '523k', '784k', '280k',
       '24k', '892k', '154k', '18k', '33k', '860k', '364k', '387k',
       '626k', '161k', '879k', '39k', '170k', '141k', '160k', '144k',
       '143k', '190k', '376k', '193k', '473k', '246k', '73k', '253k',
       '957k', '420k', '72k', '404k', '470k', '226k', '240k', '89k',
       '234k', '257k', '861k', '467k', '676k', '552k', '582k', '619k'],
      dtype=object)
```

we can see that the values stored in the size column has both interger and string and dtype =object, lets convert itinto integer

[8]:
```
def change_size(size):
    if 'M' in size:
        x=size[:-1]
        x=float(x)*1000
        return(x)
    elif 'k' in size:
        x= size[:-1]
        x=float(x)*1000
        return (x)
    else:
        return None
```

[9]:
```
# lets apply the above function into the column name size
google['Size'] =google['Size'].map(change_size)
```

[10]:
```
google['Size']
```

[10]:
```
0        19000.0
1        14000.0
2         8700.0
3        25000.0
4         2800.0
          ...
10834     2600.0
10836    53000.0
10837     3600.0
10839        NaN
10840    19000.0
Name: Size, Length: 9360, dtype: float64
```

[11]:
```
# lets check th nan value in column size:
google['Size'].isnull().sum()
```

[11]:
```
1637
```

[12]:
```
# lets fill the nan value using pad method or ffill method
google.Size.fillna(method= 'pad',inplace =True)
print("the null values in  Size Column",google.Size.isnull().sum() )
```

```
the null values in  Size Column 0
```

[13]:
```
google.Installs
```

[13]:
```
0            10,000+
1           500,000+
2         5,000,000+
3        50,000,000+
4           100,000+
              ...
10834           500+
10836         5,000+
10837           100+
10839         1,000+
10840    10,000,000+
Name: Installs, Length: 9360, dtype: object
```

[14]:
```
# lets convert the installs in integer form.

def clean (val):
    return int(val.replace(",","").replace("+",""))
```

[15]:
```
google.Installs =google.Installs.map(clean)
```

[16]:
```
google.Installs
```

[16]:
```
0           10000
1          500000
2         5000000
3        50000000
4          100000
           ...
10834         500
10836        5000
10837         100
10839        1000
10840    10000000
Name: Installs, Length: 9360, dtype: int64
```

Interpretation : hence we have successfuly done the conversion of categorical into numerical format.

[17]:
```
google.Reviews
```

[17]:
```
0           159
1           967
2         87510
3        215644
4           967
           ...
10834         7
10836        38
10837         4
10839       114
10840    398307
Name: Reviews, Length: 9360, dtype: object
```

[18]:
```
# lets convert the dtype into int64
google['Reviews']=google['Reviews'].astype('int64')
```

[19]:
```
google['Reviews']
```

[19]:
```
0           159
1           967
2         87510
3        215644
4           967
           ...
10834         7
10836        38
10837         4
10839       114
```

```
10840    398307
Name: Reviews, Length: 9360, dtype: int64
```

[20]:
```
google.columns
```

[20]:
```
Index(['App', 'Category', 'Rating', 'Reviews', 'Size', 'Installs', 'Type',
       'Price', 'Content_Rating', 'Genres', 'Last Updated', 'Current Ver',
       'Android Ver'],
      dtype='object')
```

[21]:
```
google.Price.value_counts()
```

[21]:
```
0          8715
$2.99       114
$0.99       106
$4.99        70
$1.99        59
           ...
$1.29         1
$299.99       1
$379.99       1
$37.99        1
$1.20         1
Name: Price, Length: 73, dtype: int64
```

[22]:
```
# lets remove the $ sign and convert it into numerical data
google['Price']= google['Price'].apply(lambda x:0 if x=='0'else float(x[1:]))
```

[23]:
```
google['Price'].value_counts()
```

[23]:
```
0.00      8715
2.99       114
0.99       106
4.99        70
1.99        59
           ...
1.29         1
299.99       1
379.99       1
37.99        1
1.20         1
Name: Price, Length: 73, dtype: int64
```

Hence the $ sign has been removed.

[24]:
```
# lets check if futher rectification is needed.
google.head()
```

[24]:
```
                                                 App        Category  Rating  \
0     Photo Editor & Candy Camera & Grid & ScrapBook  ART_AND_DESIGN     4.1
1                                Coloring book moana  ART_AND_DESIGN     3.9
2  U Launcher Lite - FREE Live Cool Themes, Hide …  ART_AND_DESIGN     4.7
3                               Sketch - Draw & Paint  ART_AND_DESIGN     4.5
4              Pixel Draw - Number Art Coloring Book  ART_AND_DESIGN     4.3

   Reviews     Size  Installs  Type  Price Content_Rating  \
0      159  19000.0     10000  Free    0.0       Everyone
1      967  14000.0    500000  Free    0.0       Everyone
2    87510   8700.0   5000000  Free    0.0       Everyone
3   215644  25000.0  50000000  Free    0.0           Teen
4      967   2800.0    100000  Free    0.0       Everyone

                      Genres      Last Updated         Current Ver  \
0               Art_&_Design   January 7, 2018               1.0.0
1  Art_&_Design_Pretend_Play  January 15, 2018               2.0.0
2               Art_&_Design    August 1, 2018               1.2.4
3               Art_&_Design      June 8, 2018  Varies with device
4    Art_&_Design_Creativity     June 20, 2018                 1.1

    Android Ver
0  4.0.3 and up
1  4.0.3 and up
2  4.0.3 and up
3    4.2 and up
4    4.4 and up
```

Interpretation:hence we can see some of the required data column has been converted into numerical data from categorical data.

[25]:
```
google.dtypes
```

[25]:
```
App               object
Category          object
Rating           float64
Reviews            int64
Size             float64
Installs           int64
Type              object
Price            float64
Content_Rating    object
Genres            object
Last Updated      object
Current Ver       object
Android Ver       object
dtype: object
```

[26]:
```
# lets convert the int64 into float64 for no error during the model accuracy,
google['Reviews']=google['Reviews'].astype('float64')
google['Installs']=google['Installs'].astype('float64')
```

[27]:
```
google.dtypes
```

[27]:
```
App                object
Category           object
Rating            float64
Reviews           float64
Size              float64
Installs          float64
Type               object
Price             float64
Content_Rating     object
Genres             object
Last Updated       object
Current Ver        object
Android Ver        object
dtype: object
```

[28]:
```
# the  average ratings are from 1 to 5 hence above that will be act as an␣
 ↪outliers therefore we will remove them.
#Drop the rows that have a value outside this range.
print("the length of ratings:",len(google[google.Rating>5]) )
print("the length of reviews: ", len(google[google.Reviews>google.Installs]))
print("the length of app that are free in price", len(google[(google.
 ↪Type=="free")&(google.Price>0)]))
```

```
the length of ratings: 0
the length of reviews:  7
the length of app that are free in price 0
```

[29]:
```
print("the shape of the google play store",google.shape )
```

```
the shape of the google play store (9360, 13)
```

[30]:
```
google= google[google.Reviews<google.Installs]
```

[31]:
```
print("the shape of the google play store",google.shape )
```

```
the shape of the google play store (9351, 13)
```

Reviews should not be more than installs,as only those who installs can be review the app, if there are any such records, drop them.

[32]:
```
print(len(google[google.Price>200]))
google= google[google.Price<200]
```

```
print("Google play store whose price is greater than 200", google.shape)
# lets check the review length whose review rate is greater than 2000000
print(len(google[google.Reviews>=2000000]))
google= google[google.Reviews<=2000000]
print("the shape of the google play store whose reviews >200000",google.shape )
```

```
15
Google play store whose price is greater than 200 (9336, 13)
453
the shape of the google play store whose reviews >200000 (8883, 13)
```

[33]:
```
# For free apps (type = "Free"), the price should not be >0. Drop any such rows
print(google.Installs.quantile([.25,.50,.75,.90,.99]))

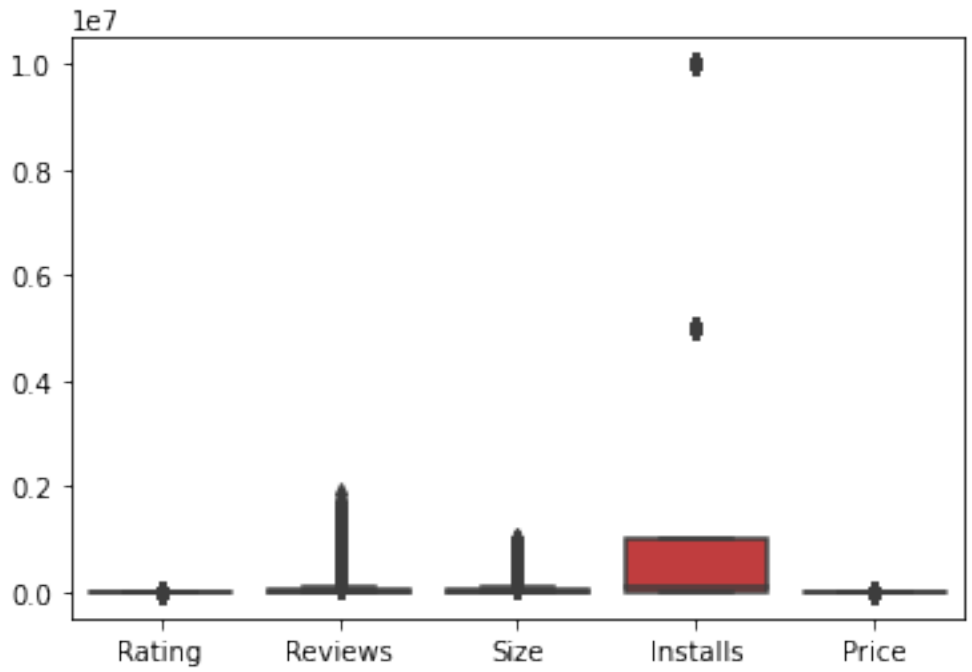
print(len(google[google.Installs>=10000000]))
google=google[google.Installs<=10000000]
print(google.shape)
```

```
0.25        10000.0
0.50       500000.0
0.75      5000000.0
0.90     10000000.0
0.99    100000000.0
Name: Installs, dtype: float64
1627
(8494, 13)
```

3 Outliers Treatment

[34]:
```
sns.boxplot(google)
```

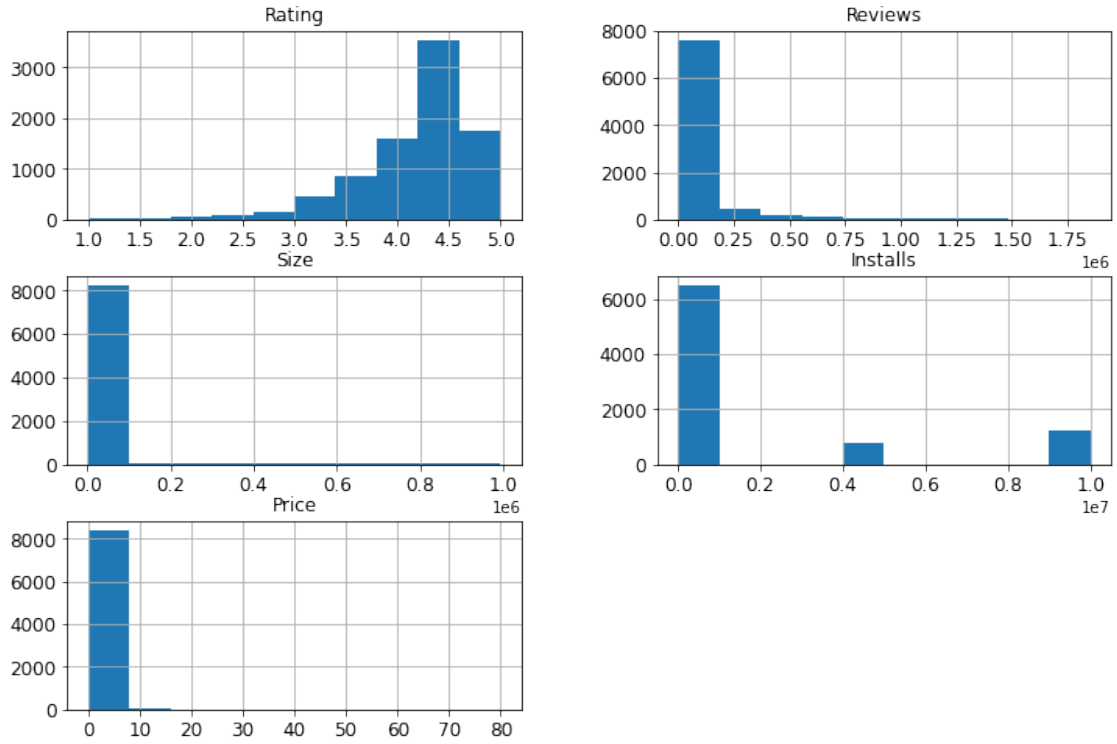
[34]: <AxesSubplot: >



Interpretation: price: From the box plot, it seems like there are some apps with very high price. A price of $200 for an application on the Play Store is very high and suspicious! reviews and install rates are also seems to be not equal. hence there are outliers hence lets get rid of it.

[35]:
```
google.hist(['Rating', 'Reviews', 'Size', 'Installs',␣
 ↪'Price'],figsize=(12,8),xlabelsize= 12
            ,ylabelsize= 12)
```

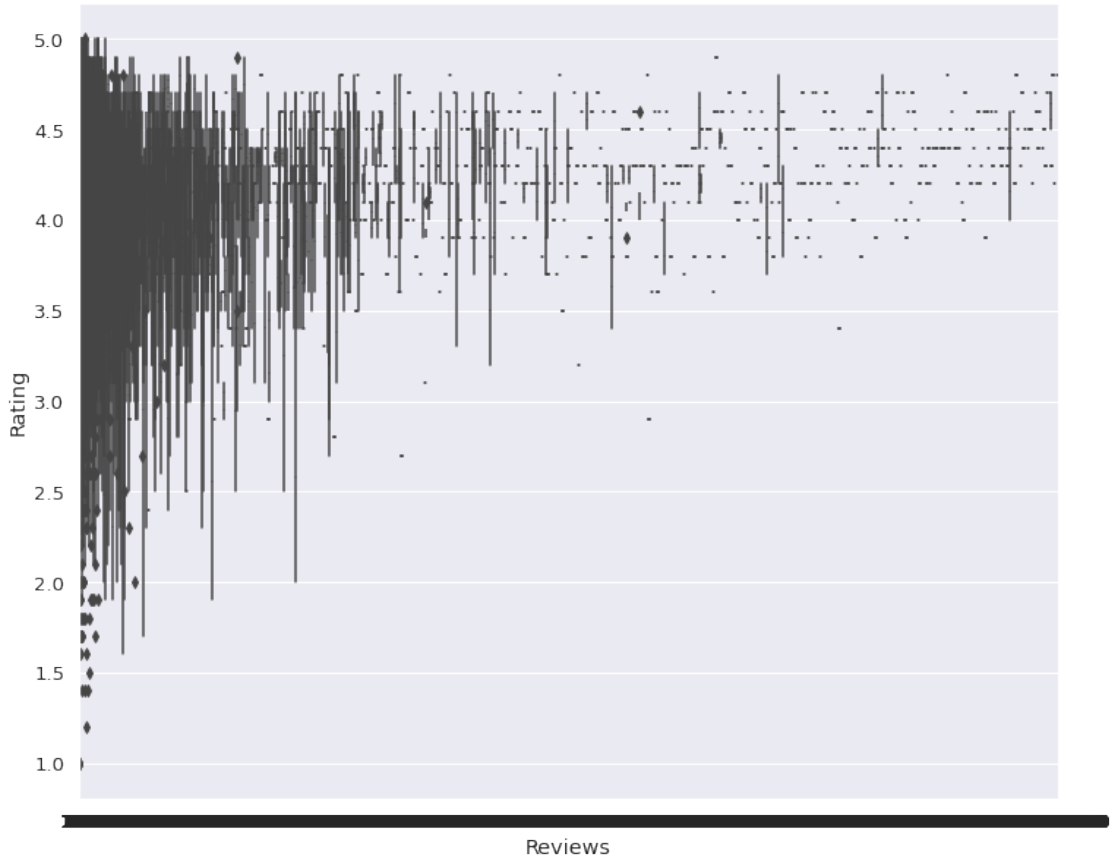
[35]:
```
array([[<AxesSubplot: title={'center': 'Rating'}>,
        <AxesSubplot: title={'center': 'Reviews'}>],
       [<AxesSubplot: title={'center': 'Size'}>,
        <AxesSubplot: title={'center': 'Installs'}>],
       [<AxesSubplot: title={'center': 'Price'}>, <AxesSubplot: >]],
      dtype=object)
```



[36]:
```
google.columns
```

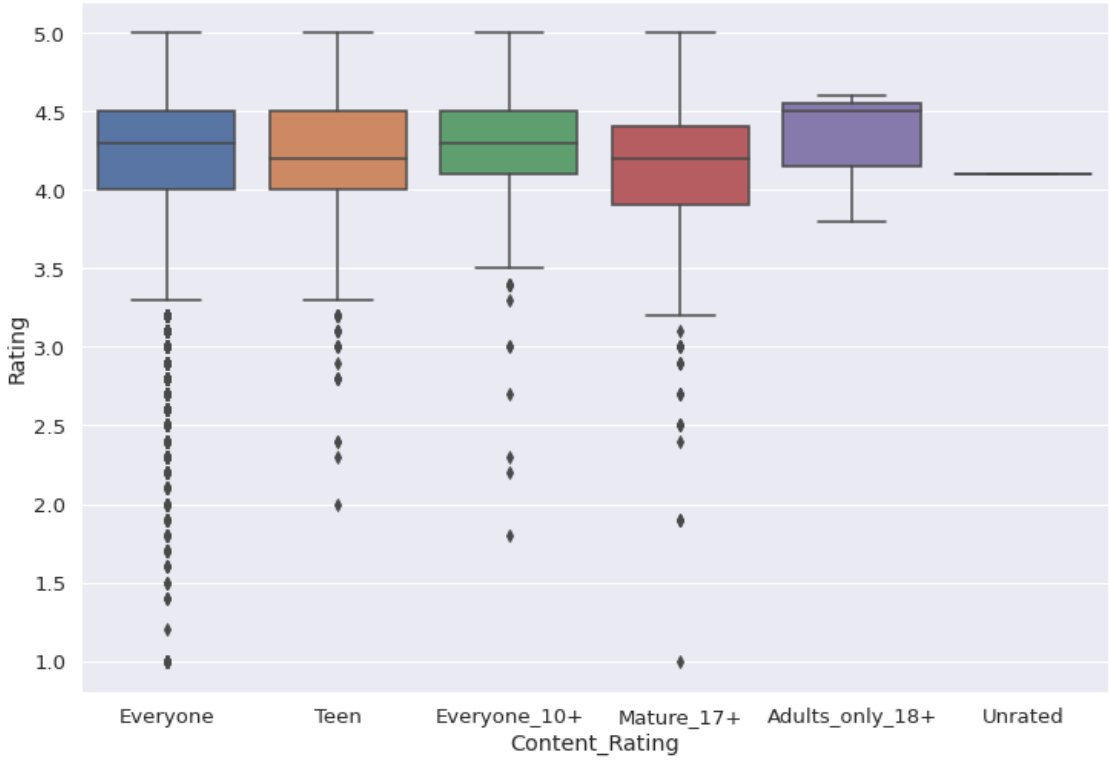
[36]:
```
Index(['App', 'Category', 'Rating', 'Reviews', 'Size', 'Installs', 'Type',
       'Price', 'Content_Rating', 'Genres', 'Last Updated', 'Current Ver',
       'Android Ver'],
      dtype='object')
```

[37]:
```
# lets see he relationship between the different columns.
plt.figure(figsize=(12,10))
sns.set_style(style="whitegrid")
sns.set(font_scale=1.2)
sns.boxplot(data=google,x='Reviews',y= 'Rating')
plt.show()
```



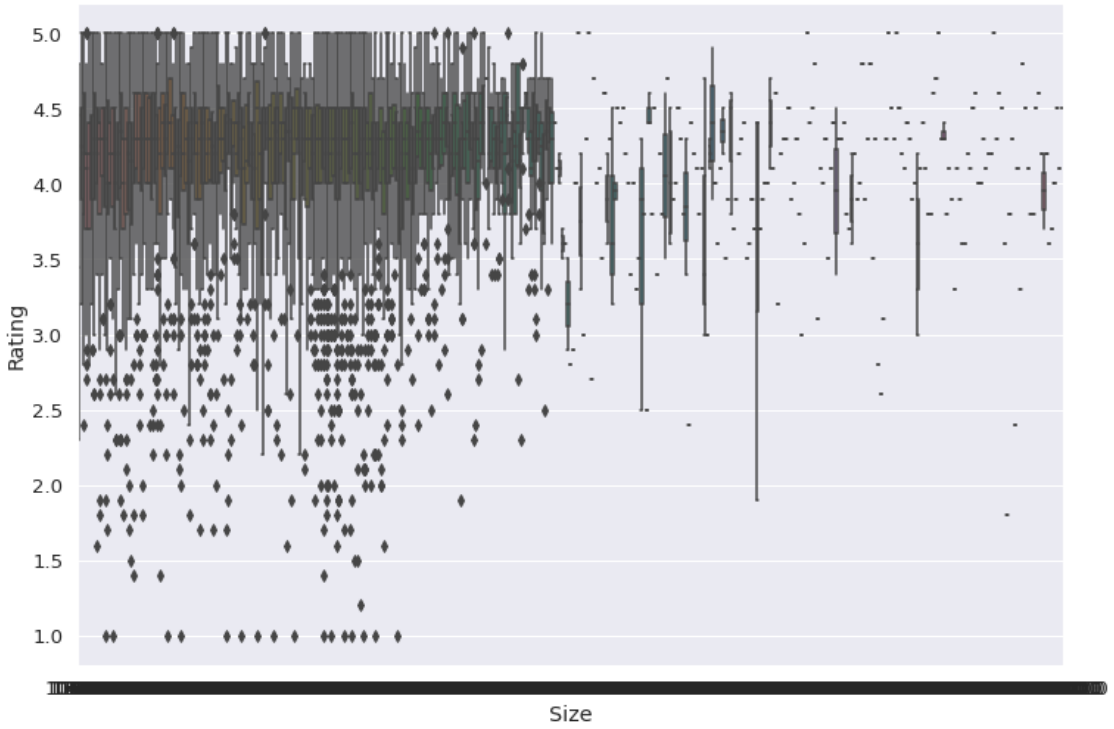
[38]:
```
plt.figure(figsize=(12, 8.27))
sns.set_style(style='whitegrid')
sns.set(font_scale=1.2)
sns.boxplot(data=google, x='Content_Rating', y='Rating')

