Theory Activity No. 1

Name : Sowmya Gourkhede

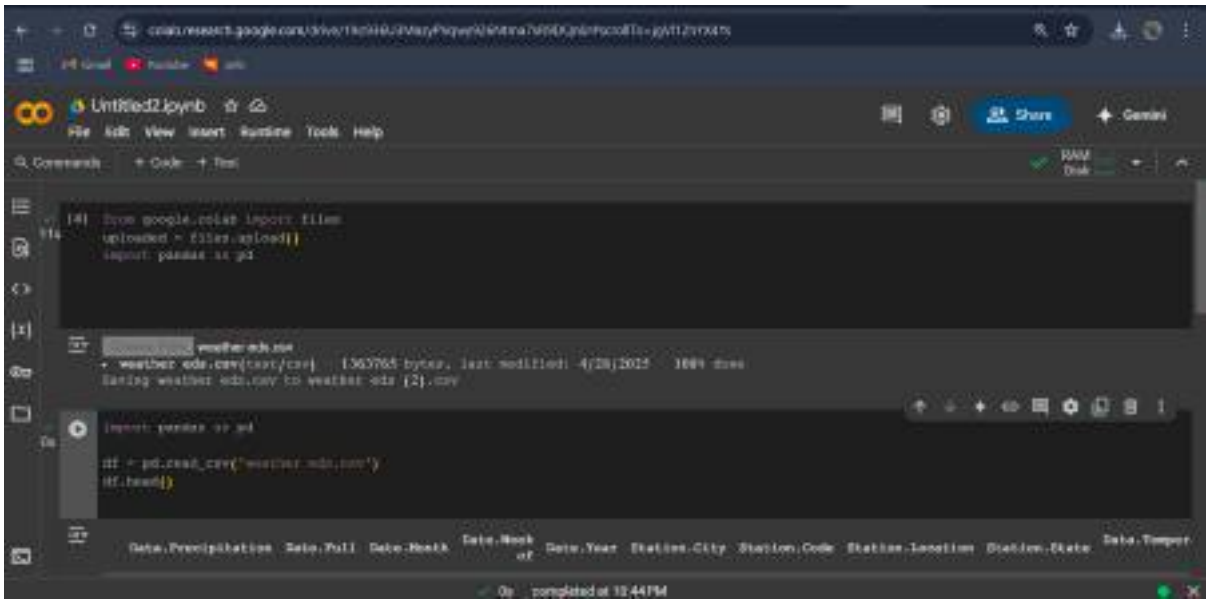
PRN: 202401100108

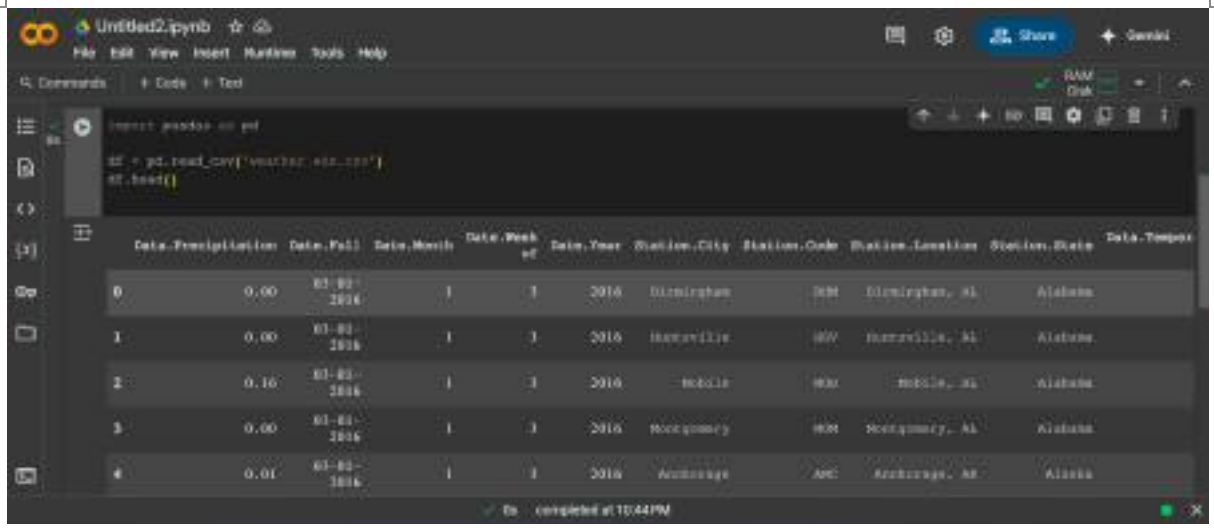
Roll No: 86

Class/Batch: CS5-4

Formulate 20 problem statements for a given dataset using Numpy and Pandas and Apply Numpy and pandas methods to find the solution for the formulated problem statements.

The dataset name is weather dataset.





1) Find the maximum (avg) temperature recorded.

```
[11] max_avgtemperature = df['Data.Temperature.Avg Temp'].max()
     print('Maximum Temperature Recorded:', max_avgtemperature, '°C')
```

```
Maximum Temperature Recorded: 100 °C
```

2) Find the minimum wind direction recorded.

```
min_data_wind_direction = df['Data.Wind.Direction'].min()
print(min_data_wind_direction)
```

```
0
```

