Experiment No. 3

Aim : Data cleaning and data storage using python.

Theory : Data cleaning means fixing bad data in your data set.

Data cleaning is a crucial step in the data analysis process, particularly when it comes to analyzing social media data. Social media data sources such as Twitter, Facebook, Instagram, and LinkedIn are often messy, inconsistent, and contain a lot of noise. Therefore, cleaning the data before analyzing it is essential to ensure the accuracy and validity of the results.

Here are some of the commonly used data cleaning techniques in social media analytics: 1. Removing duplicates: Social media platforms generate a lot of redundant data, such as retweets, shares, and likes. Removing these duplicates can help simplify the data and reduce noise. 2. Filtering out spam: Social media is rife with spam content such as promotional posts, advertisements, and irrelevant comments. Removing spam can help improve the quality of the data.

3. Removing irrelevant content: Some social media data may be irrelevant to the research question, such as posts that are not related to the topic of interest. Removing irrelevant content can help narrow down the data and focus on the most relevant information.
4. Standardizing formats: Social media data may come in various formats, such as hashtags, mentions, or emojis. Standardizing these formats can help simplify the data and make it easier to analyze.
5. Correcting errors: Social media data may contain errors, such as misspellings, grammatical errors, or incomplete sentences. Correcting these errors can help improve the accuracy of the data.
6. Handling missing data: Social media data may contain missing values, such as empty fields or null values. Handling missing data can help avoid bias and improve the accuracy of the analysis.

In summary, data cleaning is an essential step in social media analytics. It helps ensure the accuracy and validity of the results by removing duplicates, filtering out spam, removing irrelevant content, standardizing formats, correcting errors, and handling missing data. Bad data could be:

- Empty cells
- Data in wrong format
- Wrong data
- Duplicates

➢ **Dataset:**

	Duration	Date	Pulse	Maxpulse	Calories
0	60	'2020/12/01'	110	130	409.1
1	60	'2020/12/02'	117	145	479.0
2	60	'2020/12/03'	103	135	340.0
3	45	'2020/12/04'	109	175	282.4
4	45	'2020/12/05'	117	148	406.0
5	60	'2020/12/06'	102	127	300.0
6	60	'2020/12/07'	110	136	374.0
7	450	'2020/12/08'	104	134	253.3
8	30	'2020/12/09'	109	133	195.1
9	60	'2020/12/10'	98	124	269.0
10	60	'2020/12/11'	103	147	329.3
11	60	'2020/12/12'	100	120	250.7
12	60	'2020/12/12'	100	120	250.7
13	60	'2020/12/13'	106	128	345.3
14	60	'2020/12/14'	104	132	379.3
15	60	'2020/12/15'	98	123	275.0
16	60	'2020/12/16'	98	120	215.2
17	60	'2020/12/17'	100	120	300.0
18	45	'2020/12/18'	90	112	NaN
19	60	'2020/12/19'	103	123	323.0
20	45	'2020/12/20'	97	125	243.0
21	60	'2020/12/21'	108	131	364.2
22	45	NaN	100	119	282.0
23	60	'2020/12/23'	130	101	300.0
24	45	'2020/12/24'	105	132	246.0
25	60	'2020/12/25'	102	126	334.5
26	60	2020/12/26	100	120	250.0
27	60	'2020/12/27'	92	118	241.0
28	60	'2020/12/28'	103	132	NaN
29	60	'2020/12/29'	100	132	280.0
30	60	'2020/12/30'	102	129	380.3
31	60	'2020/12/31'	92	115	243.0

➢ **Remove Empty cells:** One way to deal with empty cells is to remove rows that contain empty cells. This is usually OK, since data sets can be very big, and removing a few rows will not have a big impact on the result.

➢

Code:

```
import pandas as pd
df = pd.read_csv('data.csv')
df.dropna(inplace = True)
print(df.to_string())
```

Output:

```
import pandas as pd

df = pd.read_csv('data.csv')

new_df = df.dropna()

print(new_df.to_string())
```