plt.show()
```



[39]:
```
plt.figure(figsize=(12, 8.27))
sns.set_style(style='whitegrid')
sns.set(font_scale=1.2)
sns.boxplot(data=google, x='Size', y='Rating')

plt.show()
```



Interpretation: we can see that there are alot of outliers and data is bit messy to read which can hinder the model prediction, hence it required more data preprocessing.

[40]:
```
# data preprocessing:
# lets drop the column which does not have any impact on the model prediction
print(google.columns)
```

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

[41]:
```
# from above we can see that App, Last Updated', 'Current Ver',Android Ver has␣
 ↪no impact on target of the google play store ratings, review, price.
print("before droping the column the shape of the google play store is {}".
 ↪format(google.shape))
google =google.drop(['App', 'Last Updated', 'Current Ver','Android Ver'],␣
 ↪axis=1)
print("After droping the column the shape of the google play store is {}".
 ↪format(google.shape))
```

```
before droping the column the shape of the google play store is (8494, 13)
After droping the column the shape of the google play store is (8494, 9)
```

[42]:
```
google.head()
```

[42]:

	Category	Rating	Reviews	Size	Installs	Type	Price	\
0	ART_AND_DESIGN	4.1	159.0	19000.0	10000.0	Free	0.0	
1	ART_AND_DESIGN	3.9	967.0	14000.0	500000.0	Free	0.0	
2	ART_AND_DESIGN	4.7	87510.0	8700.0	5000000.0	Free	0.0	
4	ART_AND_DESIGN	4.3	967.0	2800.0	100000.0	Free	0.0	
5	ART_AND_DESIGN	4.4	167.0	5600.0	50000.0	Free	0.0	

	Content_Rating	Genres
0	Everyone	Art_&_Design
1	Everyone	Art_&_Design_Pretend_Play
2	Everyone	Art_&_Design
4	Everyone	Art_&_Design_Creativity
5	Everyone	Art_&_Design

[43]:
```
google =pd.get_dummies(google,drop_first= True)
print(" the column of google play store are",google.columns)
```

```
 the column of google play store are Index(['Rating', 'Reviews', 'Size',
'Installs', 'Price',
       'Category_AUTO_AND_VEHICLES', 'Category_BEAUTY',
       'Category_BOOKS_AND_REFERENCE', 'Category_BUSINESS', 'Category_COMICS',
       …
       'Genres_Tools', 'Genres_Tools_Education', 'Genres_Travel_&_Local',
       'Genres_Travel_&_Local_Action_&_Adventure', 'Genres_Trivia',
       'Genres_Video_Players_&_Editors',
       'Genres_Video_Players_&_Editors_Creativity',
       'Genres_Video_Players_&_Editors_Music_&_Video', 'Genres_Weather',
       'Genres_Word'],
      dtype='object', length=157)
```

[44]:
```
google.head()
```

[44]:

	Rating	Reviews	Size	Installs	Price	Category_AUTO_AND_VEHICLES	\
0	4.1	159.0	19000.0	10000.0	0.0	0	
1	3.9	967.0	14000.0	500000.0	0.0	0	
2	4.7	87510.0	8700.0	5000000.0	0.0	0	
4	4.3	967.0	2800.0	100000.0	0.0	0	
5	4.4	167.0	5600.0	50000.0	0.0	0	

	Category_BEAUTY	Category_BOOKS_AND_REFERENCE	Category_BUSINESS	\
0	0	0	0	
1	0	0	0	
2	0	0	0	
4	0	0	0	
5	0	0	0	

```
   Category_COMICS  …  Genres_Tools  Genres_Tools_Education  \
0                0  …             0                       0
1                0  …             0                       0
2                0  …             0                       0
4                0  …             0                       0
5                0  …             0                       0

   Genres_Travel_&_Local  Genres_Travel_&_Local_Action_&_Adventure  \
0                      0                                         0
1                      0                                         0
2                      0                                         0
4                      0                                         0
5                      0                                         0

   Genres_Trivia  Genres_Video_Players_&_Editors  \
0              0                               0
1              0                               0
2              0                               0
4              0                               0
5              0                               0

   Genres_Video_Players_&_Editors_Creativity  \
0                                          0
1                                          0
2                                          0
4                                          0
5                                          0

   Genres_Video_Players_&_Editors_Music_&_Video  Genres_Weather  Genres_Word
0                                             0              0            0
1                                             0              0            0
2                                             0              0            0
4                                             0              0            0
5                                             0              0            0

[5 rows x 157 columns]
```

[45]:
```
google.shape
```

[45]:
```
(8494, 157)
```

Interpretation: from above data we have observed that in the column review and Install they have outliers and before building the linear regression mdel, it is a necessary to reduce the skewness. for that we need to use log transformation to the column reviews and installs.

2. After getting the dummy columns for the columns Category ,Genres and Content_rating. This needs to be done as the models do not uderstand categorical data, and all data should

be numeric.Hence, Dummy Encoding is one of the way to convert character fields to numeric.

[46]:
```
google.Installs
```

[46]:
```
0           10000.0
1          500000.0
2         5000000.0
4          100000.0
5           50000.0
             …
10834          500.0
10836         5000.0
10837          100.0
10839         1000.0
10840    10000000.0
Name: Installs, Length: 8494, dtype: float64
```

[47]:
```
google.Installs =google.Installs.apply(np.log1p)
```

[48]:
```
google.Installs
```

[48]:
```
0          9.210440
1         13.122365
2         15.424949
4         11.512935
5         10.819798
              …
10834      6.216606
10836      8.517393
10837      4.615121
10839      6.908755
10840     16.118096
Name: Installs, Length: 8494, dtype: float64
```

[49]:
```
google.Reviews
```

[49]:
```
0           159.0
1           967.0
2         87510.0
4           967.0
5           167.0
             …
10834         7.0
10836        38.0
10837         4.0
10839       114.0
10840    398307.0
```

```
Name: Reviews, Length: 8494, dtype: float64
```

[50]:
```
google.Reviews= google.Reviews.apply(np.log1p)
```

[51]:
```
google.Reviews
```

[51]:
```
0          5.075174
1          6.875232
2         11.379520
4          6.875232
5          5.123964
             ...
10834      2.079442
10836      3.663562
10837      1.609438
10839      4.744932
10840     12.894981
Name: Reviews, Length: 8494, dtype: float64
```

4 Model Prediction

lets import the file train_test_split, logistic regression

[52]:
```
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression,SGDRegressor
from sklearn.preprocessing import StandardScaler
```

[53]:
```
X=google.iloc[:,1:]
Y=google.iloc[:,:1]
```

[54]:
```
print(" The X dataset shape",X.shape)
print("The Y dataset shape ", Y.shape)
```

```
 The X dataset shape (8494, 156)
The Y dataset shape  (8494, 1)
```

[55]:
```
x_train,x_test,y_train,y_test =train_test_split(X,Y,test_size=0.
↪2,random_state=23)
```

[56]:
```
print("The x_train", x_train.shape)
print("The x_test",x_test.shape)
print("The y_train", y_train.shape)
print("The y_test",y_test.shape)
```

```
The x_train (6795, 156)
The x_test (1699, 156)
```

```
The y_train (6795, 1)
The y_test (1699, 1)
```

[57]:
```
#x_train =scaler.fit_transform(x_train)
x_train
```

[57]:

	Reviews	Size	Installs	Price	Category_AUTO_AND_VEHICLES	\
3139	7.919720	39000.0	15.424949	0.00	0	
4856	12.441603	99000.0	16.118096	0.00	0	
7029	5.723585	8300.0	11.512935	0.00	0	
9437	2.772589	5200.0	6.908755	0.00	0	
93	10.355645	17000.0	13.815512	0.00	1	
…	…	…	…	…	…	
4963	4.615121	17000.0	6.908755	3.99	0	
4559	7.981392	93000.0	10.819798	4.77	0	
42	12.595483	10000.0	16.118096	0.00	0	
405	10.527311	8400.0	13.815512	0.00	0	
7833	9.604003	40000.0	13.815512	0.00	0	

	Category_BEAUTY	Category_BOOKS_AND_REFERENCE	Category_BUSINESS	\
3139	0	0	0	
4856	0	0	0	
7029	0	0	0	
9437	0	0	0	
93	0	0	0	
…	…	…	…	
4963	0	0	0	
4559	0	0	0	
42	0	0	0	
405	0	0	0	
7833	0	0	0	

	Category_COMICS	Category_COMMUNICATION	…	Genres_Tools	\
3139	0	0	…	0	
4856	0	0	…	0	
7029	0	0	…	0	
9437	0	0	…	0	
93	0	0	…	0	
…	…	…	…	…	
4963	0	0	…	0	
4559	0	0	…	0	
42	0	0	…	0	
405	0	1	…	0	
7833	0	0	…	0	

	Genres_Tools_Education	Genres_Travel_&_Local	\
3139	0	1	

```
4856                          0                          0
7029                          0                          0
9437                          0                          0
93                            0                          0
…                           …                          …
4963                          0                          0
4559                          0                          0
42                            0                          0
405                           0                          0
7833                          0                          0

      Genres_Travel_&_Local_Action_&_Adventure  Genres_Trivia  \
3139                                         0              0
4856                                         0              0
7029                                         0              0
9437                                         0              0
93                                           0              0
…                                          …              …
4963                                         0              0
4559                                         0              0
42                                           0              0
405                                          0              0
7833                                         0              0

      Genres_Video_Players_&_Editors  \
3139                               0
4856                               0
7029                               0
9437                               0
93                                 0
…                                …
4963                               0
4559                               0
42                                 0
405                                0
7833                               0

      Genres_Video_Players_&_Editors_Creativity  \
3139                                          0
4856                                          0
7029                                          0
9437                                          0
93                                            0
…                                           …
4963                                          0
4559                                          0
42                                            0
```

```
405                                                 0
7833                                                0

      Genres_Video_Players_&_Editors_Music_&_Video  Genres_Weather  \
3139                                             0               0
4856                                             0               0
7029                                             0               0
9437                                             0               0
93                                               0               0
…                                              …               …
4963                                             0               0
4559                                             0               0
42                                               0               0
405                                              0               0
7833                                             0               0

      Genres_Word
3139            0
4856            0
7029            0
9437            0
93              0
…             …
4963            0
4559            0
42              0
405             0
7833            0

[6795 rows x 156 columns]
```

[58]:
```
# x_test= scaler.fit_transform(x_test)
x_test
```

[58]:
```
         Reviews      Size   Installs  Price  Category_AUTO_AND_VEHICLES  \
3800   12.600753   14000.0  16.118096   0.00                           0
359    12.049606    4000.0  16.118096   0.00                           0
357     9.941265   18000.0  13.815512   0.00                           0
9193    2.484907   15000.0   6.908755   0.00                           0
9353   10.309253   99000.0  13.815512   0.00                           0
…            …       …        …    …                              …
6929    4.248495  951000.0   6.908755   0.99                           0
10691   2.995732    1600.0   6.216606   0.00                           0
3942   11.829188   81000.0  15.424949   0.00                           0
4132    8.599326   31000.0  11.512935   4.99                           0
5322   12.559089   14000.0  16.118096   0.00                           0
```

```
       Category_BEAUTY  Category_BOOKS_AND_REFERENCE  Category_BUSINESS  \
3800                 0                             0                  0
359                  0                             0                  0
357                  0                             0                  0
9193                 0                             1                  0
9353                 0                             0                  0
…                  …                             …                  …
6929                 0                             0                  0
10691                0                             0                  0
3942                 0                             0                  0
4132                 0                             0                  0
5322                 0                             0                  0

       Category_COMICS  Category_COMMUNICATION  …  Genres_Tools  \
3800                 0                       0  …             0
359                  0                       1  …             0
357                  0                       1  …             0
9193                 0                       0  …             0
9353                 0                       0  …             0
…                  …                       …  …           …
6929                 0                       0  …             0
10691                0                       0  …             0
3942                 0                       0  …             0
4132                 0                       0  …             0
5322                 0                       0  …             0

       Genres_Tools_Education  Genres_Travel_&_Local  \
3800                        0                      0
359                         0                      0
357                         0                      0
9193                        0                      0
9353                        0                      0
…                         …                      …
6929                        0                      0
10691                       0                      0
3942                        0                      0
4132                        0                      0
5322                        0                      0