3) Find the maximum wind direction recorded

```
max_wind_direction = df['Data.Wind.Direction'].max()
print('Maximum wind direction Recorded:', max_wind_direction, '°C')
```

```
Maximum wind direction Recorded: 36 °C
```

4) Calculate the average wind speed.

```
avg_wind_speed = df['Data.Wind.Speed'].mean()
print(avg_wind_speed)
```

```
6.3298202233769345
```

5) Find the minimum (avg) temperature recorded.

```
import pandas as pd
import numpy as np
min_avg_temp = df['Data.Temperature.Avg Temp'].min()
print(min_avg_temp)
```

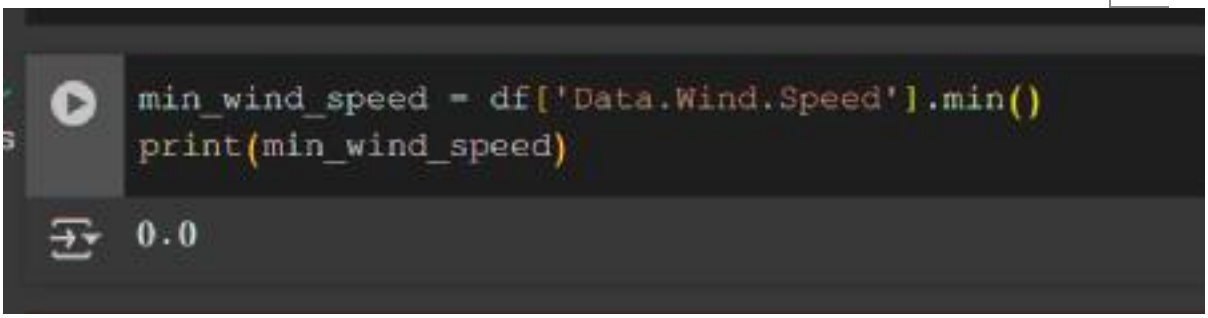
```
-27
```

6) Calculate the maximum wind speed.

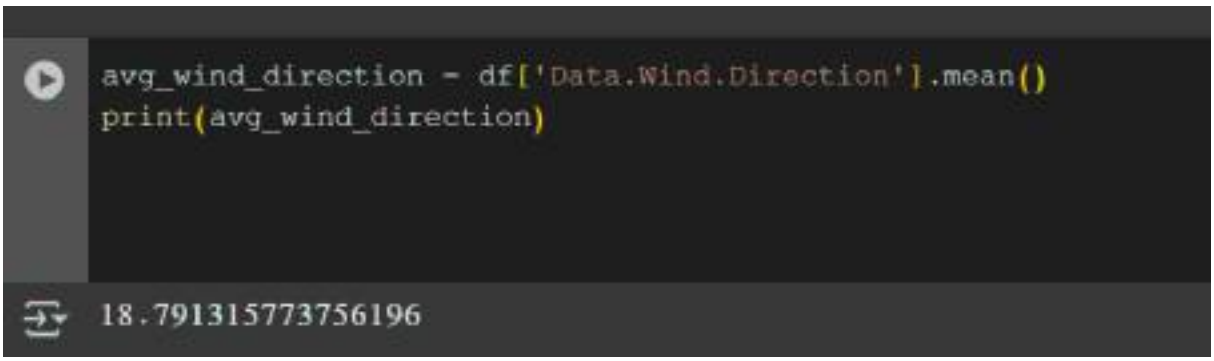
```
max_wind_speed = df['Data.Wind.Speed'].max()
print('Maximum wind speed Recorded:', max_wind_speed)
```

```
Maximum wind speed Recorded: 61.1
```