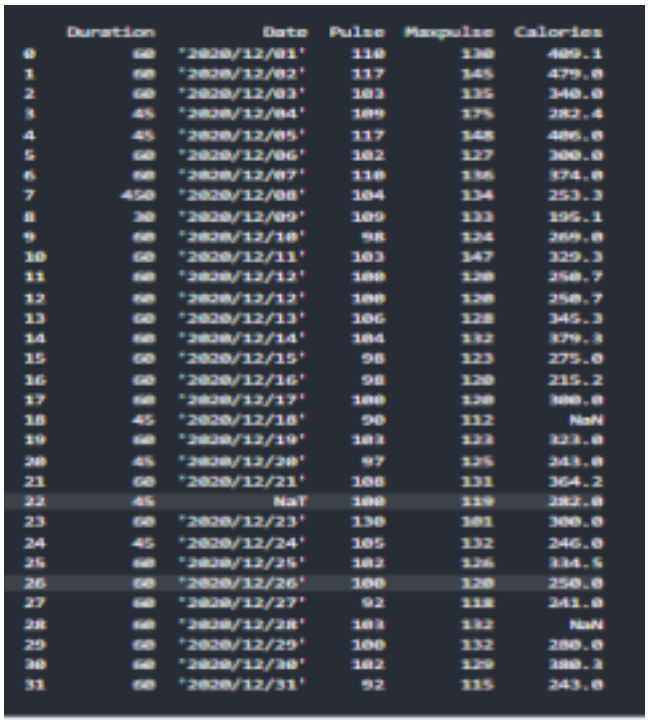
```
    Id  Duration          Date  Pulse  Maxpulse  Calories
0    0        60   2020/12/01    110       130     409.1
1    1        60  2020/12/02'    117       145     479.0
2    2        60  2020/12/03'    103       135     340.0
3    3        45  2020/12/04'    109       175     282.4
4    4        45  2020/12/05'    117       148     406.0
5    5        60  2020/12/06'    102       127     300.0
6    6        60   2020/12/07    110       136     374.0
7    7       450  2020/12/08'    104       134     253.3
8    8        30  2020/12/09'    109       133     195.1
9    9        60  2020/12/10"     98       124     269.0
10  10        60  2020/12/11'    103       147     329.3
11  11        60  2020/12/12'    100       120     250.7
12  12        60  2020/12/12'    100       120     250.7
13  13        60  2020/12/13'    106       128     345.3
14  14        60  2020/12/14'    104       132     379.3
15  15        60  2020/12/15'     98       123     275.0
16  16        60  2020/12/16'     98       120     215.2
17  17        60   2020/12/17    100       120     300.0
19  19        60  2020/12/19'    103       123     323.0
20  20        45  2020/12/20'     97       125     243.0
21  21        60  2020/12/21'    100       131     364.2
23  23        60  2020/12/23'    130       101     300.0
24  24        45  "2020/12/24"   105       132     246.0
25  25        60  2020/12/25'    102       126     334.5
26  26        60   2020/12/26    100       120     250.0
27  27        60   2020/12/27     92       118     241.0
29  29        60  2020/12/29"    100       132     280.0
30  30        60  2020/12/30"    102       129     380.3
31  31        60  2020/12/31'     92       115     243.0
```

➢ **Convert Into a Correct Format:**Cells with data of wrong format can make it difficult, or even impossible, to analyze data.To fix it, you have two options: remove the rows, or convert all cells in the columns into the same format In our Data Frame, we have two cells with the wrong format. Check out row 22 and 26, the 'Date' column should be a string that represents a date:

➢ **Code:**

```
import pandas as pd
df = pd.read_csv('data.csv')
df['Date'] = pd.to_datetime(df['Date'])
print(df.to_string())
```

Output:



	Duration	Date	Pulse	Maxpulse	Calories
0	60	'2020/12/01'	110	130	409.1
1	60	'2020/12/02'	117	145	479.0
2	60	'2020/12/03'	103	135	340.0
3	45	'2020/12/04'	109	175	282.4
4	45	'2020/12/05'	117	148	406.0
5	60	'2020/12/06'	102	127	300.0
6	60	'2020/12/07'	110	136	374.0
7	450	'2020/12/08'	104	134	253.3
8	30	'2020/12/09'	109	133	195.1
9	60	'2020/12/10'	98	124	269.0
10	60	'2020/12/11'	103	147	329.3
11	60	'2020/12/12'	100	120	250.7
12	60	'2020/12/12'	100	120	250.7
13	60	'2020/12/13'	106	128	345.3
14	60	'2020/12/14'	104	132	379.3
15	60	'2020/12/15'	98	123	275.0
16	60	'2020/12/16'	98	120	215.2
17	60	'2020/12/17'	100	120	300.0
18	45	'2020/12/18'	90	112	NaN
19	60	'2020/12/19'	103	123	323.0
20	45	'2020/12/20'	97	125	243.0
21	60	'2020/12/21'	108	131	364.2
22	45	NaT	100	119	282.0
23	60	'2020/12/23'	130	101	300.0
24	45	'2020/12/24'	105	132	246.0
25	60	'2020/12/25'	102	126	334.5
26	60	'2020/12/26'	100	120	250.0
27	60	'2020/12/27'	92	118	241.0
28	60	'2020/12/28'	103	132	NaN
29	60	'2020/12/29'	100	132	280.0
30	60	'2020/12/30'	102	129	380.3
31	60	'2020/12/31'	92	115	243.0

➢ **Format Wrong Data:**"Wrong data" does not have to be "empty cells" or "wrong format", it can just be wrong, like if someone registered "199" instead of "1.99".Sometimes you can spot wrong data by looking at the data set, because you have an expectation of what it should be.If you take a look at our data set, you can see that in row 7, the duration is 450, but for all the other rows the duration is between 30 and 60.It doesn't have to be wrong, but taking in consideration that this is the data set of someone's workout sessions, we conclude with the fact that this person did not work out in 450 minutes.