       Genres_Travel_&_Local_Action_&_Adventure  Genres_Trivia  \
3800                                          0              0
359                                           0              0
357                                           0              0
9193                                          0              0
9353                                          0              0
…                                           …              …
6929                                          0              0
```

```
10691                                          0              0
3942                                           0              0
4132                                           0              0
5322                                           0              0

       Genres_Video_Players_&_Editors  \
3800                                0
359                                 0
357                                 0
9193                                0
9353                                0
…                                   …
6929                                0
10691                               0
3942                                0
4132                                0
5322                                0

       Genres_Video_Players_&_Editors_Creativity  \
3800                                           0
359                                            0
357                                            0
9193                                           0
9353                                           0
…                                              …
6929                                           0
10691                                          0
3942                                           0
4132                                           0
5322                                           0

       Genres_Video_Players_&_Editors_Music_&_Video  Genres_Weather  \
3800                                              0               0
359                                               0               0
357                                               0               0
9193                                              0               0
9353                                              0               0
…                                                 …               …
6929                                              0               0
10691                                             0               0
3942                                              0               0
4132                                              0               0
5322                                              0               0

       Genres_Word
3800             0
359              0
```

```
357              0
9193             0
9353             0
…              …
6929             0
10691            0
3942             0
4132             0
5322             0

[1699 rows x 156 columns]
```

[59]:
```
linreg= LinearRegression()
linreg
```

[59]:
```
LinearRegression()
```

[60]:
```
y_train
```

[60]:
```
      Rating
3139     3.0
4856     4.6
7029     3.1
9437     4.7
93       4.6
…        …
4963     4.5
4559     3.8
42       4.4
405      4.3
7833     3.5

[6795 rows x 1 columns]
```

[61]:
```
import numpy as np
linreg.fit(x_train, y_train)
y_pred=linreg.predict(x_test)

y_test=np.array(y_test)
y_pred=np.array(y_pred)

a=pd.DataFrame({'Actual':y_test.flatten(),'Predicted':y_pred.flatten()});a.
 ↪head(10)
```

[61]:
```
   Actual  Predicted
0     4.3   4.270089
1     4.2   4.176790
```

```
2     3.6   4.158290
3     3.5   4.163930
4     4.0   4.120641
5     4.2   4.165760
6     4.4   4.187668
7     4.3   4.386879
8     4.5   4.674462
9     3.8   4.284005
```

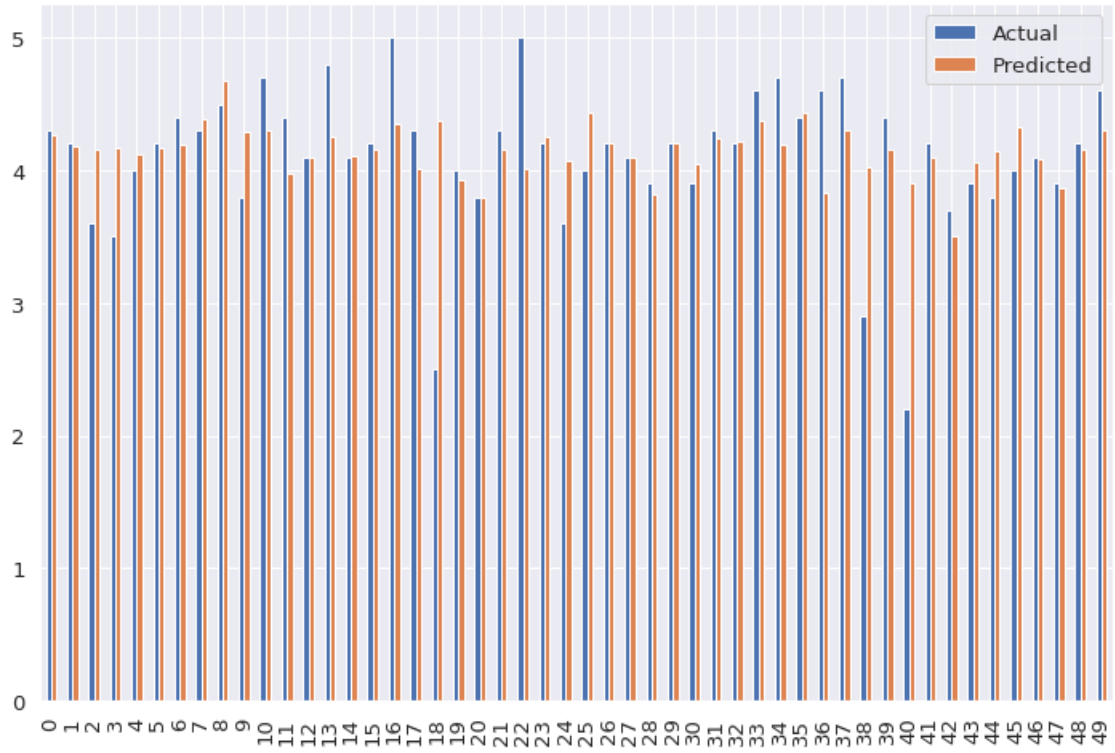
[62]:
```
lin_score= linreg.score(x_train,y_train)
lin_score
```

[62]:
```
0.16485834058497784
```

[63]:
```
import statsmodels.api as sm
from statsmodels.api import OLS
```

[64]:
```
fig =a.head(50)
fig.plot(kind='bar',figsize=(12,8))
```

[64]:
```
<AxesSubplot: >
```



we can see that model is predicting precisely well

[65]:
```
#Applying linear regression
model1 = sm.OLS(y_train, x_train)
model1=model1.fit()
```

[66]:
```
model1.summary()
```

[66]:
```
<class 'statsmodels.iolib.summary.Summary'>
"""
                                 OLS Regression Results
==============================================================================
=======
Dep. Variable:                  Rating   R-squared (uncentered):
0.986
Model:                             OLS   Adj. R-squared (uncentered):
0.986
Method:                  Least Squares   F-statistic:
3849.
Date:                 Fri, 01 Sep 2023   Prob (F-statistic):
0.00
Time:                         19:08:30   Log-Likelihood:
-4789.5
No. Observations:                6795   AIC:
9831.
Df Residuals:                    6669   BIC:
1.069e+04
Df Model:                         126
Covariance Type:            nonrobust
==============================================================================
================================
                                                 coef    std err          t
P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
--------------------------------
Reviews                                        0.1777      0.006     29.248
0.000       0.166       0.190
Size                                       -7.368e-08   6.62e-08     -1.113
0.266   -2.03e-07     5.6e-08
Installs                                      -0.1542      0.006    -25.071
0.000      -0.166      -0.142
Price                                         -0.0017      0.004     -0.466
0.641      -0.009       0.005
Category_AUTO_AND_VEHICLES                     1.5194      0.120     12.685
0.000       1.285       1.754
Category_BEAUTY                                1.6367      0.123     13.312
0.000       1.396       1.878
Category_BOOKS_AND_REFERENCE                   1.5745      0.117     13.440
0.000       1.345       1.804
```

Category_BUSINESS			1.4881	0.116	12.820
0.000	1.261	1.716			
Category_COMICS			2.2447	0.224	10.014
0.000	1.805	2.684			
Category_COMMUNICATION			1.4439	0.116	12.402
0.000	1.216	1.672			
Category_DATING			1.3936	0.118	11.855
0.000	1.163	1.624			
Category_EDUCATION			2.6367	0.239	11.035
0.000	2.168	3.105			
Category_ENTERTAINMENT			2.5258	0.240	10.531
0.000	2.056	2.996			
Category_EVENTS			1.6363	0.122	13.432
0.000	1.397	1.875			
Category_FAMILY			2.6273	0.232	11.302
0.000	2.172	3.083			
Category_FINANCE			1.4651	0.116	12.621
0.000	1.237	1.693			
Category_FOOD_AND_DRINK			1.4880	0.118	12.601
0.000	1.257	1.719			
Category_GAME			2.9140	0.231	12.632
0.000	2.462	3.366			
Category_HEALTH_AND_FITNESS			1.5209	0.116	13.086
0.000	1.293	1.749			
Category_HOUSE_AND_HOME			1.5080	0.120	12.607
0.000	1.274	1.743			
Category_LIBRARIES_AND_DEMO			1.5539	0.121	12.861
0.000	1.317	1.791			
Category_LIFESTYLE			1.8855	0.226	8.360
0.000	1.443	2.328			
Category_MAPS_AND_NAVIGATION			1.4283	0.118	12.100
0.000	1.197	1.660			
Category_MEDICAL			1.5299	0.116	13.195
0.000	1.303	1.757			
Category_NEWS_AND_MAGAZINES			1.4397	0.116	12.365
0.000	1.211	1.668			
Category_PARENTING			2.4513	0.226	10.851
0.000	2.008	2.894			
Category_PERSONALIZATION			1.5584	0.116	13.409
0.000	1.331	1.786			
Category_PHOTOGRAPHY			1.4732	0.117	12.635
0.000	1.245	1.702			
Category_PRODUCTIVITY			1.4760	0.116	12.703
0.000	1.248	1.704			
Category_SHOPPING			1.5116	0.117	12.944
0.000	1.283	1.741			
Category_SOCIAL			1.4878	0.117	12.762

```
0.000       1.259       1.716
Category_SPORTS                                2.7353      0.420      6.520
0.000       1.913       3.558
Category_TOOLS                                 1.9876      0.225      8.819
0.000       1.546       2.429
Category_TRAVEL_AND_LOCAL                      1.9850      0.226      8.798
0.000       1.543       2.427
Category_VIDEO_PLAYERS                         2.6014      0.513      5.067
0.000       1.595       3.608
Category_WEATHER                               1.4952      0.120     12.501
0.000       1.261       1.730
Type_Paid                                     -0.0729      0.031     -2.336
0.020      -0.134      -0.012
Content_Rating_Everyone                        1.6361      0.229      7.135
0.000       1.187       2.086
Content_Rating_Everyone_10+                    1.6430      0.231      7.113
0.000       1.190       2.096
Content_Rating_Mature_17+                      1.6122      0.231      6.970
0.000       1.159       2.066
Content_Rating_Teen                            1.6250      0.230      7.079
0.000       1.175       2.075
Content_Rating_Unrated                         1.6329      0.545      2.995
0.003       0.564       2.702
Genres_Action_Action_&_Adventure               0.3732      0.143      2.606
0.009       0.092       0.654
Genres_Adventure                              -0.0240      0.074     -0.323
0.746      -0.169       0.121
Genres_Adventure_Action_&_Adventure            0.2591      0.296      0.875
0.381      -0.321       0.839
Genres_Adventure_Brain_Games                   0.6133      0.501      1.225
0.221      -0.368       1.595
Genres_Adventure_Education                     0.0945      0.358      0.264
0.792      -0.607       0.796
Genres_Arcade                                  0.0520      0.057      0.910
0.363      -0.060       0.164
Genres_Arcade_Action_&_Adventure               0.3727      0.157      2.374
0.018       0.065       0.680
Genres_Arcade_Pretend_Play                     0.5838      0.500      1.167
0.243      -0.397       1.564
Genres_Art_&_Design                            3.2571      0.242     13.440
0.000       2.782       3.732
Genres_Art_&_Design_Creativity                 2.3160      0.257      9.013
0.000       1.812       2.820
Genres_Art_&_Design_Pretend_Play               1.7523      0.372      4.708
0.000       1.023       2.482
Genres_Auto_&_Vehicles                         1.5194      0.120     12.685
0.000       1.285       1.754
```

```
Genres_Beauty                                1.6367      0.123     13.312
0.000       1.396       1.878
Genres_Board                                 0.0200      0.096      0.209
0.835      -0.168       0.208
Genres_Board_Action_&_Adventure              0.2377      0.296      0.804
0.421      -0.342       0.817
Genres_Board_Brain_Games                     0.4685      0.162      2.888
0.004       0.150       0.787
Genres_Board_Pretend_Play                 2.645e-11   7.17e-11      0.369
0.712   -1.14e-10    1.67e-10
Genres_Books_&_Reference                     1.5745      0.117     13.440
0.000       1.345       1.804
Genres_Books_&_Reference_Education           0.3477      0.358      0.971
0.331      -0.354       1.049
Genres_Business                              1.4881      0.116     12.820
0.000       1.261       1.716
Genres_Card                                 -0.0445      0.087     -0.510
0.610      -0.216       0.127
Genres_Card_Action_&_Adventure               0.0768      0.501      0.153
0.878      -0.905       1.059
Genres_Card_Brain_Games                      0.7532      0.500      1.506
0.132      -0.227       1.734
Genres_Casino                                0.0795      0.097      0.819
0.413      -0.111       0.270
Genres_Casual                                0.1860      0.083      2.231
0.026       0.023       0.349
Genres_Casual_Action_&_Adventure             0.2888      0.146      1.983
0.047       0.003       0.574
Genres_Casual_Brain_Games                    0.6330      0.172      3.686
0.000       0.296       0.970
Genres_Casual_Creativity                     0.3679      0.213      1.728
0.084      -0.049       0.785
Genres_Casual_Education                      0.4290      0.296      1.451
0.147      -0.150       1.008
Genres_Casual_Music_&_Video                  0.4493      0.358      1.254
0.210      -0.253       1.151
Genres_Casual_Pretend_Play                   0.2975      0.133      2.243
0.025       0.037       0.558
Genres_Comics                                0.7667      0.186      4.132
0.000       0.403       1.130
Genres_Comics_Creativity                     1.4781      0.340      4.347
0.000       0.812       2.145
Genres_Communication                         1.4439      0.116     12.402
0.000       1.216       1.672
Genres_Communication_Creativity              0.5114      0.500      1.022
0.307      -0.469       1.492
Genres_Dating                                1.3936      0.118     11.855
```

```
0.000       1.163       1.624
Genres_Education                                0.4846      0.082       5.895
0.000       0.323       0.646
Genres_Education_Action_&_Adventure             0.7352      0.235       3.134
0.002       0.275       1.195
Genres_Education_Brain_Games                    0.3971      0.298       1.334
0.182      -0.186       0.981
Genres_Education_Creativity                     0.8585      0.218       3.937
0.000       0.431       1.286
Genres_Education_Education                      0.5630      0.113       4.992
0.000       0.342       0.784
Genres_Education_Music_&_Video                  0.4593      0.234       1.960
0.050      -0.000       0.919
Genres_Education_Pretend_Play                   0.6303      0.133       4.722
0.000       0.369       0.892
Genres_Educational                              0.2000      0.122       1.644
0.100      -0.039       0.439
Genres_Educational_Action_&_Adventure           0.6089      0.358       1.701
0.089      -0.093       1.311
Genres_Educational_Brain_Games                  0.5978      0.259       2.307
0.021       0.090       1.106
Genres_Educational_Creativity                   0.3891      0.259       1.501
0.133      -0.119       0.897
Genres_Educational_Education                    0.5505      0.118       4.678
0.000       0.320       0.781
Genres_Educational_Pretend_Play                 0.4067      0.157       2.584
0.010       0.098       0.715
Genres_Entertainment                            0.3078      0.081       3.789
0.000       0.149       0.467
Genres_Entertainment_Action_&_Adventure         0.4808      0.358       1.343
0.179      -0.221       1.183
Genres_Entertainment_Brain_Games                0.4313      0.203       2.125
0.034       0.034       0.829
Genres_Entertainment_Creativity                 0.7097      0.296       2.395
0.017       0.129       1.291
Genres_Entertainment_Education                  0.6863      0.500       1.372
0.170      -0.294       1.667
Genres_Entertainment_Music_&_Video              0.3289      0.136       2.414
0.016       0.062       0.596
Genres_Entertainment_Pretend_Play               0.3036      0.500       0.607
0.544      -0.677       1.284
Genres_Events                                   1.6363      0.122      13.432
0.000       1.397       1.875
Genres_Finance                                  1.4651      0.116      12.621
0.000       1.237       1.693
Genres_Food_&_Drink                             1.4880      0.118      12.601
0.000       1.257       1.719
```

```
Genres_Health_&_Fitness                          1.5209      0.116     13.086
0.000       1.293       1.749
Genres_Health_&_Fitness_Action_&_Adventure      -0.0651      0.500     -0.130
0.896      -1.046       0.916
Genres_Health_&_Fitness_Education           -2.393e-12    1.6e-11     -0.149
0.881   -3.38e-11    2.91e-11
Genres_House_&_Home                              1.5080      0.120     12.607
0.000       1.274       1.743
Genres_Libraries_&_Demo                          1.5539      0.121     12.861
0.000       1.317       1.791
Genres_Lifestyle                                 1.0213      0.183      5.585
0.000       0.663       1.380
Genres_Lifestyle_Education                   1.295e-11   3.61e-11      0.359
0.720   -5.78e-11    8.37e-11
Genres_Lifestyle_Pretend_Play                    0.8642      0.339      2.552
0.011       0.200       1.528
Genres_Maps_&_Navigation                         1.4283      0.118     12.100
0.000       1.197       1.660
Genres_Medical                                   1.5299      0.116     13.195
0.000       1.303       1.757
Genres_Music                                    -0.2012      0.137     -1.474
0.141      -0.469       0.066
Genres_Music_&_Audio_Music_&_Video               0.7773      0.500      1.553
0.120      -0.204       1.758
Genres_Music_Music_&_Video                       0.6470      0.296      2.189
0.029       0.068       1.226
Genres_News_&_Magazines                          1.4397      0.116     12.365
0.000       1.211       1.668
Genres_Parenting                                 0.7896      0.154      5.140
0.000       0.488       1.091
Genres_Parenting_Brain_Games                     0.3872      0.407      0.951
0.341      -0.411       1.185
Genres_Parenting_Education                       0.4060      0.304      1.336
0.182      -0.190       1.002
Genres_Parenting_Music_&_Video                   0.8684      0.220      3.949
0.000       0.437       1.300
Genres_Personalization                           1.5584      0.116     13.409
0.000       1.331       1.786
Genres_Photography                               1.4732      0.117     12.635
0.000       1.245       1.702
Genres_Productivity                              1.4760      0.116     12.703
0.000       1.248       1.704
Genres_Puzzle                                    0.3920      0.082      4.780
0.000       0.231       0.553
Genres_Puzzle_Action_&_Adventure                 0.4432      0.500      0.886
0.376      -0.537       1.424
Genres_Puzzle_Brain_Games                        0.4871      0.153      3.185
```

