instagramanalysis

October 22, 2023

```
[1]: import pandas as pd
     import numpy as np
     import matplotlib.pyplot as plt
     import plotly.express as px
     import seaborn as sns
     from sklearn.model_selection import train_test_split
     from sklearn.linear_model import PassiveAggressiveRegressor
     from wordcloud import WordCloud, STOPWORDS, ImageColorGenerator


     %matplotlib inline
```

0.0.1 Read data

```
[2]: df = pd.read_csv("/Users/AnhHuynh/Documents/FALL 2023/INTERMEDIATE PYTHON/
       ↪INSTAGRAM project/Instagram data.csv",encoding='latin1')
     df.head()
```

```
[2]:    Impressions  From Home  From Hashtags  From Explore  From Other  Saves  \
     0         3920       2586           1028           619          56     98
     1         5394       2727           1838          1174          78    194
     2         4021       2085           1188             0         533     41
     3         4528       2700            621           932          73    172
     4         2518       1704            255           279          37     96

        Comments  Shares  Likes  Profile Visits  Follows  \
     0         9       5    162              35        2
     1         7      14    224              48       10
     2        11       1    131              62       12
     3        10       7    213              23        8
     4         5       4    123               8        0

                                                  Caption  \
     0  Here are some of the most important data visua…
     1  Here are some of the best data science project…
     2  Learn how to train a machine learning model an…
     3  Here s how you can write a Python program to d…
     4  Plotting annotations while visualizing your da…
```

```
                                            Hashtags
0  #finance #money #business #investing #investme…
1  #healthcare #health #covid #data #datascience …
2  #data #datascience #dataanalysis #dataanalytic…
3  #python #pythonprogramming #pythonprojects #py…
4  #datavisualization #datascience #data #dataana…
```

0.0.2 Data cleansing

[3]:

```
# Check for null values

df.isnull().sum()
```

[3]:

```
Impressions       0
From Home         0
From Hashtags     0
From Explore      0
From Other        0
Saves             0
Comments          0
Shares            0
Likes             0
Profile Visits    0
Follows           0
Caption           0
Hashtags          0
dtype: int64
```

