15/04/2022, 11:05 33376\_facebook\_metrics\_assignment1

**Assignment 4**

**Details**

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**Problem Statement**

**Perform the following operations using Python on the Facebook metrics data sets**

1. Create data subsets

2. Merge Data

3. Sort Data

4. Transposing Data

5. Shape and reshape Data

**Implementation details**

1. Dataset URL : https://archive.ics.uci.edu/ml/datasets/Facebook+metrics

(https://archive.ics.uci.edu/ml/datasets/Facebook+metrics)

2. Python version : 3.7.4

3. Imports :

A. pandas

B. numpy

C. matplotlib

D. seaborn

4. conda environment : base

**Dataset details**

1. Given dataset is a representative of some of the Facebook metrics which are assosciated with the posts on social media.

2. These metrics are indicative of the engagement of the users with the corresponding post. 3. It includes various types of posts and their details

In [1]:

**!**python **--**version

Python 3.7.4

**Importing required libraries**

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 1/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

In [2]:

**import** pandas **as** pd

**import** numpy **as** np

**import** matplotlib.pyplot **as** plt

**import** seaborn **as** sns

sns.set()

**%**matplotlib inline

**Reading the dataset**

In [3]:

*# Reading the dataset*

dataset **=** pd.read\_csv("./dataset\_Facebook.csv", sep**=**";") dataset.head()

Out[3]:

**Page total likes**

**Type Category Post Month**

**Post**

**Weekday**

**Post**

**Hour Paid**

**Lifetime Post**

**Total**

**Reach**

**Lifetime**

**Post Total Impressions**

**Lifetime**

**Engaged**

**Users Co**

**0** 139441 Photo 2 12 4 3 0.0 2752 5091 178 **1** 139441 Status 2 12 3 10 0.0 10460 19057 1457 **2** 139441 Photo 3 12 3 3 0.0 2413 4373 177 **3** 139441 Photo 2 12 2 10 1.0 50128 87991 2211 **4** 139441 Photo 2 12 2 3 0.0 7244 13594 671

**Dataset metadata**

In [4]:

*# Shape of the dataset*

dataset.shape

Out[4]:

(500, 19)

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 2/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

In [5]:

dataset.describe(include**=**"all")Out[5]:

**Page total**

**likes Type Category Post**

**Month**

**Weekday Post Hour Paid Life**

**Post**

**To**

**count** 500.000000 500 500.000000 500.000000 500.000000 500.000000 499.000000 **unique** NaN 4 NaN NaN NaN NaN NaN **top** NaN Photo NaN NaN NaN NaN NaN **freq** NaN 426 NaN NaN NaN NaN NaN

**mean** 123194.176000 NaN 1.880000 7.038000 4.150000 7.840000 0.278557 13 **std** 16272.813214 NaN 0.852675 3.307936 2.030701 4.368589 0.448739 22 **min** 81370.000000 NaN 1.000000 1.000000 1.000000 1.000000 0.000000 **25%** 112676.000000 NaN 1.000000 4.000000 2.000000 3.000000 0.000000 3 **50%** 129600.000000 NaN 2.000000 7.000000 4.000000 9.000000 0.000000 5 **75%** 136393.000000 NaN 3.000000 10.000000 6.000000 11.000000 1.000000 13 **max** 139441.000000 NaN 3.000000 12.000000 7.000000 23.000000 1.000000 180

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 3/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

In [6]:

dataset.dtypes

Out[6]:

Page total likes

int64

Type

object

Category

int64

Post Month

int64

Post Weekday

int64

Post Hour

int64

Paid

float64

Lifetime Post Total Reach

int64

Lifetime Post Total Impressions

int64

Lifetime Engaged Users

int64

Lifetime Post Consumers

int64

Lifetime Post Consumptions

int64

Lifetime Post Impressions by people who have liked your Page int64

Lifetime Post reach by people who like your Page

int64

Lifetime People who have liked your Page and engaged with your post int64

comment

int64

like

float64

share

float64

Total Interactions

int64

dtype: object

**Note :**

1. There are 500 data points with 19 features.

**Preprocessing the data**

**1. Dropping null values**

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 4/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

In [7]:

dataset.isnull().sum()

Out[7]:

Page total likes

0

Type

0

Category

0

Post Month

0

Post Weekday

0

Post Hour

0

Paid

1

Lifetime Post Total Reach

0

Lifetime Post Total Impressions

0

Lifetime Engaged Users

0

Lifetime Post Consumers

0

Lifetime Post Consumptions

0

Lifetime Post Impressions by people who have liked your Page 0

Lifetime Post reach by people who like your Page

0

Lifetime People who have liked your Page and engaged with your post 0

comment

0

like

1

share

4

Total Interactions

0

dtype: int64

**Note :**

1. As seen above, there are null values in the dataset which can be either dropped or replaced

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 5/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

In [8]:

*# Dropping rows with null values*

dataset **=** dataset.dropna()

dataset.shape

Out[8]:

(495, 19)

In [9]:

*# Testing data for null values*

dataset.isnull().sum()

Out[9]:

Page total likes

0

Type

0

Category

0

Post Month

0

Post Weekday

0

Post Hour

0

Paid

0

Lifetime Post Total Reach

0

Lifetime Post Total Impressions

0

Lifetime Engaged Users

0

Lifetime Post Consumers

0

Lifetime Post Consumptions

0

Lifetime Post Impressions by people who have liked your Page 0

Lifetime Post reach by people who like your Page

0

Lifetime People who have liked your Page and engaged with your post 0

comment

0

like

0

share

0

Total Interactions

0

dtype: int64

**All null value data points dropped**

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 6/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

**2. Generating subsets on the basis of type**

**Identifying unique values in the "Type" column**

In [10]:

unique\_type\_entries **=** dataset["Type"].unique()

In [11]:

unique\_type\_entries

Out[11]:

array(['Photo', 'Status', 'Link', 'Video'], dtype=object)

**Generating subsets**

In [12]:

photo\_subset **=** dataset[dataset["Type"] **==** "Photo"]

status\_subset **=** dataset[dataset["Type"] **==** "Status"]

link\_subset **=** dataset[dataset["Type"] **==** "Link"]

video\_subset **=** dataset[dataset["Type"] **==** "Video"]

**Shape of subsets**

In [13]:

print("Photo Subset shape : ", photo\_subset.shape)

print("Status Subset shape : ", status\_subset.shape)

print("Link Subset shape : ", link\_subset.shape)

print("Video Subset shape : ", video\_subset.shape)

Photo Subset shape : (421, 19)

Status Subset shape : (45, 19)

Link Subset shape : (22, 19)

Video Subset shape : (7, 19)

**Graphical representation of distribution of each subset**

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 7/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

In [14]:

*# Gathering distribution data* distribution\_frequencies **=** [ photo\_subset.shape[0],

status\_subset.shape[0], link\_subset.shape[0],

video\_subset.shape[0],

]

*# Generating legend for pie chart* legend **=** [

"Photo",

"Status",

"link",

"Video"

]

*# Defining explode values*

explode **=** [0.1, 0.1, 0.1, 0.1]

*# Generating and displaying piechart* plt.pie(

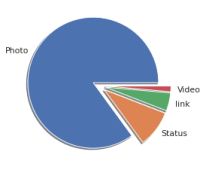
x**=**distribution\_frequencies, labels**=**legend,

shadow**=True**,

explode**=**explode

)

plt.show()

**Comparing subsets**

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 8/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

**a) Likes per subset**

In [15]:

*# Calculating Likes per subset*

likes\_data **=** [

int(photo\_subset["like"].sum()),

int(status\_subset["like"].sum()),

int(link\_subset["like"].sum()),

int(video\_subset["like"].sum()),

]

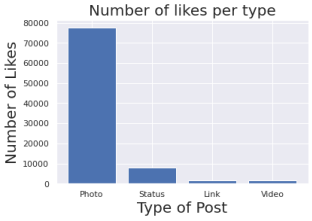
*# Generating and displaying bar chart*

plt.bar(

x**=**["Photo", "Status", "Link", "Video"], height**=**likes\_data

)

plt.xlabel("Type of Post", fontsize**=**20) plt.ylabel("Number of Likes", fontsize**=**20) plt.title("Number of likes per type", fontsize**=**20) plt.show()

**b) Comments per subset**

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 9/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

In [16]:

*# Calculating Likes per subset*

commments\_data **=** [

int(photo\_subset["comment"].sum()),

int(status\_subset["comment"].sum()), int(link\_subset["comment"].sum()),

int(video\_subset["comment"].sum()),

]

*# Generating and displaying bar chart*

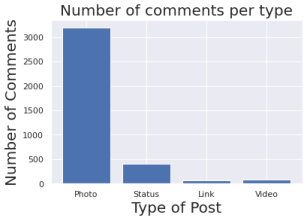
plt.bar(

x**=**["Photo", "Status", "Link", "Video"], height**=**commments\_data

)

plt.xlabel("Type of Post", fontsize**=**20)

plt.ylabel("Number of Comments", fontsize**=**20) plt.title("Number of comments per type", fontsize**=**20) plt.show()

**c) Shares per subset**

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 10/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

In [17]:

*# Calculating Likes per subset*

shares\_data **=** [

int(photo\_subset["share"].sum()),

int(status\_subset["share"].sum()),

int(link\_subset["share"].sum()),

int(video\_subset["share"].sum()),

]

*# Generating and displaying bar chart*

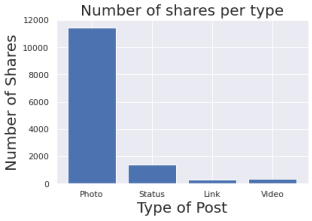
plt.bar(

x**=**["Photo", "Status", "Link", "Video"], height**=**shares\_data

)

plt.xlabel("Type of Post", fontsize**=**20)

plt.ylabel("Number of Shares", fontsize**=**20) plt.title("Number of shares per type", fontsize**=**20) plt.show()

**Exploratory analysis for Photos subset**

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 11/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

In [18]:

*# Statistical description of numerical subset* photo\_subset.describe(include**=**"all")

Out[18]:

**Page total**

**likes Type Category Post Month**

**Weekday Post Hour Paid LiT Post**

**count** 421.000000 421 421.000000 421.000000 421.000000 421.000000 421.000000 **unique** NaN 1 NaN NaN NaN NaN NaN **top** NaN Photo NaN NaN NaN NaN NaN **freq** NaN 421 NaN NaN NaN NaN NaN

**mean** 122319.612827 NaN 1.926366 6.790974 4.087886 8.004751 0.282660 13 **std** 16242.669134 NaN 0.884681 3.228447 2.056203 4.432561 0.450828 22 **min** 81370.000000 NaN 1.000000 1.000000 1.000000 1.000000 0.000000 **25%** 109670.000000 NaN 1.000000 4.000000 2.000000 3.000000 0.000000 3 **50%** 128032.000000 NaN 2.000000 7.000000 4.000000 9.000000 0.000000 4 **75%** 136013.000000 NaN 3.000000 10.000000 6.000000 11.000000 1.000000 10 **max** 139441.000000 NaN 3.000000 12.000000 7.000000 23.000000 1.000000 180

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 12/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

In [19]:

*# Number of posts with more than and less than average likes*

mean\_photo\_likes **=** photo\_subset["like"].mean()

above\_average\_photo\_likes **=** photo\_subset[photo\_subset["like"] **>=** mean\_photo\_likes] below\_average\_photo\_likes **=** photo\_subset[photo\_subset["like"] **<** mean\_photo\_likes] print("Average likes : ", mean\_photo\_likes)

print("Above average photo likes : ", above\_average\_photo\_likes.shape[0]) print("Below average photo likes : ", below\_average\_photo\_likes.shape[0])

*# Graphical representation*

plt.bar(

x**=**["Above average", "Below average"],

height**=**[

above\_average\_photo\_likes.shape[0],

below\_average\_photo\_likes.shape[0]

]

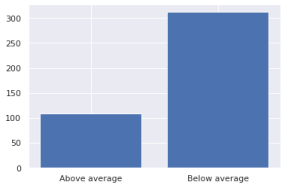
)

plt.show()

Average likes : 184.0665083135392

Above average photo likes : 109

Below average photo likes : 312



In [20]:

photo\_subset["Paid"].unique()

Out[20]:

array([0., 1.])