```
0.001       0.187       0.787
Genres_Puzzle_Creativity                          0.6099      0.500       1.219
0.223       -0.371       1.591
Genres_Puzzle_Education                           0.9180      0.500       1.835
0.067       -0.063       1.899
Genres_Racing                                    -0.1002      0.073      -1.377
0.169       -0.243       0.042
Genres_Racing_Action_&_Adventure                  0.4866      0.153       3.177
0.001       0.186       0.787
Genres_Racing_Pretend_Play                        1.0045      0.500       2.007
0.045       0.024       1.986
Genres_Role_Playing                               0.2384      0.090       2.650
0.008       0.062       0.415
Genres_Role_Playing_Action_&_Adventure            0.2543      0.202       1.258
0.208       -0.142       0.651
Genres_Role_Playing_Brain_Games                   0.4064      0.500       0.812
0.417       -0.574       1.387
Genres_Role_Playing_Pretend_Play                  0.0877      0.259       0.339
0.735       -0.420       0.595
Genres_Shopping                                   1.5116      0.117      12.944
0.000       1.283       1.741
Genres_Simulation                                 0.2544      0.085       2.979
0.003       0.087       0.422
Genres_Simulation_Action_&_Adventure              0.4958      0.202       2.451
0.014       0.099       0.892
Genres_Simulation_Education                       0.1281      0.354       0.362
0.717       -0.565       0.821
Genres_Simulation_Pretend_Play                    0.2380      0.259       0.920
0.358       -0.269       0.745
Genres_Social                                     1.4878      0.117      12.762
0.000       1.259       1.716
Genres_Sports                                     0.2297      0.351       0.654
0.513       -0.459       0.919
Genres_Sports_Action_&_Adventure                  0.3218      0.296       1.088
0.277       -0.258       0.902
Genres_Strategy                                   0.1513      0.090       1.689
0.091       -0.024       0.327
Genres_Strategy_Action_&_Adventure                0.5711      0.358       1.596
0.111       -0.131       1.273
Genres_Strategy_Creativity                             0           0         nan
nan            0            0
Genres_Strategy_Education                         0.9069      0.500       1.813
0.070       -0.074       1.888
Genres_Tools                                      0.8904      0.182       4.884
0.000       0.533       1.248
Genres_Tools_Education                            1.0973      0.339       3.241
0.001       0.434       1.761
```

```
Genres_Travel_&_Local                              0.9374      0.184      5.105
0.000       0.577       1.297
Genres_Travel_&_Local_Action_&_Adventure           1.0476      0.339      3.094
0.002       0.384       1.711
Genres_Trivia                                     -0.1443      0.111     -1.296
0.195      -0.363       0.074
Genres_Video_Players_&_Editors                     0.2563      0.467      0.549
0.583      -0.659       1.171
Genres_Video_Players_&_Editors_Creativity          0.1007      0.425      0.237
0.813      -0.732       0.934
Genres_Video_Players_&_Editors_Music_&_Video       0.1805      0.333      0.542
0.588      -0.472       0.833
Genres_Weather                                     1.4952      0.120     12.501
0.000       1.261       1.730
Genres_Word                                        0.1611      0.125      1.288
0.198      -0.084       0.406
==============================================================================
Omnibus:                     2407.734   Durbin-Watson:                   1.996
Prob(Omnibus):                  0.000   Jarque-Bera (JB):            13064.817
Skew:                          -1.608   Prob(JB):                         0.00
Kurtosis:                       8.983   Cond. No.                     2.15e+21
==============================================================================

Notes:
[1] R² is computed without centering (uncentered) since the model does not
contain a constant.
[2] Standard Errors assume that the covariance matrix of the errors is correctly
specified.
[3] The smallest eigenvalue is 1.46e-29. This might indicate that there are
strong multicollinearity problems or that the design matrix is singular.
"""
```

[67]:
```
from tabulate import tabulate
from sklearn.metrics import mean_squared_error,mean_absolute_error,␣
 ↪explained_variance_score
```

[68]:
```
lin_accuracy =explained_variance_score(y_test,y_pred)
lin_accuracy= round(lin_accuracy*100,6)
print("Linear Regression ModelAcurracy on test data:", lin_accuracy,"%")
print()
lin_mae =mean_absolute_error(y_test,y_pred)
lin_mse =mean_squared_error(y_test,y_pred)
lin_rmse =lin_mse*(1/2)
print("MAE:" ,lin_mae)
print("MSE:",lin_mse)
print("RMSE:",lin_rmse)
print()
```

```
Linear Regression ModelAcurracy on test data: 12.867859 %

MAE: 0.34717754478544766
MSE: 0.2497547471269906
RMSE: 0.1248773735634953
```

[69]:
```
print("SGD Regression:Diabetes Prediction")
sgd_reg =SGDRegressor()
sgd_reg.fit(x_train,y_train)
sgd_score =sgd_reg.score(x_train,y_train)
print("R-squared on Train:", sgd_score)
y_pred_sgd =sgd_reg.predict(x_test)
sgd_accuracy = explained_variance_score(y_test, y_pred_sgd)
sgd_accuracy = round(sgd_accuracy*100, 6)
print("SGD Regressor Model Accuracy on Test:", sgd_accuracy, "%")
print()
sgd_mae =mean_absolute_error(y_test,y_pred_sgd)
sgd_mse =mean_squared_error(y_test,y_pred_sgd)
sgd_rmse=sgd_mse*(1/2)

print("MAE:", sgd_mae)
print("MSE:", sgd_mse)
print("RMSE:", sgd_rmse)
print()
```

```
SGD Regression:Diabetes Prediction

/usr/local/lib/python3.10/site-packages/sklearn/utils/validation.py:1143:
DataConversionWarning: A column-vector y was passed when a 1d array was
expected. Please change the shape of y to (n_samples, ), for example using
ravel().
  y = column_or_1d(y, warn=True)

R-squared on Train: -1.2341968582263784e+37
SGD Regressor Model Accuracy on Test: -8.93024951672048e+38 %

MAE: 6.315689490374587e+17
MSE: 2.9572774392287917e+36
RMSE: 1.4786387196143959e+36
```

[70]:
```
# lets form the tabular formate for statsmodel using ordinary least square OLS␣
 ↪method.
# performing the evaluation matrix comparision
model_table_1 =pd.DataFrame(columns=["Comparision Matrix","LR Model","SGD␣
 ↪Model"])
```

```
model_table_1["Comparision Matrix"]=["Accuracy(Variance Score)","R2␣
 ↪Score","MAE","MSE","RMSE"]
model_table_1["LR Model"]=[lin_accuracy,lin_score,lin_mae,lin_mse,lin_rmse]
model_table_1["SGD Model"]=[sgd_accuracy,sgd_score,sgd_mae,sgd_mse,sgd_rmse]
print(tabulate(model_table_1,headers="keys",tablefmt="fancy_outline",numalign="left"))
```

```
╒════╤═══════════════════════════╤═══════════╤═══════════════╕
│    │ Comparision Matrix        │ LR Model  │ SGD Model     │
╞════╪═══════════════════════════╪═══════════╪═══════════════╡
│ 0  │ Accuracy(Variance Score)  │ 12.8679   │ -8.93025e+38  │
├────┼───────────────────────────┼───────────┼───────────────┤
│ 1  │ R2 Score                  │ 0.164858  │ -1.2342e+37   │
├────┼───────────────────────────┼───────────┼───────────────┤
│ 2  │ MAE                       │ 0.347178  │ 6.31569e+17   │
├────┼───────────────────────────┼───────────┼───────────────┤
│ 3  │ MSE                       │ 0.249755  │ 2.95728e+36   │
├────┼───────────────────────────┼───────────┼───────────────┤
│ 4  │ RMSE                      │ 0.124877  │ 1.47864e+36   │
╘════╧═══════════════════════════╧═══════════╧═══════════════╛
```

5 lets try with Standard Scaler for SGDregressor, tabular format.

[72]:
```
from tabulate import tabulate
from sklearn.model_selection import cross_val_score
from sklearn.preprocessing import StandardScaler
from sklearn.linear_model import LinearRegression, SGDRegressor
from sklearn.metrics import mean_squared_error, mean_absolute_error,␣
 ↪explained_variance_score
import warnings
warnings.filterwarnings("ignore")
import matplotlib.pyplot as plt
%matplotlib inline
```

[73]:
```
scaler= StandardScaler()
scaler
```

[73]:
```
StandardScaler()
```

[74]:
```
x= google.drop('Rating',axis=1)
y= google.Rating
```

[75]:
```
print("The x shape is:",x.shape)
print("The y shape is:",y.shape)
```

```
The x shape is: (8494, 156)
The y shape is: (8494,)
```

[76]:
```
X_train,X_test,Y_train,Y_test= train_test_split(x,y, test_size=0.3,␣
 ↪random_state=30)
```

[77]:
```
print("The x_train shape",X_train.shape)
print("The shape of X_test",X_test.shape)
print("The Y_train Shape",Y_train.shape)
print("The Y_test shape",Y_test.shape)
```

```
The x_train shape (5945, 156)
The shape of X_test (2549, 156)
The Y_train Shape (5945,)
The Y_test shape (2549,)
```

[78]:
```
scaler =StandardScaler().fit(X_train)
```

[79]:
```
X_train = scaler.transform(X_train)
X_test = scaler.transform(X_test)
```

[80]:
```
X_train;X_test
```

[80]:
```
array([[-0.27687705,  3.77153482, -0.72259123, …, -0.01834476,
        -0.09116315, -0.04858476],
       [-0.59779029, -0.3104075 , -0.05962626, …, -0.01834476,
        -0.09116315, -0.04858476],
       [ 0.21415294, -0.20501798, -0.05962626, …, -0.01834476,
        -0.09116315, -0.04858476],
       …,
       [ 0.48890313, -0.24847758,  0.40378217, …, -0.01834476,
        -0.09116315, -0.04858476],
       [ 0.4535812 , -0.34626166,  0.60336202, …, -0.01834476,
        -0.09116315, -0.04858476],
       [ 0.7630694 , -0.25934247,  0.60336202, …, -0.01834476,
        -0.09116315, -0.04858476]])
```

[81]:
```
train_data=pd.DataFrame(X_train)
train_data['Price']=Y_train
```

[82]:
```
train_data.head()
```

[82]:

	0	1	2	3	4	5	6	…	147	148	149	150	Price
0	-1.101469	3.239155	-0.722591	-0.156277	-0.093021	-0.0724	-0.14893	…	-0.012971	-0.158114	-0.012971	-0.055109	1.0
1	1.010209	-0.270207	0.603362	-0.156277	-0.093021	-0.0724	-0.14893	…	-0.012971	-0.158114	-0.012971	-0.055109	1.0
2	-0.423062	0.012280	-0.722591	-0.156277	-0.093021	-0.0724	-0.14893	…	-0.012971	-0.158114	-0.012971	-0.055109	1.0
3	0.748811	0.436011	0.603362	-0.156277	-0.093021	-0.0724	-0.14893	…	-0.012971	-0.158114	-0.012971	-0.055109	1.0
4	1.027064	-0.139829	1.066773	-0.156277	-0.093021	-0.0724	-0.14893	…	-0.012971	-0.158114	-0.012971	-0.055109	1.0

```
3 -0.193238 -0.084351 -0.168958  … -0.012971 -0.158114 -0.012971 -0.055109
4 -0.193238 -0.084351 -0.168958  … -0.012971 -0.158114 -0.012971 -0.055109

        151       152       153       154       155  Price
0 -0.123982 -0.018345 -0.018345 -0.091163 -0.048585    4.1
1 -0.123982 -0.018345 -0.018345 -0.091163 -0.048585    NaN
2 -0.123982 -0.018345 -0.018345 -0.091163 -0.048585    4.7
3 -0.123982 -0.018345 -0.018345 -0.091163 -0.048585    NaN
4 -0.123982 -0.018345 -0.018345 -0.091163 -0.048585    4.3

[5 rows x 157 columns]
```

[83]:
```
X_test =np.array(X_test)
Y_test= np.array(Y_test)
```

[84]:
```
print("Linear Regression: Google Play store prediction")
lin_reg =LinearRegression()
lin_reg
```

```
Linear Regression: Google Play store prediction
```

[84]:
```
LinearRegression()
```

[85]:
```
lin_reg.fit(X_train,Y_train)
lin_score= lin_reg.score(X_train,Y_train)
print("R-Squared on the traim data:",lin_score)
```

```
R-Squared on the traim data: 0.1509702880911723
```

[86]:
```
lin_y_pred =lin_reg.predict(X_test)
lin_accuracy=explained_variance_score(Y_test, lin_y_pred)
lin_accuracy= round(lin_accuracy*100,6)
print("Linear Regression ModelAcurracy on test data:", lin_accuracy,"%")
print()
lin_mae =mean_absolute_error(Y_test,lin_y_pred)
lin_mse= mean_squared_error(Y_test,lin_y_pred)
lin_rmse=lin_mse*(1/2.0)
print("MAE:" ,lin_mae)
print("MSE:",lin_mse)
print("RMSE:",lin_rmse)
print()
```

```
Linear Regression ModelAcurracy on test data: -9.163047384133715e+26 %

MAE: 39136358833.476875
MSE: 2.6126560258909894e+24
RMSE: 1.3063280129454947e+24
```

[87]:
```
print("SGD Regression:Diabetes Prediction")
sgd_reg = SGDRegressor()
sgd_reg.fit(X_train, Y_train)
sgd_score = sgd_reg.score(X_train, Y_train)
print("R-squared on Train:", sgd_score)

sgd_y_pred = sgd_reg.predict(X_test)
sgd_accuracy = explained_variance_score(Y_test, sgd_y_pred)
sgd_accuracy = round(sgd_accuracy*100, 6)
print("SGD Regressor Model Accuracy on Test:", sgd_accuracy, "%")
print()

sgd_mae = mean_absolute_error(Y_test, sgd_y_pred)
sgd_mse = mean_squared_error(Y_test, sgd_y_pred)
sgd_rmse = sgd_mse*(1/2.0)

print("MAE:", sgd_mae)
print("MSE:", sgd_mse)
print("RMSE:", sgd_rmse)
print()
```

```
SGD Regression:Diabetes Prediction
R-squared on Train: -56845206.41751026
SGD Regressor Model Accuracy on Test: -10840628211.275059 %

MAE: 237.5329574846341
MSE: 30932663.18062522
RMSE: 15466331.59031261
```

[88]:
```
#Performing evaluation matrix comparison
model_table = pd.DataFrame(columns = ["Comparison Matrix", "LR Model", "SGD␣
 ↪Model"])
model_table["Comparison Matrix"] = ["Accuracy (Variance Score)", "R2 Score",␣
 ↪"MAE", "MSE", "RMSE"]
model_table["LR Model"] = [lin_accuracy, lin_score, lin_mae, lin_mse, lin_rmse]
model_table["SGD Model"] = [sgd_accuracy, sgd_score, sgd_mae, sgd_mse, sgd_rmse]

print(tabulate(model_table, headers = 'keys', tablefmt = 'psql',␣
 ↪numalign="left"))
```

```
+----+---------------------------+-------------+--------------+
|    | Comparison Matrix         | LR Model    | SGD Model    |
|----+---------------------------+-------------+--------------|
| 0  | Accuracy (Variance Score) | -9.16305e+26 | -1.08406e+10 |
| 1  | R2 Score                  | 0.15097     | -5.68452e+07 |
| 2  | MAE                       | 3.91364e+10  | 237.533      |
```

```
| 3   | MSE                         | 2.61266e+24   | 3.09327e+07   |
| 4   | RMSE                        | 1.30633e+24   | 1.54663e+07   |
+----+-----------------------------+---------------+---------------+
```

[89]:
```
prediction_table = pd.DataFrame(columns=["Actual Value","LR Predicted Value",␣
 ↪"SGD Predicted Value"])
prediction_table["Actual Value"] = Y_test

prediction_table["LR Predicted Value"] = lin_y_pred
prediction_table["SGD Predicted Value"] = sgd_y_pred

print(tabulate(prediction_table, headers = 'keys', tablefmt = 'psql',␣
 ↪numalign="left"))
```