7) Calculate the minimum wind speed.



8)Find the Average wind direction.



9)Filter the dataset for a State Location.

```
station_location = df[df['Station.Location'] == 'Huntsville, AL']
print(station_location)
```

	Data.Precipitation	Date.Full	Date.Month	Date.Week of	Date.Year	\
1	0.00	03-01-2016	1	3	2016	
316	0.43	10-01-2016	1	10	2016	
631	0.16	17-01-2016	1	17	2016	
946	2.38	24-01-2016	1	24	2016	
1261	0.60	31-01-2016	1	31	2016	
1576	2.27	07-02-2016	2	7	2016	
1891	0.01	14-02-2016	2	14	2016	
2206	2.56	21-02-2016	2	21	2016	
2521	1.54	28-02-2016	2	28	2016	
2836	0.70	06-03-2016	3	6	2016	
3153	1.20	13-03-2016	3	13	2016	
3468	0.60	20-03-2016	3	20	2016	
3783	0.14	27-03-2016	3	27	2016	
4098	0.00	03-04-2016	4	3	2016	
4415	0.41	10-04-2016	4	10	2016	
4731	1.37	17-04-2016	4	17	2016	
5047	0.04	24-04-2016	4	24	2016	
5363	0.08	01-05-2016	5	1	2016	
5680	0.41	08-05-2016	5	8	2016	
5997	1.04	15-05-2016	5	15	2016	
6314	0.09	22-05-2016	5	22	2016	
6631	0.00	29-05-2016	5	29	2016	
6948	2.56	05-06-2016	6	5	2016	
7265	0.03	12-06-2016	6	12	2016	

```
station_location = df[df['Station.Location'] == 'Huntsville, AL']
print(station_location)
```

```
      Station.City Station.Code Station.Location Station.State  \
1       Huntsville          HSV   Huntsville, AL       Alabama
316     Huntsville          HSV   Huntsville, AL       Alabama
631     Huntsville          HSV   Huntsville, AL       Alabama
946     Huntsville          HSV   Huntsville, AL       Alabama
1261    Huntsville          HSV   Huntsville, AL       Alabama
1576    Huntsville          HSV   Huntsville, AL       Alabama
1891    Huntsville          HSV   Huntsville, AL       Alabama
2206    Huntsville          HSV   Huntsville, AL       Alabama
2521    Huntsville          HSV   Huntsville, AL       Alabama
2836    Huntsville          HSV   Huntsville, AL       Alabama
3153    Huntsville          HSV   Huntsville, AL       Alabama
3468    Huntsville          HSV   Huntsville, AL       Alabama
3783    Huntsville          HSV   Huntsville, AL       Alabama
4098    Huntsville          HSV   Huntsville, AL       Alabama
4415    Huntsville          HSV   Huntsville, AL       Alabama
4731    Huntsville          HSV   Huntsville, AL       Alabama
5047    Huntsville          HSV   Huntsville, AL       Alabama
5363    Huntsville          HSV   Huntsville, AL       Alabama
5680    Huntsville          HSV   Huntsville, AL       Alabama
5997    Huntsville          HSV   Huntsville, AL       Alabama
6314    Huntsville          HSV   Huntsville, AL       Alabama
6631    Huntsville          HSV   Huntsville, AL       Alabama
6948    Huntsville          HSV   Huntsville, AL       Alabama
7265    Huntsville          HSV   Huntsville, AL       Alabama
```

```
station_location = df[df['Station.Location'] == 'Huntsville, AL']
print(station_location)
```

```
      Data.Temperature.Avg Temp  Data.Temperature.Max Temp  \
1                            39                         47
316                          43                         50
631                          39                         49
946                          33                         40
1261                         46                         58
1576                         48                         60
1891                         36                         45
2206                         51                         58
2521                         50                         59
2836                         47                         58
3153                         66                         75
3468                         59                         71
3783                         56                         67
4098                         57                         66
4415                         56                         70
4731                         62                         71
5047                         67                         79
5363                         71                         78
5680                         64                         77
5997                         70                         80
6314                         69                         80
6631                         75                         88
6948                         79                         88
7265                         77                         91
```