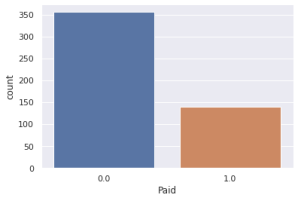
localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 13/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

In [22]:

*# Counting number of paid and unpaid posts* sns.countplot(x**=**dataset["Paid"])

plt.show()



**3. Transpose of data**

**Note :**

1. The smallest subset is considered for transposing

In [23]:

*# Shape of data before transposing*

print("Shape of Video subset : ", video\_subset.shape) Shape of Video subset : (7, 19)

In [24]:

*# Transposing data*

video\_subset\_transpose **=** video\_subset.transpose()

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 14/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

In [25]:

*# Shape of data after transposing*

print("Shape of Video subset transpose: ", video\_subset\_transpose.shape) Shape of Video subset transpose: (19, 7)

In [26]:

video\_subset\_transpose

Out[26]:

**29 55 71 74 183 243 277**

**Page total likes** 138895 138329 137893 137893 134879 130791 126424

**Type** Video Video Video Video Video Video Video

**Category** 1 1 1 1 1 1 1

**Post Month** 12 11 11 11 9 7 6

**Post Weekday** 4 6 5 3 2 3 2

**Post Hour** 11 2 3 11 10 11 13

**Paid** 1.0 1.0 1.0 0.0 0.0 1.0 0.0

**Lifetime Post Total Reach** 36208 16416 100768 13544 30624 21872 139008 **Lifetime Post Total Impressions** 61262 31950 220447 30235 56950 40413 277100 **Lifetime Engaged Users** 1141 459 2101 517 2080 3872 1779

**Lifetime Post Consumers** 1068 411 1735 458 1956 3822 1643 **Lifetime Post Consumptions** 1728 539 2331 667 3253 7327 2356

**Lifetime Post Impressions by**

**people who have liked your Page** 30131 21436 59658 26622 32033 24667 107502

**Lifetime Post reach by people who**

**like your Page** 14112 9568 18880 11760 15744 12920 38720

**Lifetime People who have liked your**

**Page and engaged with your post** 559 363 885 447 1376 2218 1008 **comment** 18 2 17 2 6 18 23

**like** 143.0 65.0 449.0 99.0 345.0 315.0 204.0

**share** 13.0 14.0 84.0 13.0 121.0 76.0 44.0

**Total Interactions** 174 81 550 114 472 409 271

**4. Merging data**

**Note :**

1. For performing merging operation, 2 subsets of the given dataset are considered (Photo and video subset)

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 15/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

In [27]:

print("Shape of photo subset : ", photo\_subset.shape) print("Shape of video subset : ", video\_subset.shape)

Shape of photo subset : (421, 19)

Shape of video subset : (7, 19)

In [29]:

*# Checking columns of both data subsets*

print("Columns of photo subset : ", photo\_subset.columns) print("Columns of video subset : ", video\_subset.columns)

Columns of photo subset : Index(['Page total likes', 'Type', 'Categor y', 'Post Month', 'Post Weekday',

'Post Hour', 'Paid', 'Lifetime Post Total Reach', 'Lifetime Post Total Impressions', 'Lifetime Engaged Users', 'Lifetime Post Consumers', 'Lifetime Post Consumptions', 'Lifetime Post Impressions by people who have liked your Page', 'Lifetime Post reach by people who like your Page', 'Lifetime People who have liked your Page and engaged with your post',

'comment', 'like', 'share', 'Total Interactions'], dtype='object')

Columns of video subset : Index(['Page total likes', 'Type', 'Categor y', 'Post Month', 'Post Weekday',

'Post Hour', 'Paid', 'Lifetime Post Total Reach', 'Lifetime Post Total Impressions', 'Lifetime Engaged Users', 'Lifetime Post Consumers', 'Lifetime Post Consumptions', 'Lifetime Post Impressions by people who have liked your Page', 'Lifetime Post reach by people who like your Page', 'Lifetime People who have liked your Page and engaged with your post',

'comment', 'like', 'share', 'Total Interactions'], dtype='object')

In [32]:

*# Merging the 2 subsets (DataFrames)*

photo\_video\_merged **=** pd.merge(

left**=**photo\_subset,

right**=**video\_subset,

on**=**"Paid"