```
+------+----------------+----------------------+-----------------------+
|      | Actual Value   | LR Predicted Value   | SGD Predicted Value   |
|------+----------------+----------------------+-----------------------|
| 0    | 4.2            | 4.13719              | -64.9616              |
| 1    | 3.9            | 3.74436              | -50.4024              |
| 2    | 4              | 4.27024              | 23.2021               |
| 3    | 4.7            | 4.03343              | 20.6508               |
| 4    | 4              | 4.14634              | -57.739               |
| 5    | 4.2            | 4.14085              | 98.2101               |
| 6    | 2.9            | 4.03245              | -16.7091              |
| 7    | 4.1            | 4.16722              | -1.26626              |
| 8    | 4.7            | 3.75462              | 75.8889               |
| 9    | 3.9            | 3.85789              | -34.0408              |
| 10   | 4.3            | 3.92613              | -28.7732              |
| 11   | 4.3            | 4.30979              | -23.0037              |
| 12   | 4.5            | 4.42759              | -1.10126              |
| 13   | 4.5            | 4.27915              | -21.5937              |
| 14   | 3.3            | 3.90647              | -17.6081              |
| 15   | 4.2            | 4.01829              | -7.59629              |
| 16   | 4.5            | 4.38548              | -22.1402              |
| 17   | 3.8            | 4.27708              | 1.81486               |
| 18   | 4              | 4.18626              | -17.6589              |
| 19   | 4.2            | 4.06553              | -45.3454              |
| 20   | 4.6            | 4.33128              | -27.6753              |
| 21   | 4.3            | 4.20945              | -105.268              |
| 22   | 4.3            | 4.176                | -52.4505              |
| 23   | 4.3            | 4.07835              | 62.8089               |
| 24   | 3.8            | 4.3762               | -8.08989              |
| 25   | 4.3            | 4.1649               | -18.7715              |
| 26   | 3.8            | 3.89573              | 27.8024               |
| 27   | 4              | 4.1428               | 1.21659               |
| 28   | 4.5            | 4.28343              | 216.177               |
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| 30   | 2.8            | 3.97312              | -63.2927              |
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467	3.9	4.093	99.6884
468	3.8	4.13108	2.55541
469	4.7	4.09788	-1.6952
470	4.5	4.26389	-23.8042
471	4.1	4.1974	-30.0583
472	2.4	3.74925	96.6609
473	4.1	4.09934	-25.5604
474	3.9	4.06175	-3.11941
475	4.1	4.22923	5.50986
476	4.7	4.46922	-94.9009
477	4.1	4.1887	-663.379
478	3.6	3.87522	24.7403
479	4.8	4.34617	-104.417
480	4.2	4.05882	41.9818
481	3.6	3.96165	-21.3312
482	4.5	4.13218	6.65501
483	4.4	3.9564	-23.3283
484	4.6	4.32054	26.5802
485	4.2	4.14182	23.561
486	4.1	4.11009	3.90663
487	4.6	4.31223	-14.8492
488	3.3	3.79283	76.5135
489	4.3	3.97166	89.9831
490	4.2	3.94468	47.4923
491	3.6	4.0554	80.6878
492	4.6	4.20139	-27.5692
493	4.6	4.25511	66.3898
494	4.4	4.23939	-7.13893
495	4	4.19651	32.078
496	4.6	3.99534	9.30341
497	4.5	4.30589	91.226
498	4.4	3.90305	3.93906
499	4.9	4.47889	76.4451
500	5	4.1183	89.0492
501	4.1	3.88597	-12.0998
502	4.4	4.28147	35.6842
503	3.7	4.05589	54.771
504	4	4.19407	29.0895
505	4.4	3.90476	-28.0192
506	4.6	4.12937	-103.359
507	4.1	3.9243	-58.965
508	4.5	4.55125	-28.8858
509	4.6	4.2927	-1.7226
510	5	3.97141	102.239

511	4.2	4.18052	93.9709
512	4.3	3.80515	-36.0125
513	3.9	3.89524	1.7195
514	4.1	4.22972	101.603
515	4.7	4.43577	73.4997
516	4.5	4.48753	-6.82955
517	4	4.02854	-44.7612
518	4	3.7899	30.0188
519	4.2	3.97508	-83.1607
520	4.4	4.67161	-29.7306
521	2.9	3.99937	98.7503
522	4.7	4.39451	-91.2812
523	4.8	4.32347	18.8764
524	4.8	4.29514	83.0344
525	4	4.10267	2.85826
526	4.6	4.22764	-25.3187
527	4.5	3.76194	45.8488
528	3.4	3.72923	45.5512
529	2.3	3.86057	-17.5468
530	4.6	4.43284	-28.9789
531	4.4	3.92991	54.0339
532	4.2	4.03172	-82.9487
533	4.6	4.41282	36.3659
534	4.3	4.68199	324.699
535	4.2	4.19993	-13.1206
536	3.9	4.04612	-15.8985
537	4.7	4.31028	169.696
538	3.8	3.895	-34.8258
539	4.4	4.1349	-19.8858
540	5	4.30393	19.2031
541	4.6	4.0554	-6.97037
542	4.1	4.30833	8.54507
543	4.2	4.35423	2.21852
544	4.2	4.50364	-19.9144
545	4.2	4.24973	-12.4168
546	4.4	3.94773	-5.50234
547	3.9	4.01951	-85.207
548	4	3.92454	35.3323
549	4.5	4.32389	-51.6086
550	4.2	4.30979	-27.057
551	4.4	4.63255	-5.87648
552	4.5	4.1052	136.706
553	4.2	4.51725	-25.7375
554	4.2	4.31028	-37.8624
555	4.2	4.00218	20.5973
556	4.6	4.36839	-19.2981
557	4.5	4.22297	25.5382
558	3.4	4.1218	-17.5017

559	4.3	4.33958	-37.7226
560	4.3	4.16001	5.09231
561	4.4	4.31468	24.1211
562	5	4.176	83.5005
563	4.4	4.34153	21.7618
564	4.4	4.05491	-19.6195
565	3.8	3.49815	-25.6975
566	4.1	4.02171	12.8733
567	3.6	4.26389	-0.329563
568	4.4	3.93577	54.0528
569	4.4	3.95823	3.28708
570	4.2	4.1804	1.67945
571	4.4	4.21018	-35.7204
572	4.3	4.20139	45.5482
573	3.6	4.18211	-64.1902
574	4.6	4.2219	-19.8052
575	4	4.05686	-11.5272
576	4.5	4.09983	57.3081
577	4	3.77805	22.637
578	4.2	4.22288	-0.587872
579	3.6	3.98313	57.3054
580	4.5	4.07493	16.4112
581	4.5	4.04539	-108.344
582	4.2	4.48948	45.8709
583	3.8	4.24485	5.04336
584	3.7	3.96311	53.3472
585	4	4.28929	-24.3902
586	4.7	4.12034	-70.139
587	4.4	4.48313	-3.45678
588	4.8	4.26097	44.7765
589	4.8	4.57847	252.283
590	4.3	4.23264	-22.7348
591	3.5	4.03562	-108.352
592	4.7	4.21604	71.774
593	3.8	3.93186	-30.9383
594	4	4.28831	7.27526
595	4.6	4.35911	-0.141948
596	3.7	4.00599	22.0864
597	4.4	4.31468	-24.6998
598	4.3	4.27134	2.24438
599	4.2	4.31346	-24.2176
600	4.3	3.94065	-14.4514
601	4.4	4.00266	16.1116
602	4	4.21458	50.8026
603	4.4	4.17454	9.81531
604	4.3	4.16697	-64.9587
605	4.4	3.88719	-58.071
606	4.5	4.35081	70.3548

607	3.5	4.01353	-14.7917
608	4.5	4.3939	13.212
609	4	4.14378	41.9866
610	4.3	4.16276	-15.9651
611	4.4	4.27854	-3492.19
612	4.4	4.44163	-13.3053
613	4.6	4.41038	-55.7341
614	4.6	4.33128	32.324
615	4.6	4.40208	5.71643
616	4.5	4.10026	-31.0841
617	3.8	3.92991	51.6204
618	4.5	4.50132	27.2571
619	3.8	3.93284	69.7128
620	4.6	3.74827	63.6646
621	3.2	4.1135	71.2058
622	4.6	4.42405	22.6712
623	4.3	4.2385	-76.6917
624	2.4	4.05442	40.3305
625	4.5	4.13157	3.02548
626	3.3	4.10227	15.339
627	4.4	4.17503	-46.6845
628	4.2	4.13011	78.8641
629	5	4.21263	101.703
630	4.5	4.07163	8.278
631	4	4.03782	52.2453
632	4.2	4.01194	82.6108
633	4.5	4.04539	-48.4345
634	5	4.31028	101.286
635	4.1	4.14007	-15.0716
636	4.1	3.8753	-64.8384
637	4.2	3.83038	9.5573
638	3.6	3.93211	-52.0617
639	3.7	4.21336	-79.5014
640	4.3	4.20823	32.8018
641	4.6	4.593	-28.4996
642	4.7	4.63401	31.0671
643	4.2	4.11936	-25.8603
644	3.8	4.05686	82.2609
645	4.4	3.85179	-7.77308
646	4.5	4.39378	-124.926
647	3.7	3.92454	33.9682
648	4.5	3.99839	16.8253
649	4.4	4.15745	-51.3924
650	4.1	3.90672	-105.52
651	4.1	3.9846	29.5079
652	4.2	4.41734	19.4895
653	4.8	3.66926	37.2976
654	4.5	4.00608	20.6655

655	4.3	4.426	-5.37481
656	4.4	3.91844	-28.3325
657	4.4	4.07249	-12.5398
658	3.7	3.91429	-69.9154
659	4.9	4.09886	-1.75658
660	3.9	4.23655	1.0604
661	4.3	4.31907	3.24943
662	2.7	3.91429	136.103
663	3.9	3.74339	-49.8346
664	4.4	4.09788	-15.2647
665	5	4.06956	117.991
666	5	4.02513	98.77
667	3.4	4.18235	29.3017
668	3.9	3.96214	92.5836
669	4.6	4.09193	-4.15729
670	3.4	3.76414	-101.943
671	4	3.97874	-10.3238
672	4.5	4.30924	287.397
673	4.5	4.48924	229.191
674	3.9	4.2219	33.2108
675	4.6	4.22923	-10.1379
676	4.3	4.13597	33.188
677	4.4	4.12718	26.5388
678	4.2	4.19798	-17.9696
679	4.3	4.26389	-23.8096
680	4.1	4.19468	64.0214
681	3.4	3.78001	61.9552
682	4.3	4.34837	-77.081
683	4.6	3.95921	64.5609
684	4.2	4.09373	86.5917
685	4	4.3303	-22.3251
686	5	4.07102	39.2977
687	4.4	4.46311	11.4497
688	3.8	4.28098	-3724.62
689	3.3	4.14573	-6.79704
690	4.2	4.15867	-104.158
691	4.8	3.78196	66.2096
692	4.3	4.33824	30.7578
693	4.7	4.50999	-20.7155
694	4.1	3.93479	-30.1783
695	4	4.28929	-52.9342
696	2.9	3.76829	46.4775
697	4.4	4.38401	16.5376
698	4.4	4.38401	-30.3699
699	3.3	3.93772	37.2529
700	3.1	3.98841	-1.62341
701	4.2	4.28977	27.1049
702	3.6	3.83055	-12.2033

703	3	4.07078	-37.9633
704	3.2	4.18821	36.8434
705	4.6	4.46311	3.98592
706	4	4.04807	2.6082
707	4.4	4.62522	-24.1258
708	4.3	4.01585	77.9554
709	3.6	3.80003	2.90038
710	4.5	4.23753	-16.5236
711	4.2	4.05296	35.5411
712	4.2	4.36546	9.12502
713	4.6	4.40403	-39.3204
714	4.4	4.49046	62.4654
715	4.2	4.37278	-39.3978
716	5	4.06712	39.9665
717	4.1	4.53147	-48.8783
718	4.4	4.42796	14.6175
719	4.2	4.36692	36.4607
720	3.3	3.80287	25.9747
721	4.8	4.14243	21.7055
722	3.2	4.02659	74.1575
723	4.2	4.38352	-24.5692
724	4.2	4.44651	25.782
725	4	3.79917	-8.46591
726	3.7	3.90086	-81.9499
727	4.7	4.15745	-23.2838
728	4.3	4.65208	-29.7197
729	4.8	3.95432	-681.568
730	4.1	4.33421	49.2022
731	3.9	3.99143	-20.4104
732	3.4	3.90305	85.3803
733	4.4	4.48728	-118.489
734	4.2	4.44505	59.1136
735	4.3	4.1677	40.1671
736	4.1	3.85874	85.4882
737	4.1	4.16136	-5.39367
738	4.3	2.4973e+11	-430.724
739	4	4.42014	-3.33373
740	4.3	4.31468	-46.3838
741	5	4.51585	157.036
742	4.5	4.64573	42.2384
743	2.4	4.12132	48.6163
744	3.8	3.9221	-89.2443
745	4.4	4.34638	102.332
746	4.3	4.36643	35.0028
747	4.5	4.21116	-20.1478
748	4.3	4.24302	-20.0448
749	4.2	4.12962	15.1803
750	4.3	4.16908	-6.00496

751	4.2	4.3513	47.4781
752	4.3	4.34397	20.6808
753	4.3	4.34348	31.7162
754	4.1	4.00437	-100.182
755	4.5	4.18968	12.6565
756	4.7	4.20286	58.0702
757	5	4.56272	18.1505
758	4.4	4.20628	-4.15804
759	5	4.35764	92.0534
760	4.3	4.33177	-61.5729
761	4.7	4.06504	-61.5269
762	4.1	4.19822	-34.6294
763	4.5	4.64182	-720.389
764	4.5	4.06565	7.33893
765	4	4.14305	-103.244
766	2.7	3.97386	72.9011
767	4.3	4.02195	-101.133
768	4.4	4.50315	-58.7547
769	4.5	4.34397	-54.0987
770	4.5	4.7938	-30.7755
771	4	4.0222	-13.9262
772	4.6	3.96995	-22.3001
773	4.1	4.4221	23.8218
774	4.5	4.37425	-3.67748
775	4.2	4.24092	4.26521
776	2.3	4.02082	105.472
777	5	4.21812	140.551
778	4.5	4.64573	42.2384
779	4	4.06947	-27.4293
780	4.3	4.06761	20.162
781	3.4	3.93479	-62.0155
782	4.4	3.81126	-14.3815
783	5	3.73167	154.803
784	4	4.2722	4.19268
785	5	4.60276	32.9332
786	4.6	4.57359	78.9802
787	4	4.13499	6.68831
788	4.2	4.218	103.8
789	4.1	4.1815	-53.829
790	4.9	4.53013	12.9863
791	4.6	4.46177	45.552
792	4.5	4.36253	18.0771
793	4	4.07932	66.2051
794	5	4.05686	86.3813
795	3.8	3.94447	71.5333
796	3.9	4.20432	8.64455
797	4	4.20378	253.269
798	4.3	4.13597	-43.7064

799	4.3	4.35862	29.2428
800	4.2	4.27708	-37.0371
801	3.3	3.90891	58.2905
802	4.1	4.25218	-9.08849
803	4.3	3.94065	45.7185
804	3.9	3.88133	-33.9522
805	4.5	4.23362	44.0754
806	4.7	4.27854	43.51
807	3.2	4.1179	10.9929
808	3.8	3.83055	-49.4811
809	4.6	4.26585	-7.09812
810	4.2	4.24729	-14.3292
811	3.9	3.92893	103.406
812	4.4	4.22483	-25.4701
813	3.9	4.39475	-31.4968
814	4.3	4.34202	73.9166
815	3.9	4.03758	-38.0878
816	4.7	4.30198	88.7552
817	4	4.06858	2.16189
818	4.2	4.19944	-17.9224
819	4.1	4.08665	-54.0903
820	4	4.00111	91.4777
821	3.5	4.15354	32.2075
822	4.1	4.06663	-57.6717
823	4.7	4.32542	13.458
824	4.5	4.10862	11.5396
825	4.2	3.97917	-65.8004
826	4.4	4.00804	14.591
827	3.7	4.12229	35.9259
828	4.3	3.91062	-28.1381
829	4.2	4.44554	-42.8846
830	3.9	3.9094	-65.4261
831	4.2	3.87327	-68.6419
832	3.8	3.57078	-97.9675
833	4.5	4.27805	-12.1069
834	4	4.25315	-15.215
835	3	4.07542	-1.24242
836	2.8	4.61253	-40.8354
837	5	4.36448	88.0294
838	5	3.9719	28.3842
839	2.9	4.05149	75.6519
840	4.1	3.99546	22.962
841	4.2	4.14768	-59.3588
842	4	4.29954	3.70647
843	4.7	4.21995	-657.293
844	4.7	4.28953	-59.5346
845	4.1	4.18919	94.5254
846	4.4	3.79417	81.3586

847	3	3.71897	81.6524
848	3.8	3.82249	126.729
849	4.6	4.39671	5.00626
850	4.2	4.48557	2.17987
851	4.8	4.31907	52.5187
852	4	4.03013	62.2382
853	4.4	4.55442	32.8591
854	4	4.0969	99.5812
855	4.7	4.13206	90.8536
856	4.2	4.44126	12.9905
857	3.2	4.22093	62.703
858	4	4.35764	-5.77901
859	4.2	4.0687	36.7863
860	4.3	4.21751	5.45164
861	3.9	4.21311	5.34515
862	4.6	4.19505	24.7291
863	3.9	4.18235	6.30261
864	4.3	4.02867	-53.8802
865	3.8	4.06468	46.7984
866	4.5	4.52998	-13.8935
867	4.4	4.10227	-18.4363
868	4.1	4.01048	32.599
869	4.1	4.1555	40.4535
870	3.9	3.77781	-55.7177
871	4.4	4.23509	-34.4767
872	4.2	4.21812	57.4888
873	4.2	4.34007	12.0605
874	3.8	4.31858	69.4409
875	4.3	3.95335	23.0167
876	4.2	4.24339	27.6337
877	4.6	4.29283	41.7476
878	4	3.97727	14.1182
879	3.8	4.12425	-40.0157
880	2.7	4.27171	53.2314
881	4.6	4.17014	37.0769
882	3.5	4.00266	79.5407
883	3.7	4.09593	54.6995
884	4.5	4.0847	-14.909
885	4.4	3.93675	59.6712
886	5	4.25706	90.4631
887	4.9	4.21861	50.8561
888	4.1	4.25511	-3.61582
889	3.3	4.00022	59.8161
890	4.5	4.27366	-0.101044
891	4.2	4.21458	50.7316
892	4.7	4.28733	-6.04066
893	4.6	4.426	-112.786
894	5	3.92991	65.8375