[25]:

```
df = df.dropna()
```

[5]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 119 entries, 0 to 118
Data columns (total 13 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   Impressions     119 non-null    int64
 1   From Home       119 non-null    int64
 2   From Hashtags   119 non-null    int64
 3   From Explore    119 non-null    int64
 4   From Other      119 non-null    int64
 5   Saves           119 non-null    int64
 6   Comments        119 non-null    int64
 7   Shares          119 non-null    int64
 8   Likes           119 non-null    int64
 9   Profile Visits  119 non-null    int64
 10  Follows          119 non-null    int64
 11  Caption          119 non-null    object
 12  Hashtags         119 non-null    object
dtypes: int64(11), object(2)
memory usage: 12.2+ KB
```

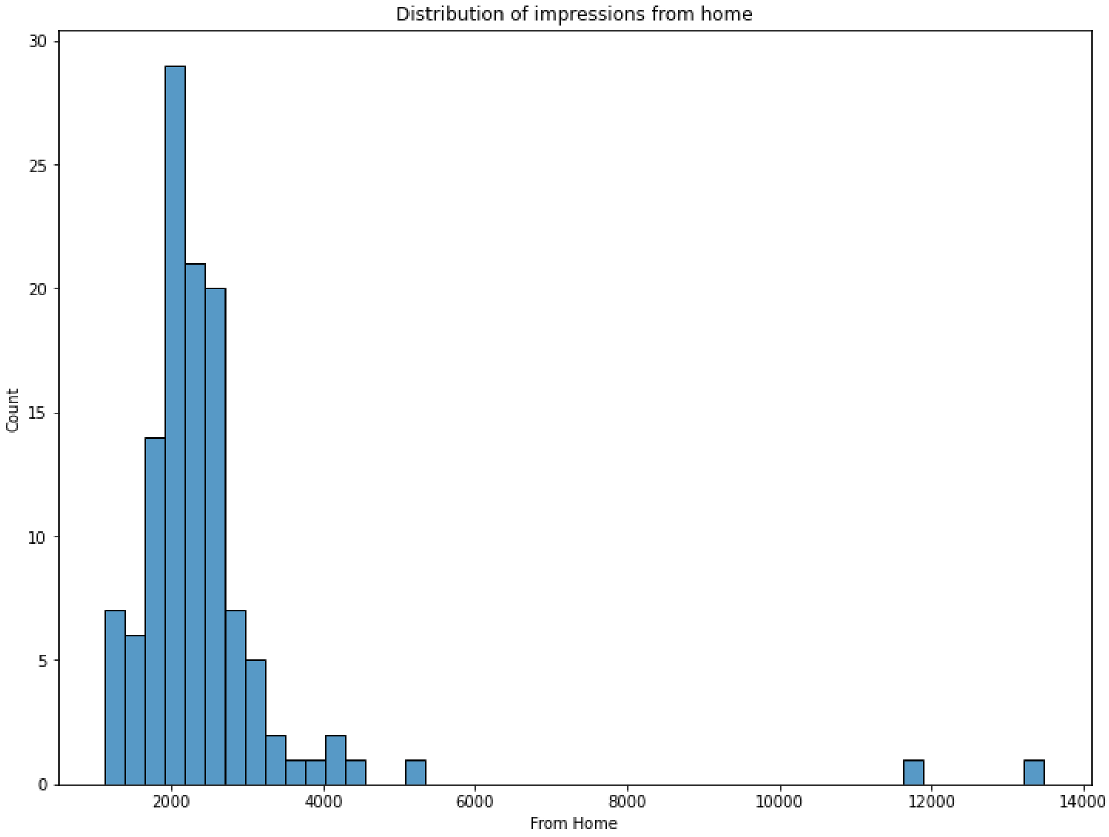
0.0.3 Exploratory Data Analysis

[6]:

```
# Distribution of Impresssions from home

plt.figure(figsize=(12,9))
plt.title("Distribution of impressions from home")
sns.histplot(df['From Home'])
```

[6]:

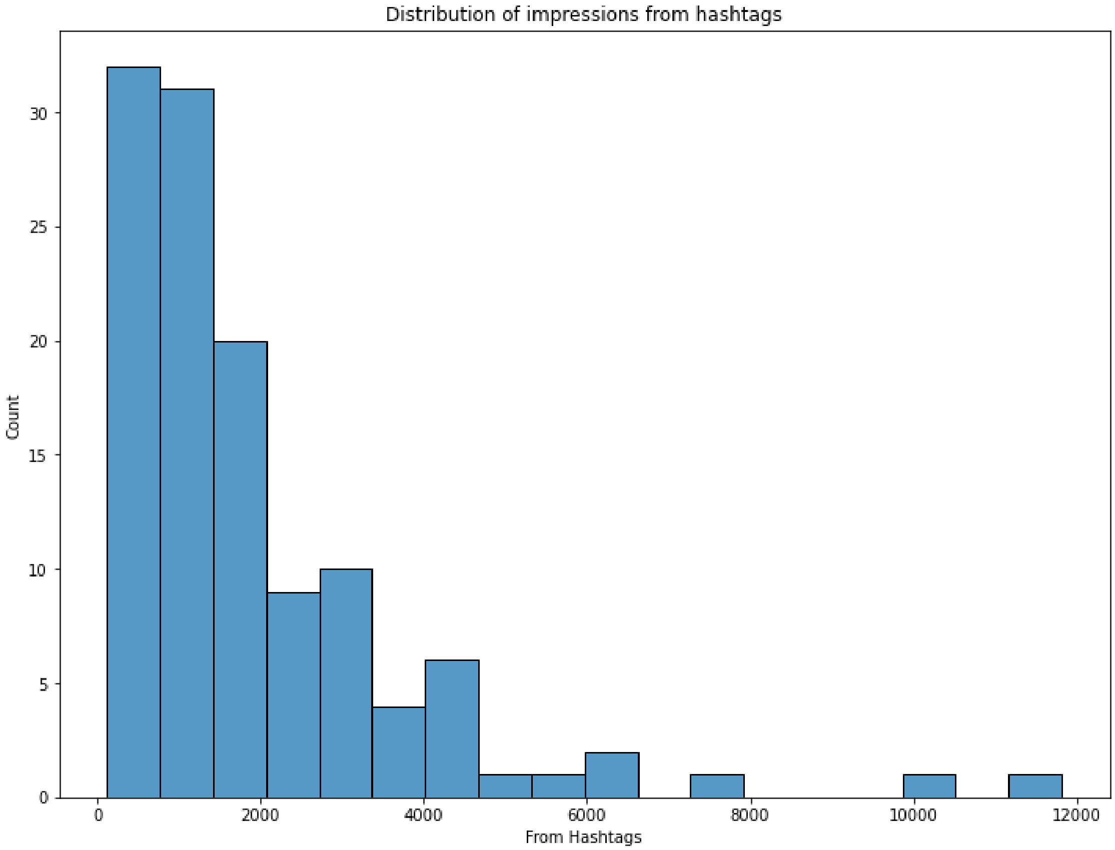
```
<AxesSubplot:title={'center':'Distribution of impressions from home'},
xlabel='From Home', ylabel='Count'>
```



[7]:

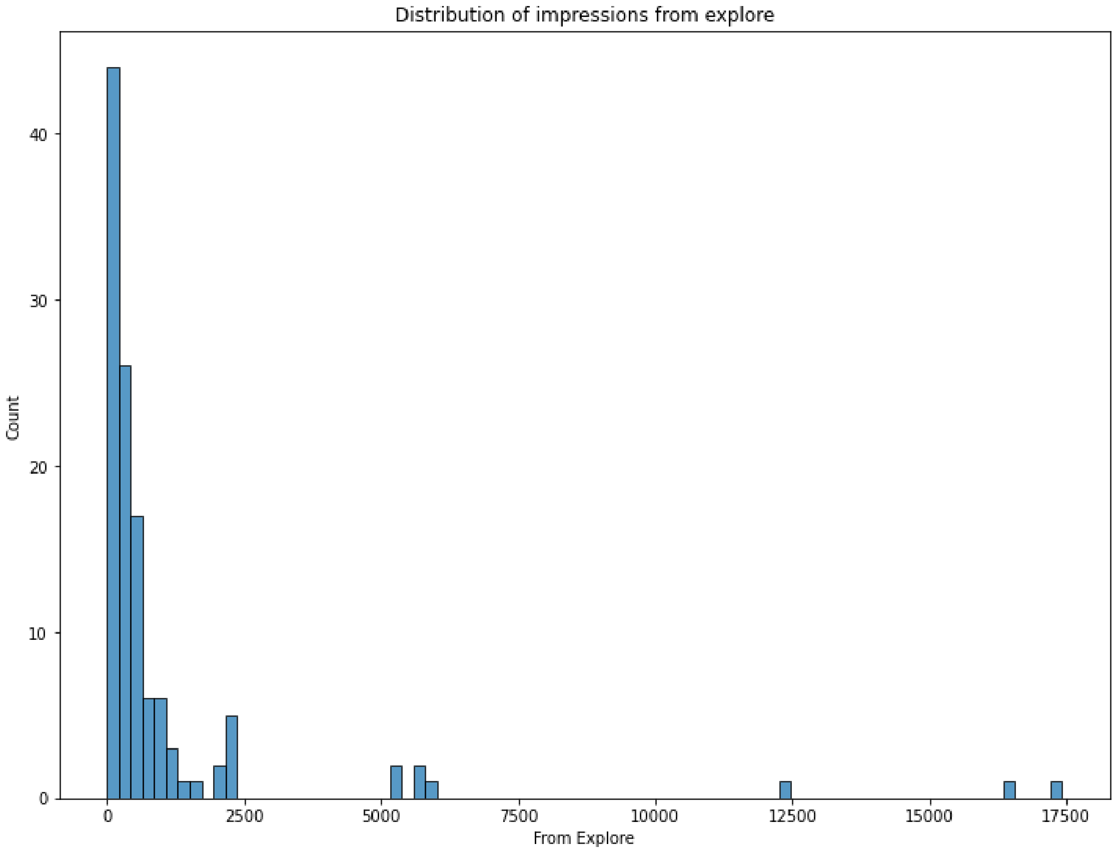
```
# Distribution of impressions from Hashtags
plt.figure(figsize=(12,9))
plt.title("Distribution of impressions from hashtags")
sns.histplot(df['From Hashtags'])
```