)

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 16/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

In [33]:

photo\_video\_merged.head() Out[33]:

**Page**

**Lifetime**

**Lifetime Post**

**total**

**likes\_x**

**Type\_x Category\_x Post Month\_x**

**Post**

**Weekday\_x**

**Post**

**Hour\_x Paid**

**Post**

**Total**

**Reach\_x**

**Total**

**Impressions\_x**

**0** 139441 Photo 2 12 4 3 0.0 2752 5091 **1** 139441 Photo 2 12 4 3 0.0 2752 5091 **2** 139441 Photo 2 12 4 3 0.0 2752 5091 **3** 139441 Photo 3 12 3 3 0.0 2413 4373 **4** 139441 Photo 3 12 3 3 0.0 2413 4373

5 rows × 37 columns

In [35]:

photo\_video\_merged.shape

Out[35]:

(1382, 37)

**5. Sorting data**

Sorting the data on the basis of the number of likes

In [36]:

*# Sorting the data on the basis of number of likes*

likes\_sorted\_data **=** dataset.sort\_values(by**=**"Page total likes")

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 17/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

In [37]:

*# Displaying the top 5 liked records* likes\_sorted\_data.head()

Out[37]:

**Page**

**Lifetime**

**Lifetime**

**Lifetime**

**total likes**

**Type Category Post Month**

**Post**

**Weekday**

**Post**

**Hour Paid**

**Post**

**Total Reach**

**Post Total Impressions**

**Engaged**

**Users C**

**498** 81370 Photo 3 1 4 11 0.0 4156 7564 626 **497** 81370 Photo 1 1 5 2 0.0 3778 7216 625 **496** 81370 Photo 2 1 5 8 0.0 3480 6229 537 **493** 85093 Photo 3 1 1 2 0.0 8412 13960 1179 **495** 85093 Photo 3 1 7 2 0.0 4684 7536 733

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 18/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

In [39]:

*# Displaying the bottom 10 liked records* likes\_sorted\_data.tail(10)

Out[39]:

**Page**

**Lifetime**

**Lifetime**

**Lifetime**

**total likes**

**Type Category Post Month**

**Post**

**Weekday**

**Post**

**Hour Paid**

**Post**

**Total Reach**

**Post Total Impressions**

**Engaged**

**Users C**

**4** 139441 Photo 2 12 2 3 0.0 7244 13594 671 **6** 139441 Photo 3 12 1 3 1.0 11692 19479 481 **12** 139441 Photo 2 12 5 10 0.0 2847 5133 193 **8** 139441 Status 2 12 7 3 0.0 11844 22538 1530 **9** 139441 Photo 3 12 6 10 0.0 4694 8668 280 **10** 139441 Status 2 12 5 10 0.0 21744 42334 4258 **11** 139441 Photo 2 12 5 10 0.0 3112 5590 208 **13** 139441 Photo 2 12 5 3 0.0 2549 4896 249 **7** 139441 Photo 3 12 7 9 1.0 13720 24137 537 **0** 139441 Photo 2 12 4 3 0.0 2752 5091 178

**6. Reshaping the data**

**Note :**

Here, the operations of melt and pivot are used to reshape the data in computer readable format **Melting**

In [40]:

*# Melting the data on the value variables as type and category* melting\_result **=** pd.melt(

frame**=**dataset,

id\_vars**=**"Page total likes",

value\_vars**=**["Type", "Category"]

)

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 19/20

15/04/2022, 11:05 33337\_facebook\_metrics\_assignment1

In [41]:

melting\_result.head()

Out[41]:

**Page total likes variable value**

**0** 139441 Type Photo

**1** 139441 Type Status

**2** 139441 Type Photo

**3** 139441 Type Photo

**4** 139441 Type Photo

In [42]:

melting\_result.tail()

Out[42]:

**Page total likes variable value**

**985** 85093 Category 3

**986** 85093 Category 3

**987** 81370 Category 2

**988** 81370 Category 1

**989** 81370 Category 3

In [43]:

*# Checking shape of melted data*

melting\_result.shape

Out[43]:

(990, 3)

**End of Notebook**

localhost:8888/notebooks/33337\_facebook\_metrics\_assignment1.ipynb#Preprocessing 20/20