895	4.4	4.28636	94.989
896	5	4.46311	0.0772585
897	4.3	4.04759	12.7145
898	4.1	4.30161	41.2157
899	4	4.38413	-61.9529
900	4.6	4.44163	-1.12526
901	3.4	4.17796	-25.2596
902	4.3	4.00865	47.8948
903	3.4	4.06468	74.8101
904	4.3	4.13352	-78.5906
905	4.5	4.23106	-1.47167
906	4.7	4.45677	168.381
907	3.6	4.13999	7.5416
908	4.1	4.48557	-28.2883
909	3.8	4.14732	28.4126
910	4.5	4.3054	46.159
911	4.3	4.22679	22.9511
912	5	3.77781	-25.1105
913	4.6	4.32151	-50.3163
914	2.7	3.90281	-49.6405
915	4.2	4.11936	-13.276
916	4.4	4.03782	2.99829
917	4.7	4.55393	269.173
918	4.6	4.27854	66.1594
919	4.2	4.426	70.3592
920	4.1	4.63499	-34.658
921	4.7	4.27122	-23.0215
922	4	4.05149	-23.3294
923	4.6	4.0637	-684.021
924	3.7	3.67454	36.4252
925	3.9	4.13401	-23.4835
926	4.3	3.91429	71.0223
927	3.6	3.94212	-27.4757
928	4.5	4.15305	6.81683
929	4.3	4.25559	39.6832
930	4.5	4.61546	5.78065
931	4	4.17796	33.6395
932	4	3.94798	57.5016
933	3.8	4.33921	-45.638
934	3.5	4.1081	7.29391
935	4.4	4.72483	30.8195
936	3.9	3.68577	75.27
937	3.2	3.88328	-10.2326
938	4.4	4.13889	-13.8425
939	4.4	4.33518	-41.8161
940	4.5	4.47019	-25.6008
941	3.7	4.26292	2.61477
942	4.7	4.52561	-18.5207

943	4.5	4.55589	8.50195
944	4.2	4.343	20.2938
945	3.9	3.9719	-12.8936
946	5	4.00804	9.64856
947	3	4.051	25.792
948	4.2	4.11546	-1.95506
949	4.1	4.21116	-8.2187
950	4.2	4.21995	-19.5324
951	4.3	4.21311	64.281
952	4.4	4.2899	24.0405
953	3.7	4.01792	-37.6717
954	4.5	4.36651	-20.8012
955	3.6	4.28717	9.22518
956	4.4	4.21942	-23.4881
957	3.9	3.85276	-92.9161
958	4.8	4.15647	-0.716903
959	3.8	4.1721	97.7734
960	3.7	3.94798	-13.1795
961	4.5	4.25828	-113.641
962	3	3.89036	65.3825
963	4	4.1024	-0.45728
964	2.8	3.94847	-66.518
965	4.7	3.95335	-2.11665
966	4.4	4.18763	-5.97035
967	4.5	4.27427	-4.998
968	2.9	3.76084	38.76
969	4	3.89292	19.6603
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971	3.7	4.23948	-84.9817
972	3.6	4.12864	30.1147
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982	4.5	4.09446	-53.9166
983	4.8	4.5012	-74.2094
984	4.5	4.44407	49.3841
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987	4.2	4.04753	-31.5672
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989	4.2	4.52073	-28.9664
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993	4.4	4.26389	-31.2868
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995	4.2	4.06223	4.62786
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999	4.3	4.02024	35.5701
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1002	4.9	4.31272	-31.4498
1003	4.3	4.1743	-104.57
1004	4	4.25657	4.18086
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1011	4.1	3.81516	83.6891
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1028	2.7	4.01023	-63.4196
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1091	4.7	4.12376	73.593
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1105	5	4.22483	193.621
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1166	4.6	3.92039	-28.0954
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1171	4.3	4.02171	60.4287
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1207	4.3	4.33921	-62.1146
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1214	4.5	4.44456	25.6178
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1389	4.3	4.15052	64.801
1390	4.7	4.41526	-21.5214
1391	4.5	3.69578	-15.9108
1392	4.7	4.31321	-52.4198
1393	4.3	2.4973e+11	-394.687
1394	4.6	4.45921	-27.805
1395	3.5	3.85032	-16.0847
1396	4.2	3.79734	-25.5486
1397	4.8	4.4037	-21.1361
1398	4.5	3.94456	-18.8795
1399	3.9	4.30638	-4.36285
1400	4.3	4.18235	6.20112
1401	4.8	4.14634	21.6285
1402	4.5	4.33705	60.5997
1403	4.5	4.14915	34.5661
1404	4.6	4.39524	-39.5907
1405	4.3	4.23094	-32.098
1406	5	4.32151	16.5756
1407	4.3	4.08225	-46.0217
1408	4.3	4.06468	40.8481
1409	4.2	4.15171	-14.313
1410	4.5	4.33714	15.2755
1411	3.1	4.03306	31.8411
1412	4.6	4.50523	35.1728
1413	4.4	4.22483	-11.0853
1414	3.8	3.96897	37.0797
1415	3.8	4.15452	60.1458
1416	3.8	3.85667	6.54816
1417	3.5	3.81272	80.0573
1418	4.6	4.52378	51.4123
1419	1.8	3.78135	38.256
1420	3.9	4.2201	27.9191
1421	5	4.09886	-1.79535
1422	4.5	4.28147	-0.855797

1423	3.8	4.26304	-13.6119
1424	4.6	4.35911	-17.3111
1425	4.4	4.21214	23.1208
1426	4.6	4.32005	22.859
1427	4.5	4.24143	43.304
1428	4.8	4.19749	94.4332
1429	4.3	4.58042	304.335
1430	3	4.06883	-38.7834
1431	4.2	4.35008	-92.2163
1432	4.8	4.42381	-87.1039
1433	3.7	4.08518	0.428343
1434	4.3	4.08616	2.65884
1435	4.6	4.27805	-75.5889
1436	4.6	4.05125	-38.1884
1437	4.1	4.16319	-24.4098
1438	3.9	4.09007	-15.5384
1439	4.5	4.19578	-105.117
1440	3.8	3.94456	-17.415
1441	4.4	4.54075	-42.8702
1442	3.9	3.87742	-50.2027
1443	4.5	4.39622	-17.5423
1444	4.2	4.18034	-17.8696
1445	3.9	4.00437	-37.3196
1446	4.2	4.21861	-20.3029
1447	3.6	3.66624	80.2625
1448	2.2	3.59812	-74.9169
1449	4	4.26292	2.91284
1450	4.7	3.93382	65.4176
1451	4.2	4.23753	30.5956
1452	4.4	4.17063	-10.3441
1453	4.5	4.2678	-5.26088
1454	4.6	4.51817	10.4083
1455	4.6	4.39768	-24.6468
1456	3.4	3.8364	-80.3827
1457	3.7	4.38889	-52.0326
1458	4.2	4.09104	56.5034
1459	3.7	4.02561	51.9546
1460	4.3	4.52171	-52.5987
1461	3.9	4.22874	52.0239
1462	4.6	4.21531	-65.6341
1463	4.1	3.87156	-81.314
1464	4.1	4.26634	-12.1648
1465	2	4.01023	-13.1444
1466	4.6	4.45921	72.4965
1467	4.4	4.42796	85.8979
1468	4.6	4.63792	-84.4597
1469	3.8	3.97312	-76.2373
1470	3.7	3.76829	61.1712

1471	2.3	3.80711	-56.3372
1472	1	3.75633	-1.10841
1473	4.2	4.02116	32.4822
1474	4.2	4.19554	19.8843
1475	4.5	4.30296	-24.7397
1476	3.7	3.93382	61.3241
1477	4.3	4.12913	3.10664
1478	4.2	4.21604	134.602
1479	1.7	4.32102	-13.0961
1480	2.4	4.1096	-70.1938
1481	4.9	4.28001	71.0149
1482	4.7	4.24656	-106.029
1483	3.2	3.95521	46.5917
1484	4.6	4.4636	-19.7077
1485	3.7	4.01194	50.9971
1486	4.5	3.84837	46.0096
1487	5	3.81858	14.0489
1488	3.6	3.85032	13.3437
1489	4.5	4.26585	9.76528
1490	4.3	-1.73529e+12	-397.559
1491	4.3	4.30284	26.1148
1492	3.1	4.0222	9.66064
1493	4.8	4.28953	-90.6781
1494	5	4.14182	-16.163
1495	4.4	4.05198	51.31
1496	4.3	3.76414	-16.4213
1497	4.8	4.28245	77.4341
1498	3.5	4.22679	5.23877
1499	4.7	4.28001	-19.3518
1500	2.9	3.78929	63.3879
1501	4	4.29771	71.053
1502	4.2	4.20921	-272460
1503	4.7	4.32627	-4.40397
1504	4.6	4.32493	-83.4726
1505	4.6	4.39964	69.7614
1506	4.5	4.49436	45.6476
1507	4.4	4.54505	10.1232
1508	4.5	4.0637	42.0007
1509	4.1	4.30491	147.78
1510	4.4	4.03147	-12.0388
1511	4.2	3.98948	25.5617
1512	4.5	3.92234	-93.4869
1513	4.3	3.53172	-26.4409
1514	4.7	3.76585	8.06512
1515	4.5	4.30003	66.8107
1516	4	4.2136	5.57367
1517	4.5	4.35813	-15.4388
1518	4.4	4.07603	6.90296

1519	4.3	4.4011	2.01348
1520	4.5	4.19261	-3.64507
1521	5	3.89036	65.3954
1522	4	4.31272	53.1813
1523	4.6	4.28758	-114.204
1524	4.2	4.12937	-63.5417
1525	4.2	3.98753	37.1991
1526	4.3	4.49583	67.7262
1527	4.5	4.22239	-12.9411
1528	4.3	4.07066	21.9191
1529	4.7	4.13889	-28.9945
1530	4.6	4.26536	16.3816
1531	4.2	4.11741	34.4123
1532	4.4	4.12522	38.2652
1533	5	4.48411	89.6544
1534	4.5	4.3513	0.800157
1535	4.1	4.04173	32.794
1536	4.5	4.29368	-15.1021
1537	4.2	3.78953	-18.8493
1538	4	4.15843	14.905
1539	4.5	4.2805	-45.8147
1540	3.7	4.40159	74.2989
1541	3.9	4.0637	11.2853
1542	2.9	4.05882	51.8215
1543	4.4	3.80418	35.9459
1544	4.7	4.0532	-108.931
1545	4.1	4.14817	-33.867
1546	4.4	4.26878	-39.279
1547	3.8	4.02659	13.1521
1548	4.2	3.85029	-10.2817
1549	4.4	4.15806	23.1099
1550	4.5	4.32273	-115.02
1551	4.2	4.15403	-3.81876
1552	4.7	4.4846	41.791
1553	3.7	4.18577	4.22025
1554	4.6	3.84007	-23.1557
1555	4.5	4.0305	-14.3471
1556	4.6	4.19016	-20.344
1557	4.8	4.28929	69.8279
1558	4.4	4.63401	0.419653
1559	3.4	3.9304	80.0658
1560	4.6	4.25169	-21.009
1561	4	4.20555	-3690.95
1562	5	4.37864	67.8963
1563	4.5	4.00315	37.1809
1564	4.5	4.5742	-108.328
1565	4.3	4.09812	-85.8135
1566	4.1	4.36839	48.0117

1567	4	4.13108	-67.3427
1568	4.3	4.18577	-21.5016
1569	3.1	3.82664	-80.2567
1570	4.7	4.16734	-11.5793
1571	4.2	3.77757	34.1103
1572	4.7	4.39573	-27.3933
1573	4	4.11912	-40.2278
1574	3.8	4.33079	31.9857
1575	4.5	3.81858	-28.1754
1576	4.1	3.74656	-54.9569
1577	4.2	4.18723	25.806
1578	4.6	4.32981	45.2596
1579	4.4	4.15452	7.8986
1580	4.1	3.74265	-31.3645
1581	3.6	3.88304	30.7507
1582	4.2	4.1667	12.8568
1583	4.3	3.95139	41.4742
1584	3.3	4.16624	-1.01325
1585	4.1	4.60472	-32.972
1586	4.6	4.0554	23.3783
1587	4.3	4.12376	-9.06923
1588	4.6	4.33714	-7.20479
1589	3.4	4.27805	-11.7474
1590	4.5	3.96125	-9.20994
1591	4.4	4.43382	-24.4789
1592	4.4	4.09588	48.6132
1593	4.3	4.19806	73.631
1594	3.6	3.91449	60.3191
1595	4.6	4.45384	-2.95637
1596	3.8	4.09153	-32.6659
1597	4.6	3.91322	70.465
1598	5	4.64866	77.7804
1599	3.9	3.90647	-10.5152
1600	3.5	4.40598	-16.9541
1601	3.7	4.19895	57.6933
1602	4.7	4.04576	23.9349
1603	4.4	4.13987	76.5313
1604	2.8	4.04734	-14.5381
1605	4.2	4.1594	-75.5571
1606	4.3	4.27781	-113.884
1607	4.2	3.85203	-26.7854
1608	4.2	3.97181	45.7163
1609	4.1	3.82469	-62.0578
1610	4.5	4.24143	19.8832
1611	4.5	4.30198	5.62865
1612	4	4.00608	3.18355
1613	3.9	4.23094	-42.4408
1614	4.4	4.52525	-33.2489

1615	4.5	4.37327	-80.3607
1616	4.4	4.3137	-689.431
1617	4.3	4.1696	-80.8842
1618	4.7	4.49461	-117.799
1619	4.6	4.23655	-28.418
1620	5	4.39964	11.871
1621	4.2	4.33268	-74.1535
1622	4.4	4.26487	-4.8044
1623	3.6	4.33616	5.46972
1624	4.6	3.9614	-82.7591
1625	4.6	4.54222	45.0837
1626	4.3	4.26341	-14.4237
1627	4.2	4.43495	-0.593868
1628	3.1	3.96604	52.2122
1629	4.5	4.32701	-5.77972
1630	4.2	4.16819	48.8713
1631	4.6	4.51585	23.4995
1632	5	4.36009	32.834
1633	3.8	3.98069	79.0916
1634	4.6	4.14305	-87.4077
1635	4.1	4.04514	-17.0801
1636	4.2	4.37486	-30.8658
1637	3	4.07005	52.6414
1638	4.4	4.39195	-62.7556
1639	5	4.08177	89.3496
1640	4.1	3.82273	-9.66935
1641	5	4.48802	75.2088
1642	4.1	4.17893	-0.600221
1643	5	4.33909	74.2102
1644	3.9	4.22874	-96.2778
1645	4.4	4.11253	0.759363
1646	3.9	4.38841	-24.4486
1647	4.4	4.16038	-17.1598
1648	4	4.20579	-17.0719
1649	4.5	4.08225	22.3355
1650	4.2	4.14744	46.9769
1651	3.8	4.12718	8.44417
1652	4	4.16722	63.2275
1653	4.2	4.2783	-107.26
1654	4.4	4.55796	15.1393
1655	4.5	4.37962	-84.6287
1656	4.3	4.33811	-25.5902
1657	4.7	4.56468	27.8815
1658	4.4	4.31419	-0.551105
1659	4	4.11643	-35.8388
1660	4.6	4.54136	261.307
1661	4.4	4.36839	-19.4508
1662	4.3	4.12327	2.90709

1663	4.3	4.02464	-1.9925
1664	1	3.79734	-1.05456
1665	3	4.04368	-23.1563
1666	4.3	4.08323	0.13339
1667	4.4	4.369	-87.8245
1668	4.3	3.94554	-10.5695
1669	4	4.08409	36.4316
1670	4.3	3.85984	-57.5046
1671	4.6	4.23557	51.7992
1672	4.2	4.17503	-59.558
1673	4.2	4.19138	3.17371
1674	4.2	4.24192	10.4681
1675	4.6	4.52366	-40.8797
1676	4.5	4.16844	-88.0163
1677	4.4	4.16722	68.587
1678	5	4.46018	107.714
1679	3.7	4.35276	-17.0558
1680	4.7	4.40257	-25.1286
1681	4.6	4.35081	17.4027
1682	4.1	4.40391	35.1643
1683	3	3.88401	58.918
1684	4.1	4.20103	-1.25683
1685	4.6	4.2468	154.315
1686	5	4.10911	67.7814
1687	4.5	3.97508	-39.705
1688	4.7	4.36253	28.6501
1689	3.4	4.26975	-3.78445
1690	4.3	4.40501	-22.7648
1691	4.4	4.0731	7.04361
1692	3.8	4.03294	30.0035
1693	4.4	4.61302	-28.9007
1694	3.4	4.19554	-36.3557
1695	4.6	4.52317	-6.07552
1696	4.6	4.59397	-9.1389
1697	4	4.15891	6.5893
1698	4.7	4.06687	-15.2771
1699	4.7	4.5012	-717.599
1700	3.8	4.06638	49.7669
1701	4.3	4.32395	44.8792
1702	4.5	4.07444	61.8994
1703	3.6	4.21006	-25.5965
1704	4.6	4.33677	-18.5073
1705	3.7	4.24241	72.5794
1706	4.8	4.32444	41.4031
1707	3.6	4.07493	-35.6504
1708	3.6	3.83323	47.4085
1709	4.6	4.37864	-23.2162
1710	4.7	4.56761	43.684