```
[7]: <AxesSubplot:title={'center':'Distribution of impressions from hashtags'},
     xlabel='From Hashtags', ylabel='Count'>
```



```
[8]: # Distribution from Explore
     plt.figure(figsize=(12,9))
     plt.title("Distribution of impressions from explore")
     sns.histplot(df['From Explore'])
```

```
[8]: <AxesSubplot:title={'center':'Distribution of impressions from explore'},
     xlabel='From Explore', ylabel='Count'>
```



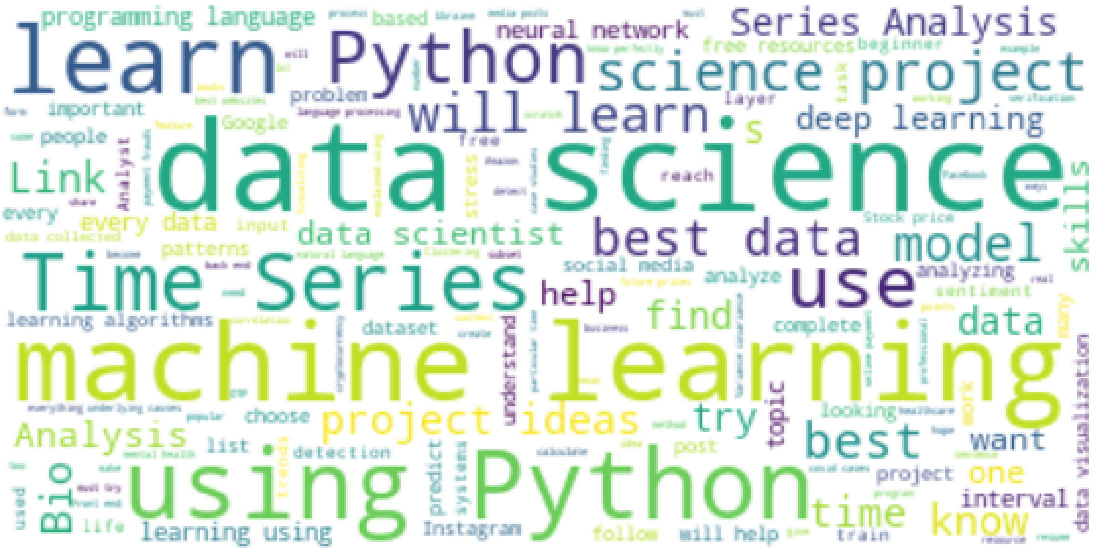
- The three plots show that impressions mostly come from hashtags.
- The explore section doesn't help gain much impressions.

[9]:
```
# Explore the percentage of sources of impressions
home = df['From Home'].sum()
hashtags = df['From Hashtags'].sum()
explore = df['From Explore'].sum()
others = df['From Other'].sum()

labels = ['From Home','From Hashtags','From Explore','From Other']
values = [home, hashtags, explore, others]

fig = px.pie(df,values = values, names= labels,
            title = "Sources of Instagram posts impresssions")

fig.show()
```

0.0.4 Analyzing content

[10]:

```
# We will create a wordcloud to show words appear most frequently in caption and hashtags

text = " ".join(i for i in df.Caption)
stopwords = set(STOPWORDS)
wordcloud = WordCloud(stopwords = stopwords,background_color="white").generate(text)
plt.figure(figsize=(10,8))
plt.style.use("classic")
plt.imshow(wordcloud,interpolation="bilinear")
plt.axis("off")
plt.show()
```



[11]:

```
text = " ".join(i for i in df.Hashtags)
stopwords = set(STOPWORDS)
wordcloud = WordCloud(stopwords=stopwords, background_color="white").generate(text)
plt.figure(figsize=(12,9))
plt.style.use("classic")
plt.imshow(wordcloud,interpolation="bilinear")
plt.axis("off")
plt.show()
```

pythoncode artificialintelligence
python pythonprogramming
machinelearningprojects datascienceprojects
datascientist machinelearning
ai deeplearning
thecleverprogrammer data
pythonprogramming pythonprojects
dataanalytics datascientist
pythonprojects pythoncode
amankharwal thecleverprogrammer
deeplearning machinelearningprojects
artificialintelligence ai
data datascience
machinelearning python
datascience dataanalysis
datascienceprojects amankharwal
dataanalysis dataanalytics

- The bigger size the words are, the more frequent the words are mentioned/tagged in captions and hashtags.

0.0.5 Analyzing relationship

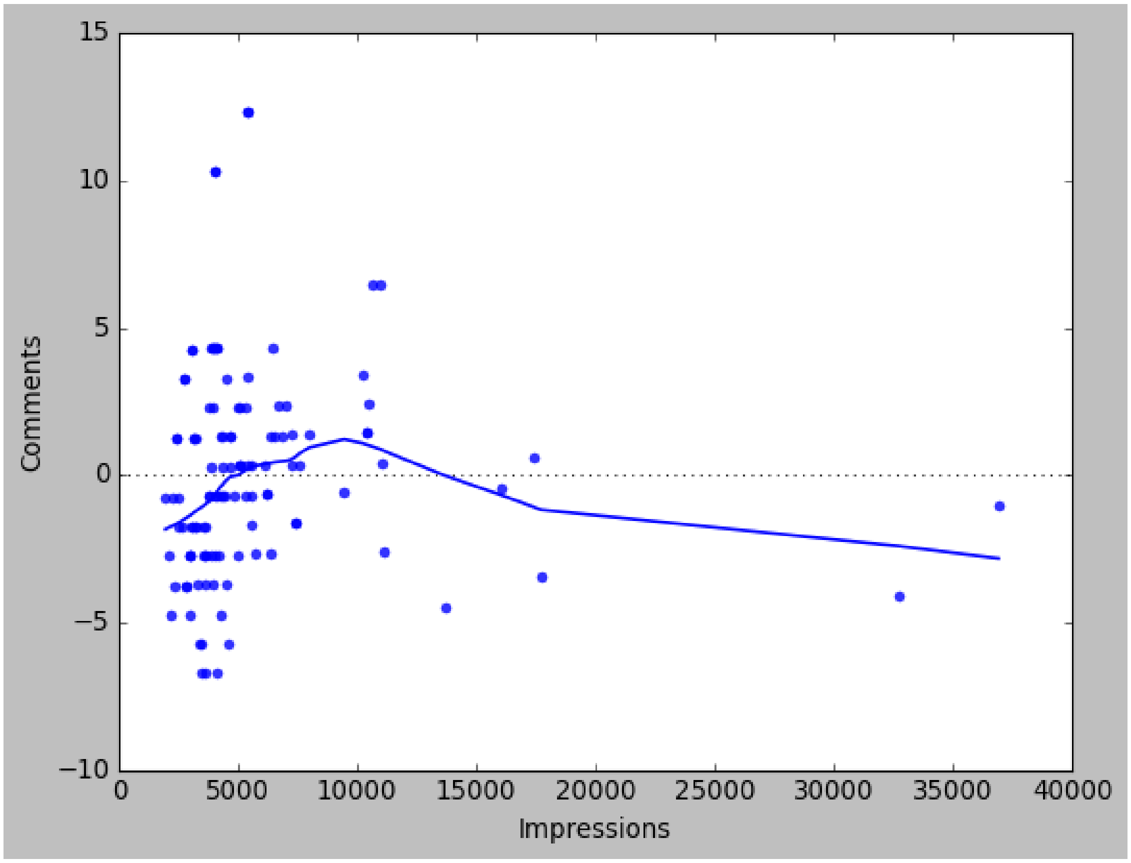
```
[12]: import statsmodels
      fig = px.scatter(df,x="Impressions", y="Likes", size="Likes", trendline="ols",
                       title="Correlation between Likes and Impressions")
      fig.show()
```

- We can detect linear relationship between likes and impressions. However, there are outliers that largely impact the linear model.