➢ Code:

Replace wrong value

```
df.loc[7, 'Duration'] = 45
```

Output:

	Duration	Date	Pulse	Maxpulse	Calories
0	60	'2020/12/01'	110	130	409.1
1	60	'2020/12/02'	117	145	479.0
2	60	'2020/12/03'	103	135	340.0
3	45	'2020/12/04'	109	175	282.4
4	45	'2020/12/05'	117	148	406.0
5	60	'2020/12/06'	102	127	300.0
6	60	'2020/12/07'	110	136	374.0
7	45	'2020/12/08'	104	134	253.3
8	30	'2020/12/09'	109	133	195.1
9	60	'2020/12/10'	98	124	269.0
10	60	'2020/12/11'	103	147	329.3
11	60	'2020/12/12'	100	120	250.7
12	60	'2020/12/12'	100	120	250.7
13	60	'2020/12/13'	106	128	345.3
14	60	'2020/12/14'	104	132	379.3
15	60	'2020/12/15'	98	123	275.0
16	60	'2020/12/16'	98	120	215.2
17	60	'2020/12/17'	100	120	300.0
18	45	'2020/12/18'	90	112	NaN
19	60	'2020/12/19'	103	123	323.0
20	45	'2020/12/20'	97	125	243.0
21	60	'2020/12/21'	108	131	364.2
22	45	NaN	100	119	282.0
23	60	'2020/12/23'	130	101	300.0
24	45	'2020/12/24'	105	132	246.0
25	60	'2020/12/25'	102	126	334.5
26	60	20201226	100	120	250.0
27	60	'2020/12/27'	92	118	241.0
28	60	'2020/12/28'	103	132	NaN
29	60	'2020/12/29'	100	132	280.0
30	60	'2020/12/30'	102	129	380.3
31	60	'2020/12/31'	92	115	243.0

➢ **Removing Duplicates:**By taking a look at our test data set, we can assume that row 11 and 12 are duplicates.To discover duplicates, we can use the duplicated() method.The duplicated() method returns a Boolean values for each row:

➢

Code:

```
df.drop_duplicates(inplace = True)
```

Output:

	Duration	Date	Pulse	Maxpulse	Calories
0	60	'2020/12/01'	110	130	409.1
1	60	'2020/12/02'	117	145	479.0
2	60	'2020/12/03'	103	135	340.0
3	45	'2020/12/04'	109	175	282.4
4	45	'2020/12/05'	117	148	406.0
5	60	'2020/12/06'	102	127	300.0
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7	450	'2020/12/08'	104	134	253.3
8	30	'2020/12/09'	109	133	195.1
9	60	'2020/12/10'	98	124	269.0
10	60	'2020/12/11'	103	147	329.3
11	60	'2020/12/12'	100	120	250.7
13	60	'2020/12/13'	106	128	345.3
14	60	'2020/12/14'	104	132	379.3
15	60	'2020/12/15'	98	123	275.0
16	60	'2020/12/16'	98	120	215.2
17	60	'2020/12/17'	100	120	300.0
18	45	'2020/12/18'	90	112	NaN
19	60	'2020/12/19'	103	123	323.0
20	45	'2020/12/20'	97	125	243.0
21	60	'2020/12/21'	108	131	364.2
22	45	NaN	100	119	282.0
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24	45	'2020/12/24'	105	132	246.0
25	60	'2020/12/25'	102	126	334.5
26	60	20201226	100	120	250.0
27	60	'2020/12/27'	92	118	241.0
28	60	'2020/12/28'	103	132	NaN
29	60	'2020/12/29'	100	132	280.0
30	60	'2020/12/30'	102	129	380.3
31	60	'2020/12/31'	92	115	243.0

Conclusion- Data cleaning is a crucial step in the data preparation process, aimed at addressing and rectifying various issues within a dataset. The identification and correction of bad data, including empty cells, incorrect formats, erroneous values, and duplicates, are essential for ensuring the accuracy, reliability, and integrity of the data. Effective data cleaning practices contribute to improved data quality, leading to more meaningful and trustworthy insights when performing analyses or building machine learning models. By implementing techniques such as handling missing values, standardizing formats, validating data, and removing duplicates, data professionals can enhance the overall quality of their datasets and make informed decisions based on cleaner and more reliable information.