1711	4.8	4.3513	39.3583
1712	4.4	4.63694	-24.2701
1713	3.1	4.25169	58.0427
1714	3.8	3.94554	-6.75491
1715	3.4	4.01805	-53.0354
1716	4.2	4.35325	8.26341
1717	4.6	4.35423	4.65501
1718	2.3	4.12913	67.9774
1719	3.1	4.15647	37.0809
1720	4.3	4.19749	23.3106
1721	4.1	4.19944	-43.6008
1722	3.7	4.19749	-20.4633
1723	4.6	4.25608	-16.1472
1724	4	3.98875	-27.3747
1725	3.8	3.96555	-68.2177
1726	4.7	3.96409	56.8587
1727	4.6	4.07359	113.65
1728	4.2	4.10227	-54.3211
1729	4.8	4.36448	66.7776
1730	4.3	4.13609	88.7266
1731	4	4.16331	0.709242
1732	4.4	4.33421	97.6143
1733	3.5	3.92893	-17.8725
1734	4.1	4.19065	-17.1841
1735	4	4.23069	-20.7528
1736	4	3.9857	9.40251
1737	2.1	3.74265	-47.809
1738	3.3	3.92591	0.546476
1739	3.9	4.00022	32.0243
1740	4.3	4.5803	-0.434147
1741	4.4	4.61155	11.9006
1742	3.9	4.04319	18.4994
1743	4.1	4.09934	-25.5604
1744	4.2	4.38352	-60.1425
1745	4.5	4.63401	-10.0749
1746	4.2	4.22483	51.7924
1747	4.1	4.50364	30.7156
1748	3.7	4.04954	39.1846
1749	4.2	4.1135	6.23437
1750	4.1	3.90397	-16.8894
1751	4.1	4.06858	-0.113749
1752	4.3	4.25999	-23.3324
1753	4	3.91673	95.3477
1754	4.7	4.24534	58.5985
1755	4.6	4.28587	-58.2597
1756	4	4.20579	5.0533
1757	4.7	4.22923	-11.9843
1758	4.4	4.13096	-23.3771

1759	4.2	4.29905	17.265
1760	5	4.55296	103.347
1761	4.7	4.50218	107.864
1762	4.8	4.01829	86.0032
1763	4.3	4.42515	13.4384
1764	4.2	4.48411	-2.4852
1765	3.6	4.38206	41.8339
1766	2.4	4.13792	76.1896
1767	3	4.06516	102.569
1768	4	4.0138	21.2931
1769	4.3	4.50279	323.492
1770	4.2	4.13255	36.1582
1771	3.3	4.35276	-99.2106
1772	4.5	4.70286	14.5228
1773	3.7	3.84876	56.172
1774	4.1	3.85984	-50.4433
1775	4.5	4.45603	-28.5763
1776	4.5	4.38194	-52.9549
1777	3.9	3.81101	-32.9293
1778	4.1	4.43723	-4.51099
1779	4.5	4.2512	-120.925
1780	4.1	4.09385	47.5947
1781	4.3	4.39573	-8.197
1782	3.1	4.28636	-27.877
1783	4.6	4.01487	24.8861
1784	4.3	4.13157	-11.3953
1785	4.6	4.44407	-22.4269
1786	3.5	4.17307	21.7349
1787	4.5	4.33531	37.6259
1788	4.5	4.6179	-64.8977
1789	3.4	4.0969	48.4063
1790	4.5	4.14378	45.4699
1791	4.6	4.19163	5.95179
1792	4	4.10667	-0.409188
1793	4.7	4.64085	35.0844
1794	4.4	4.10374	22.5342
1795	4.6	4.03196	17.2436
1796	2.8	3.89109	-11.0403
1797	4.4	4.15843	241.678
1798	4.6	4.27561	-12.2822
1799	4.3	4.23618	-30.5582
1800	3.9	4.04905	-29187.6
1801	4.1	4.24534	35.6711
1802	3.3	3.94383	-57.1154
1803	4.5	4.49632	33.2931
1804	3.3	4.0493	-38.308
1805	4.8	4.22923	1.63513
1806	3.8	4.16673	29.0374

1807	4	4.32737	5.35905
1808	3.4	4.24729	-20.7755
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1810	4.4	3.97984	-35.1202
1811	4.4	4.1721	217.948
1812	5	4.04612	97.1621
1813	4.3	4.05515	-31.4349
1814	4.5	4.30125	32.2583
1815	4.2	4.19016	-18.256
1816	4.4	4.36595	-17.6844
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1818	1.9	4.06077	56.9527
1819	4.2	4.19154	-6.06059
1820	3.7	4.07261	8.65686
1821	4	4.29783	-14.6618
1822	4.1	4.01042	-23.6534
1823	3.7	3.97679	-6.18465
1824	3.9	4.29771	13.7642
1825	4.5	5.23387	-27713.7
1826	4.6	4.38474	-115.193
1827	4.6	4.16624	18.1369
1828	4.8	4.27708	72.6882
1829	4.8	3.86204	59.1132
1830	4.6	4.00501	68.0087
1831	3.9	4.01682	36.5554
1832	4.5	4.41029	-34.5158
1833	4.4	4.28538	-29.441
1834	5	4.42845	113.395
1835	4.9	3.97483	83.6055
1836	4.4	4.18723	-19.049
1837	4.7	4.33518	-78.4684
1838	4.3	4.05589	-22.0141
1839	4.2	4.00511	11.4175
1840	4.2	3.68601	-38.0408
1841	4.1	4.11656	49.1739
1842	4.2	4.20164	-41.7756
1843	4.2	4.42112	-42.967
1844	4.5	4.12156	-15.9763
1845	4.3	4.06761	-47.4321
1846	4.6	4.09788	25.7701
1847	4.3	4.06419	5.34961
1848	3.5	4.07639	-22.3457
1849	4.5	4.31809	-37.8995
1850	4.5	4.34388	-10.1716
1851	4	4.31663	9.52311
1852	4.3	4.03391	-8.45212
1853	4.8	4.07249	73.118
1854	4.2	4.10667	98.9713

1855	3.7	4.15452	81.7498
1856	4.4	4.34348	72.475
1857	3.9	4.00794	-18.8318
1858	5	3.68797	0.485486
1859	4.2	3.78501	-28.84
1860	3.4	4.05796	57.0012
1861	3.5	4.20164	-68.3666
1862	3.6	3.81663	20.9668
1863	4.7	4.44895	50.97
1864	4.2	4.27036	-97.772
1865	3.6	3.94077	23.9799
1866	3.4	4.0222	16.4109
1867	4.5	4.32701	-5.77972
1868	4.4	4.25706	7.94771
1869	3.2	3.88743	-50.361
1870	3.9	3.85807	-40.4605
1871	4.1	4.11839	72.6881
1872	4.2	4.02952	-11.4071
1873	4.8	4.47288	14.9795
1874	4.2	4.35862	-29.3357
1875	3	3.8762	93.4728
1876	4.4	3.99818	44.7184
1877	4.5	4.24436	23.4329
1878	4.2	4.17417	64.1316
1879	4.5	4.57932	-23.2506
1880	3.8	4.09104	24.3945
1881	4.8	4.34617	-80.0133
1882	4.4	4.07347	70.9819
1883	3.2	4.04173	15.1133
1884	4.5	4.33531	13.88
1885	4.2	4.92039	-28045.9
1886	4.6	4.59886	-22.9572
1887	4.6	4.33665	0.728389
1888	4.6	4.29514	37.4811
1889	4.5	4.11448	-15.6626
1890	4.3	4.41819	30.55
1891	3.3	3.86448	53.0789
1892	4.4	4.1594	-82.4995
1893	4.2	4.34959	-113.758
1894	4.4	4.15061	17.5032
1895	1	4.0239	16.652
1896	4	4.00315	52.4978
1897	4.3	4.34593	-10.5506
1898	4.2	4.02171	101.308
1899	4.7	3.9221	-33.3195
1900	4.3	4.26365	-67.0571
1901	4.6	4.43186	-79.7136
1902	4.6	4.48167	92.009

1903	4.6	4.53098	-28.4022
1904	3.9	4.36497	63.9966
1905	3.3	4.06663	2.07742
1906	4.5	4.03529	-3.03607
1907	4.4	4.24632	-1.26673
1908	4.1	4.04124	33.4332
1909	4	3.78343	3.49632
1910	4.6	4.2844	60.2089
1911	4.7	4.50519	21.5747
1912	4.3	4.24859	-42.7576
1913	3	3.91258	13.0071
1914	4.6	4.37864	-23.2149
1915	4.3	4.06492	-85.6463
1916	1.5	4.07102	39.3526
1917	3.3	4.03404	54.4334
1918	4.6	4.19309	-35.4237
1919	4.6	4.19847	34.5316
1920	4.4	4.04661	130.819
1921	4.4	4.19554	-3.95522
1922	4.6	4.31956	-27.4235
1923	4.6	4.25111	39.3844
1924	4.2	4.08763	-3701.8
1925	4.3	4.11814	-39.9999
1926	4.3	4.43052	-42.9604
1927	4.4	4.0438	70.6078
1928	4.6	4.31614	61.1826
1929	4.4	3.92625	-28.5017
1930	4	4.28636	37.2637
1931	5	4.3928	100.722
1932	4.8	4.56956	-59.409
1933	3.8	4.35764	15.9909
1934	4.5	3.80686	39.2242
1935	4.7	4.56956	-41.7771
1936	4.4	4.27805	-12.2437
1937	4.3	4.05735	79.1927
1938	4.5	4.16136	-0.793611
1939	4.4	4.22569	-49.3947
1940	4.5	4.25047	-66.3524
1941	4.7	4.26292	22.007
1942	4.1	3.83323	-17.233
1943	3.7	3.89671	-7.04211
1944	4.3	4.46702	-28.5344
1945	4.5	4.28782	84.1309
1946	4.1	4.29905	-24148.4
1947	4.4	3.84837	21.0883
1948	4.3	4.1262	8.74841
1949	4.5	4.36997	-29.2945
1950	4.5	4.16868	-20.0145

1951	4.2	4.16087	-4.34627
1952	4.5	4.30833	115.638
1953	4	4.06077	38.0023
1954	4	3.94847	-14.1638
1955	4.2	4.4387	23.0782
1956	3.9	4.43333	-1.04708
1957	3.8	4.27708	62.5178
1958	4.7	4.21311	131.457
1959	4	4.08299	-6022.1
1960	4.2	4.35179	-78.0845
1961	4.4	4.21897	-44.1131
1962	4.8	4.16844	-75.6588
1963	4.4	4.05039	25.9257
1964	3.9	4.20725	0.728458
1965	4.2	4.06687	-38.745
1966	4.4	3.81101	-96.1815
1967	4.2	4.16783	20.9478
1968	4.3	3.95384	-28.2834
1969	4.2	4.53538	-32.0294
1970	4.6	4.03196	-23.0172
1971	4.6	4.16062	-111.277
1972	4.3	4.27674	50.4229
1973	4.2	3.96531	-59.9452
1974	4.3	4.01414	-84.5914
1975	4	4.17405	97.8308
1976	4.6	4.21458	0.754895
1977	4.4	4.0344	71.4345
1978	4.3	4.22581	-51.6615
1979	4.1	4.12034	17.3917
1980	4.3	3.92405	37.8208
1981	3.7	4.0593	75.2839
1982	4.2	4.3303	-71.1536
1983	4	4.43479	-59.295
1984	4.1	3.96104	-19.8039
1985	4.6	4.46897	-6.37147
1986	4.8	4.25022	109.665
1987	3.2	3.80296	7.38356
1988	4.5	4.37425	-27.1278
1989	5	4.75999	108.501
1990	4.2	3.91819	11.0226
1991	4.6	4.55247	-20.0302
1992	3.9	3.94383	-28.8299
1993	2.4	4.05491	38.8364
1994	3.2	3.90452	31.0412
1995	4.9	4.71458	70.9605
1996	4.6	4.37815	31.9728
1997	4.3	4.14768	-17.0746
1998	3.3	3.99339	8.98572

1999	4.5	4.33103	-26.3567
2000	4.3	4.48655	-55.6081
2001	4.9	4.42124	67.3263
2002	4.4	4.25315	47.2243
2003	4.3	4.15452	22.6123
2004	4.3	4.10227	86.6268
2005	4.1	4.0178	31.7569
2006	2.3	4.09788	61.5121
2007	4.2	3.67796	-3.21288
2008	4.6	4.53678	276.457
2009	4.4	4.06761	-22.9201
2010	4.4	4.10179	2.21582
2011	4.1	3.99693	-11.2926
2012	4.5	4.0427	14.6565
2013	3.7	3.80793	34.2617
2014	4.5	4.19163	59.2922
2015	4.6	3.93211	-12.2033
2016	3.1	3.8253	38.3219
2017	4.2	3.91258	-58.7022
2018	3.9	3.77976	-102.623
2019	4.5	4.55882	2.11254
2020	4.4	4.37718	-19.0069
2021	2.9	4.24302	19.5983
2022	3.5	3.9304	-20.2638
2023	3.9	4.2805	-29.2627
2024	4.4	4.33811	-24.931
2025	4.8	4.44163	-16.6445
2026	4.4	4.2263	-19.5711
2027	4.6	4.63304	-34.5507
2028	4.5	4.51389	-121.922
2029	4.3	4.48277	276.386
2030	3.5	3.921	-10.8881
2031	3.6	3.89622	-20.8271
2032	4.4	4.23228	43.2245
2033	4.9	3.71409	-7.10926
2034	4.4	4.44749	53.6569
2035	4.4	4.14768	-22.1846
2036	3.9	3.70139	28.3207
2037	4.2	4.1815	-3.06232
2038	4.1	4.02586	-84.6775
2039	4.7	4.46555	-17.7505
2040	4.6	4.3718	44.3013
2041	4.1	4.35276	-2.41176
2042	4.8	4.53977	-28.7842
2043	4.4	4.21165	25.3959
2044	4.3	4.40855	-16.5671
2045	4.6	4.42112	57.3128
2046	4	4.0012	72.2608

2047	4.8	4.56223	33.8419
2048	4.7	4.54612	-36.477
2049	3.7	4.01673	-18.0308
2050	4.4	4.28538	1.98632
2051	4	4.46848	-2.0831
2052	4.4	3.97483	-19650.8
2053	4.8	4.31858	18.7143
2054	3.9	3.99973	30.1263
2055	3.7	3.9055	-70.01
2056	3.5	3.75608	57.2067
2057	4.2	4.1721	-27.5591
2058	4.4	4.36411	16.8332
2059	3	3.95628	26.5881
2060	4	4.0969	18.3231
2061	4.3	4.23557	-2.64184
2062	4.4	3.90257	-34.7956
2063	4.7	4.2971	-18.7724
2064	4.7	4.19554	100.403
2065	3.8	3.89085	19.1265
2066	4.9	4.10227	91.541
2067	4	4.41819	-126.73
2068	2.1	4.23704	71.782
2069	4.2	4.12742	-63.5933
2070	4.6	4.02366	74.5711
2071	4.5	4.2136	8.78022
2072	4.5	4.31126	-19.4415
2073	4.4	4.26487	-18.1872
2074	5	4.54026	149.818
2075	2.6	4.10423	54.5861
2076	4.1	3.99827	-22.9479
2077	3	4.01585	47.3189
2078	3.4	3.87547	-27.3573
2079	3.9	4.2956	-13.3175
2080	4.6	4.35337	12.9006
2081	4.9	4.41233	11.6894
2082	4.8	4.76194	-6.81848
2083	4.1	4.38841	51.4552
2084	4.3	3.79954	20.6651
2085	4.3	4.09397	-15.6887
2086	3.8	4.44798	-12.0003
2087	4.6	4.20005	32.9867
2088	4.1	4.04173	32.8002
2089	4.4	4.53358	-2.7921
2090	4.1	4.01243	-75.8016
2091	4.1	4.1974	-30.0583
2092	3.7	3.85008	-80.711
2093	4.2	4.37327	48.9514
2094	3.9	4.34397	-4.1242

2095	3.9	3.61643	23.5292
2096	4.5	4.25755	96.5835
2097	2.7	3.9055	74.314
2098	3.5	4.01963	25.9562
2099	4.3	3.96263	8.10141
2100	4.7	4.23701	87.0437
2101	4.4	4.18763	-5.97035
2102	3.1	3.79344	-56.0271
2103	4.5	4.38548	81.7325
2104	4.6	4.46165	-4.89275
2105	4.2	4.15989	49.0141
2106	4.6	3.75608	7.27036
2107	3.5	3.801	32.2894
2108	4.2	4.18235	4.75129
2109	4.2	4.19261	9.43073
2110	4.7	4.48411	-2.43337
2111	4.3	4.03623	2.29644
2112	4.3	4.25022	2.47306
2113	3.7	3.99046	30.0751
2114	4.3	3.97581	49.4607
2115	4	4.11704	-0.28219
2116	3.6	4.3762	-54.7481
2117	4.4	4.38889	31.648
2118	4.2	3.92405	27.9875
2119	4.4	4.39866	3.18388
2120	4.4	4.089	4.73031
2121	4.3	3.97202	0.238083
2122	3.3	3.91673	34.777
2123	4.2	4.22288	32.2191
2124	4.4	4.19554	-15.4267
2125	4.4	3.8469	5.16564
2126	3.6	3.96458	53.8591
2127	4.7	4.35911	7.50599
2128	4.7	3.91673	57.6904
2129	3.4	3.84702	92.4109
2130	3.7	3.80125	-9.23919
2131	4.5	4.51487	290.352
2132	4.7	4.12864	59.8286
2133	4.7	4.26341	24.1457
2134	4	3.91233	36.9009
2135	3.7	4.23313	11.4467
2136	4	4.39323	-46.1412
2137	3.7	4.04563	14.8621
2138	4.3	4.15647	1.04247
2139	4.3	3.69163	40.2739
2140	4.1	4.26097	37.2531
2141	4.3	4.20677	4.009
2142	4.4	4.09495	33.6016