```
[13]: fig_1 = px.scatter(df,x="Impressions", y="Comments", size="Comments",␣
       ↪trendline="ols",
                         title="Correlation between Likes and Comments")
      fig_1.show()
```

```
[24]: sns.residplot(data=df,x="Impressions",y="Comments",lowess=True)
```

```
[24]: <AxesSubplot:xlabel='Impressions', ylabel='Comments'>
```

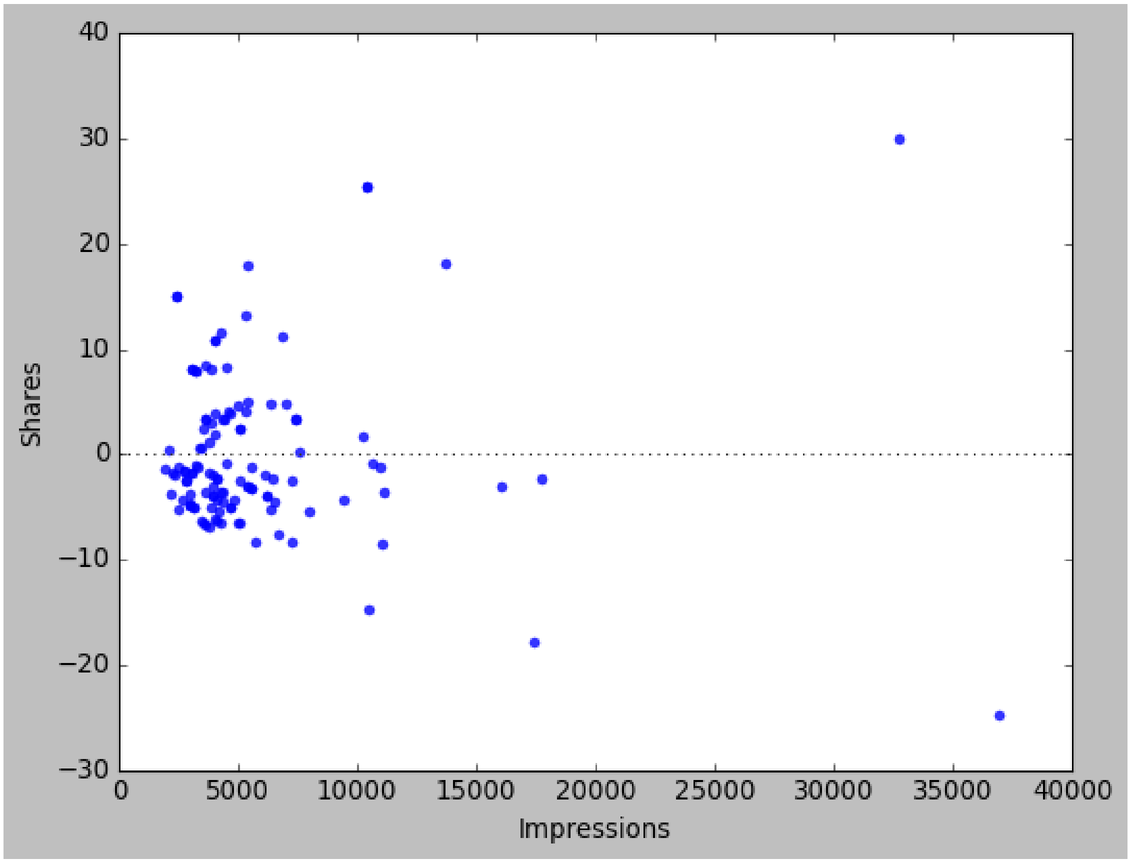


- We cannot determine a linear relationship between impressions and comments based on the scatter plot and the residual plots