2143	4.5	4.26097	154.99
2144	4.7	4.19798	51.3654
2145	4.6	4.31614	61.1762
2146	3.9	4.19602	29.2682
2147	3.3	4.14866	76.5913
2148	4.2	4.03831	-2.76526
2149	4.3	4.23753	30.8281
2150	4.6	4.21116	22.2012
2151	4.4	4.30052	8.82855
2152	4.2	4.34055	82.7719
2153	4.6	4.41038	7.45831
2154	4.2	4.0576	55.6489
2155	3.5	3.7053	59.2299
2156	4.1	4.21165	-10.6364
2157	4.6	4.27659	-16.6968
2158	3.7	3.89866	77.4161
2159	5	3.91868	19.5655
2160	3.4	4.16197	21.1391
2161	4.2	3.97288	29.7042
2162	3.4	4.23326	26.428
2163	3.9	4.04368	5.94323
2164	2.9	4.04124	-45.1586
2165	4.5	3.97666	33.8615
2166	4.3	4.3093	-83.2461
2167	4.8	4.13133	-56.3339
2168	4.4	4.41844	-117.203
2169	4.6	4.21311	70.1965
2170	4.2	4.32487	-52.7766
2171	4.6	3.88499	30.3626
2172	4.4	4.02366	82.5254
2173	4.1	4.13694	-13.2784
2174	4.2	3.7971	56.547
2175	3.7	4.00511	13.9698
2176	4.4	3.99973	91.2774
2177	4.2	4.08039	-18.7069
2178	3.7	4.10472	-11.8653
2179	4.8	4.22581	-49.3669
2180	4.4	4.21812	29.7777
2181	4.7	4.32639	13.4365
2182	4.5	4.34788	-52.1139
2183	4.1	3.98313	10.6581
2184	4.5	3.97141	157.214
2185	5	4.2429	19.746
2186	4.4	4.55796	15.1393
2187	4.1	4.04905	35.4409
2188	4	4.11643	82.5627
2189	4	3.98167	3.15045
2190	3.7	3.96311	112.638

2191	3.1	3.89573	75.532
2192	4.5	3.98289	-3685.48
2193	4.1	4.24534	109.31
2194	3.6	4.25315	8.21018
2195	4.3	4.39524	-28.1187
2196	3.6	3.86204	19.112
2197	3.8	4.11253	34.4667
2198	4.2	4.4354	13.7368
2199	4.1	4.04222	1.00249
2200	4.2	4.26243	-14.8817
2201	3.7	3.96116	31.6248
2202	4.1	3.95725	10.2203
2203	3.6	3.97141	9.71938
2204	4	4.2899	71.9576
2205	3.1	3.81468	34.1182
2206	4.4	3.8093	99.0316
2207	4.1	4.19114	-11.5086
2208	4.6	4.57639	-39.7835
2209	4.5	3.94407	11.3707
2210	3.9	4.32701	-28.2672
2211	4.5	4.14964	-68.5947
2212	4.3	4.22837	-15.9308
2213	4.4	4.47581	-60.2778
2214	4	4.03831	1.01374
2215	3.2	3.7407	-47.576
2216	4.5	4.47593	40.695
2217	4	4.09495	-46.3124
2218	4.1	4.14475	-50.8696
2219	4.1	4.10911	112.772
2220	4.3	4.18345	-18.9598
2221	3.9	4.18955	51.1435
2222	4.4	4.03782	2.99829
2223	3.9	4.34739	1.30618
2224	4.3	4.11588	-62.4492
2225	3.6	3.82054	79.143
2226	4.3	3.7429	59.5348
2227	3.9	3.74265	-30.8908
2228	4.6	4.46751	-22.9062
2229	2.9	3.74981	62.2339
2230	4.6	4.42437	214.097
2231	4.1	4.10862	69.7256
2232	4.8	4.28391	32.9402
2233	4	3.87742	-3.91813
2234	4.2	3.83177	75.2693
2235	4.7	4.73069	-17.5469
2236	4.4	4.23802	50.4608
2237	4.1	3.88108	38.7729
2238	4	4.53452	17.1294

2239	4.5	4.01414	-63.4597
2240	2.3	4.11204	101.414
2241	4	4.30052	1.87759
2242	4.5	4.21702	-6.5963
2243	4.3	3.98069	2.4785
2244	4.1	4.20298	43.5815
2245	4.4	4.14964	18.6125
2246	4.4	4.42954	-8.64673
2247	3.9	3.92014	-6.80587
2248	4.7	4.20286	48.0931
2249	4.2	4.09446	51.404
2250	3	3.85862	56.0625
2251	3.9	4.15672	-64.1736
2252	4.9	4.31272	-27.7635
2253	4.3	4.31761	-29.5681
2254	3.9	3.99265	-100.484
2255	4	3.80296	-31.99
2256	4.8	4.17845	-20.8379
2257	4.2	4.22483	51.7924
2258	4.5	4.50462	60.6153
2259	4.1	4.15159	15.9827
2260	4.3	4.0438	23.7542
2261	4.5	4.3513	107.021
2262	3.8	4.02781	-61.3465
2263	4.2	4.60374	-53.8853
2264	4.4	4.21107	-30.029
2265	4	4.1428	1.21659
2266	4.5	4.16477	1.86498
2267	4	3.9553	9.54335
2268	3.7	3.93675	152.803
2269	4.6	4.68479	-108.083
2270	4	3.89085	30.2788
2271	4.4	4.54514	44.3334
2272	3.1	3.93772	-5.57854
2273	4.4	4.22874	-60.9461
2274	2.3	3.86009	39.3153
2275	3.9	4.11057	-46.6355
2276	4.3	4.10032	54.6922
2277	4.8	4.3581	48.8002
2278	4.5	4.27464	21.5532
2279	4.4	4.20481	32.0321
2280	1	3.83372	86.9581
2281	4.2	4.12425	-58.5352
2282	5	4.22166	115.717
2283	3.3	4.23753	0.0839942
2284	3.8	4.13304	47.0992
2285	4.7	4.38694	-34.4791
2286	3.8	4.04026	2.07426

2287	4.4	4.23014	-18.5446
2288	4.4	4.2956	25.004
2289	4.8	4.37766	-25.3408
2290	2.7	3.98704	17.3669
2291	4.2	4.3303	-54.0549
2292	4.1	4.14378	22.5493
2293	4.4	4.56614	-28.3771
2294	4.2	3.9387	11.2231
2295	4.2	4.53306	292.297
2296	4.8	4.31126	93.604
2297	4.5	4.24302	19.182
2298	3.8	4.02952	5.70013
2299	4.9	4.31346	-20.4932
2300	4	4.43717	248.52
2301	4.3	4.33079	61.7738
2302	4.3	4.47093	22.7872
2303	3.8	4.03147	16.8125
2304	4.9	4.55833	42.8351
2305	3.3	4.2844	-22.1179
2306	4.6	4.40354	18.7107
2307	4.4	4.31907	-17.7892
2308	5	4.22727	71.8108
2309	4.4	4.23069	58.5337
2310	3.9	3.86155	38.244
2311	4.1	4.18833	-22.9921
2312	4.2	4.19749	12.2231
2313	4.6	4.51731	-4.03137
2314	4.1	4.1179	4.58901
2315	4	4.42991	47.1391
2316	4.3	4.03587	4.75918
2317	3.6	4.03465	-3640.43
2318	4.8	4.57932	-695.896
2319	4.1	4.19016	-18.5102
2320	3.9	3.9846	75.4459
2321	3.9	3.4835	-32.4868
2322	4.3	4.42014	-55.6773
2323	4.3	4.18138	-27.5421
2324	4.3	4.21748	4.71923
2325	4.2	4.145	-64.0549
2326	4.4	4.49925	-30.5138
2327	4.6	4.33225	42.5505
2328	4.4	4.39866	-21.7612
2329	4.4	3.86448	59.097
2330	2.8	4.06077	68.0688
2331	4	3.83665	5.34323
2332	3.9	3.76975	62.2622
2333	4.1	4.06858	-0.113749
2334	4.2	3.91477	-49.9011

2335	4.3	4.07981	3.86725
2336	4	4.03977	-46.0074
2337	4.4	4.47386	128.664
2338	3.3	4.39048	39.9788
2339	4.1	4.0261	9.51306
2340	4.4	4.15891	52.7862
2341	4	3.93589	-35.5515
2342	3.7	3.52781	-66.3314
2343	4.2	4.20249	24.2545
2344	4	4.14121	-39.4428
2345	4	3.90159	62.0542
2346	5	4.52952	58.042
2347	4.4	4.31663	15.736
2348	4.2	3.98557	50.5333
2349	4.3	4.09095	49.8791
2350	4.9	4.343	76.3111
2351	4.3	4.33079	-20.6651
2352	3.9	4.1052	11.2722
2353	4.2	4.33811	-99.5277
2354	4.7	4.23826	-80.848
2355	4.1	4.19993	-73.2107
2356	4.4	4.63401	-54.5498
2357	4.2	4.13108	-13.8007
2358	4.2	3.95555	-82.8333
2359	2.9	4.14134	50.8061
2360	3.9	3.70921	-8.60541
2361	4.7	4.19847	-10.7348
2362	4.4	4.0471	65.7575
2363	4.1	4.23802	0.628973
2364	3.5	3.9763	114.004
2365	4.7	4.04222	1.87073
2366	4	4.31761	-74.8668
2367	3.5	4.08665	18.6679
2368	4.7	4.36302	7.18046
2369	4.3	4.11546	12.4409
2370	4.3	4.1677	-26.395
2371	3.9	3.94651	103.647
2372	4.5	4.11741	-0.144767
2373	2.5	4.00892	21.6425
2374	2.9	4.05503	97.8986
2375	3.9	4.02415	63.524
2376	4.5	4.51951	205.388
2377	4.5	4.11784	-59.6142
2378	3.9	4.18345	4.59291
2379	4.3	3.93577	65.1688
2380	4.7	4.55882	-82.2096
2381	4	3.86936	43.9772
2382	4.2	4.12937	-63.2688

2383	4.5	4.46848	-33.8049
2384	4.6	4.11448	-23.3799
2385	2.7	3.97141	103.366
2386	3.7	3.85789	-57.3583
2387	4.1	3.8513	79.3286
2388	4	3.85764	71.6634
2389	5	4.32444	18.7504
2390	4.5	3.9221	0.312921
2391	4.4	4.33958	-38.045
2392	4.6	4.09983	94.6716
2393	4.2	3.89518	5.00818
2394	4.3	4.24534	-77.4684
2395	4.6	4.36497	-5.64646
2396	3.9	4.20286	28.2946
2397	4.4	3.94065	57.889
2398	4	3.82273	-56.074
2399	3.8	4.11366	160.569
2400	4.7	4.4304	-27.1373
2401	4.4	4.08274	-70.5452
2402	4.3	4.24595	42.4789
2403	3.7	3.91331	15.0362
2404	4.6	4.32786	53.5881
2405	4.6	4.60081	42.951
2406	4.1	4.12718	52.3657
2407	4.2	4.33567	60.6167
2408	1	4.04612	97.2396
2409	4.4	4.15159	52.347
2410	4.5	4.62876	-35.4352
2411	3.6	3.9044	-17.8499
2412	4.3	4.12034	-66.6586
2413	4.5	4.11546	41.8751
2414	4.3	4.31272	66.603
2415	5	4.11204	96.892
2416	4.1	3.78391	7.76295
2417	4.2	3.89671	37.3428
2418	4.1	4.21946	-57.2693
2419	4.1	4.0742	-15.2395
2420	4.5	4.16722	27.2785
2421	4.8	4.07054	87.8644
2422	4.1	3.68186	60.0536
2423	4.3	4.42845	1.19592
2424	5	4.14109	6.67094
2425	4.2	4.03245	47.9747
2426	4.2	4.32273	-114.994
2427	4.4	4.03831	79.1048
2428	3.9	4.21116	-34.0823
2429	4.1	4.32932	29.0905
2430	3.6	3.91026	-18.7178

2431	3.6	3.91136	50.7093
2432	4.1	4.08909	65.2906
2433	3.3	3.93626	35.5948
2434	4	4.45677	58.8229
2435	4.6	4.16722	-26.7538
2436	4.2	4.3303	66.1361
2437	3.4	3.77171	57.7589
2438	4.3	3.76023	-18.8163
2439	4.1	4.03172	-54.1776
2440	4.6	4.21897	17.2751
2441	4.1	4.07295	31.4612
2442	4.4	4.2899	-4.53436
2443	4.9	4.22984	40.8831
2444	4	4.33079	22.5683
2445	4.2	4.04417	-57.2661
2446	4.5	4.41331	54.1779
2447	4.8	4.42259	19.8421
2448	5	4.12815	92.7399
2449	4.6	4.46214	-22.2982
2450	4.7	4.50852	71.9512
2451	4.5	4.20384	-33.8643
2452	4.3	4.15867	-64.2606
2453	4.6	4.15501	-16.9066
2454	4.1	4.33811	-15.5353
2455	3.9	4.28648	39.5975
2456	4.5	4.60337	-47.9804
2457	2	3.94261	73.5065
2458	4.3	4.02964	-29.6389
2459	4.4	4.36048	-33.4004
2460	3.1	3.7219	-12.7287
2461	3.1	4.4763	34.704
2462	4.4	4.4011	44.375
2463	4.1	4.05515	-61.9742
2464	4.5	4.18977	-44.3427
2465	4.4	4.16429	-50.2802
2466	4.3	4.1594	-81.1629
2467	4.7	4.15159	6.6722
2468	4.2	4.05735	12.021
2469	3.6	3.88743	55.3343
2470	4.5	4.37718	-27.4187
2471	4	4.18748	84.4657
2472	4.1	4.12913	84.1359
2473	4.7	4.17747	48.6794
2474	3.6	4.04759	5.54122
2475	5	4.04173	101.811
2476	3	3.76682	-31.8118
2477	2.9	4.13645	10.6544
2478	4.6	4.23326	-27.3355

2479	4.7	3.95384	71.1131
2480	4.6	3.95127	-12.5786
2481	3.4	3.75511	54.3799
2482	4.4	4.6096	65.4683
2483	4.1	4.29514	49.8746
2484	4	4.14817	28.837
2485	4.5	4.22141	5.06658
2486	4.4	4.26829	1.50169
2487	3.6	3.87327	7.49529
2488	4	3.97972	-16.6117
2489	2.9	4.03062	21.7823
2490	3.6	4.01805	-84.6178
2491	4.3	4.28489	2.05292
2492	3.5	4.04405	55.4995
2493	4	4.15257	-69.9617
2494	5	4.32786	73.8668
2495	3.7	3.9243	-98.7712
2496	4.7	4.38694	-58.3083
2497	4.2	4.0886	6.98461
2498	4.5	4.15305	11.07
2499	5	4.32859	24.8298
2500	5	4.24461	11.1074
2501	4.2	4.32835	-3.00705
2502	3.8	4.19554	52.8915
2503	4	4.21263	63.8214
2504	4.4	4.2407	-66.2302
2505	3.8	3.84348	19.2248
2506	4.2	4.10569	107.091
2507	3.3	4.05686	54.3257
2508	4.7	4.12864	67.0218
2509	5	4.38889	101.297
2510	4.4	4.59007	-5.87546
2511	4.1	4.03245	-683.457
2512	4.4	4.28343	-7.30256
2513	4.1	4.12815	16.5388
2514	4.3	-1.29174e+11	-442.522
2515	3.5	4.35862	-30.9952
2516	4.8	4.03245	-16.6025
2517	4.4	4.15843	-87.5882
2518	3.5	3.8989	-50.7472
2519	4.6	4.51536	-26.4255
2520	4.6	4.1594	-47.5847
2521	3.8	3.96702	41.4398
2522	4.2	4.09226	-62.8143
2523	3.8	-8.09732e+13	-699.197
2524	4.3	4.46229	66.2584
2525	3.5	3.78916	31.2402
2526	1.7	4.20432	21.4955

2527	4.2	4.17796	22.1132
2528	4.3	4.35032	2.04322
2529	4.2	4.23521	-20.6493
2530	2.9	3.99143	49.1111
2531	4.6	4.23326	-27.341
2532	4.4	4.10874	-26.7428
2533	3.9	3.84031	-57.1031
2534	4.5	4.44261	-9.14015
2535	4.4	4.34934	-24.3202
2536	4.5	4.19578	-88.4989
2537	3.9	4.23264	28.447
2538	4.2	4.34251	2.50409
2539	4.6	4.19969	-18.2666
2540	3.4	3.99192	7.75439
2541	4	3.89866	63.5337
2542	3.6	4.15354	-71.1483
2543	4.6	4.37229	6.9677
2544	4.6	4.1865	-15.6862
2545	4.1	3.82688	34.8654
2546	4.6	4.09641	14.0733
2547	3.7	4.03338	54.7329
2548	4.5	4.37835	-15.808

6 Conclusion:

Standard Scaler has same effect as Compared to OLS model function. hence the accuracy model score by using Standard Scaler is 12.86% and OLS model Score is12.86% using Linear Regression

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