```
[ ]: fig_2 = px.scatter(df,x="Impressions",y="Shares",size="Shares",trendline =␣
      ↪"ols",
                         title="Correlation between Impressions and Shares")
     fig_2.show()
```

```
[27]: sns.residplot(data=df,x="Impressions",y="Shares")
```

```
[27]: <AxesSubplot:xlabel='Impressions', ylabel='Shares'>
```



- We can't detect a linear relationship between Impressions and Shares either. Most of the data points scatter around 0-10k, and there are outliers that largely impact the accuracy of the model.

```
[28]: # Subset the df to include only columns with numeric values
      data = df.iloc[:, [0,1,2,3,4,5,6,7,8,9,10]].copy()
```

```
[29]: data.head()
```

```
[29]:    Impressions  From Home  From Hashtags  From Explore  From Other  Saves  \
      0         3920       2586           1028           619          56     98
      1         5394       2727           1838          1174          78    194
      2         4021       2085           1188             0         533     41
      3         4528       2700            621           932          73    172
      4         2518       1704            255           279          37     96

         Comments  Shares  Likes  Profile Visits  Follows
      0         9       5    162              35        2
      1         7      14    224              48       10
      2        11       1    131              62       12
      3        10       7    213              23        8
```

```
4          5         4     123                 8        0
```

[30]:

```
correlation = data.corr()
print(correlation['Impressions'].sort_values(ascending=False))
```

```
Impressions        1.000000
From Explore       0.893607
Follows            0.889363
Likes              0.849835
From Home          0.844698
Saves              0.779231
Profile Visits     0.760981
Shares             0.634675
From Other         0.592960
From Hashtags      0.560760
Comments          -0.028524
Name: Impressions, dtype: float64
```

- We can conclude that for this Instagram profile, impressions mainly come from explore section, the followers, likes, and home.
- In case we want to use this Instagram pofile to promote our business, or products, we should focus on the top 4 sections where most impressions come from to make sure that our products reach large pool of people.

[19]:

```
# We want to see the conversion rate on our Instgram page
conversion_rate = round(100*data['Follows'].sum()/data['Profile Visits'].
  ↪sum(),2)

conversion_rate
```

[19]:

```
41.0
```

- The conversion rate on this Instagram profile is very high, around 41%. In other words, we can say that 41% of profile visits achieve what they desire.

0.1 INSTAGRAM REACH PREDICTION MODEL

[31]:

```
# Define x, y
x=np.array(data[['Likes','Saves', 'Comments', 'Shares', 'Profile␣
  ↪Visits','Follows']])
y=np.array(data['Impressions'])
Xtrain,xtest,Ytrain,ytest = train_test_split(x,y,test_size=0.2,random_state=42)
```

[32]:

```
# Fit and test the model
model = PassiveAggressiveRegressor()
model.fit(Xtrain,Ytrain)
model.score(xtest,ytest)
```

[32]:

```
0.8785755782415448
```

- With the combination of different features, the model can predict the impresssions about 86% correctly.

[22]:

```
# Predict impressions by all the features combined
#Features = [['Like','Saves','Comments','Shares','Profile Visits','Follows']]
features = np.array([[282.0, 233.0, 4.0, 9.0, 165.0, 54.0]])
model.predict(features)
```

[22]:

```
array([9499.49289984])
```