	Data.Temperature.Min Temp	Data.Wind.Direction	Data.Wind.Speed
1	31	32	3.86
316	34	13	8.34
631	29	22	4.57
946	25	19	6.44
1261	34	20	6.40
1576	37	23	5.98
1891	26	20	8.61
2206	43	21	6.45
2521	39	19	8.44
2836	36	23	3.85
3153	57	14	8.61
3468	46	25	6.01
3783	45	21	7.57
4098	47	20	5.56
4415	43	17	7.08
4731	51	10	7.97
5047	53	14	4.21
5363	63	19	4.50
5680	50	29	5.64
5997	60	20	6.00
6314	58	20	5.45
6631	62	21	4.14
6948	69	15	2.32
7265	62	22	2.95
7580	70	22	4.54
7895	72	19	3.51
8210	68	28	3.00
8526	73	23	5.35

10) Calculate the variance of temperature.

```
var_datatemp = df['Data.Temperature.Avg Temp'].var()
print(var_datatemp)
```

```
353.37588371123974
```

11) Calculate the var of Wind direction

```
var_data_wind_dir = df['Data.Wind.Direction'].var()
print(var_data_wind_dir)
```

```
41.751335402789486
```

12) Calculate the var of Wind speed

```
var_data_wind_speed = df['Data.Wind.Speed'].var()
print(var_data_wind_speed)
```

```
12.213523961227596
```

13) Count the no. of times Alabama occurs under station state.

```
stationstate = (df['Station.State'] == 'Alabama').sum()
print(stationstate)
```

```
212
```

14) Count the no. of times Nome AK occurs under station location.

```
stationloc = (df['Station.Location'] == 'Nome, AK').sum()
print(stationloc)
```

```
53
```

15) Find the number of unique wind directions.

```
unique_direction = df['Data.Wind.Direction'].nunique()
print(unique_direction)
```

```
37
```

16) Find the number of unique wind speed.

```
unique_speed = df['Data.Wind.Speed'].nunique()
print(unique_speed)
```

```
1461
```

17) Find the number of unique station city.

```
unique_city = df['Station.City'].nunique()
print(unique_city)
```

```
307
```

18) Filter the dataset for days with temperature below 0°C.

```
freezing_days = df[df['Data.Temperature.Min Temp'] < 0]
print(freezing_days)
```

	Data.Temperature.Min Temp	Data.Wind.Direction	Data.Wind.Speed
23	-9	20	0.36
62	-5	32	1.40
64	-23	12	0.40
97	-4	2	2.66
166	-12	15	1.80
...	...	...	...
16450	-9	18	2.04
16461	-6	12	14.01
16490	-11	20	0.80
16594	-1	21	3.60
16657	-3	19	2.05

[214 rows x 14 columns]

19) Filter the dataset for days with speed below 10.

```
wind_speed- df[df['Data.Wind.Speed'] < 10]
print(wind_speed)
```

	Data.Temperature.Min Temp	Data.Wind.Direction	Data.Wind.Speed
0	32	33	4.33
1	31	32	3.86
2	41	35	9.73
3	38	32	6.86
4	29	19	7.80
...	...	...	...
16733	35	22	7.68
16735	20	25	9.51
16736	19	25	6.33
16740	4	26	1.65
16742	8	23	7.51

[14810 rows x 14 columns]

20) Check if there are any missing values in the dataset.

```
missing_values = df.isnull().sum()
print(missing_values)
```

```
Data.Precipitation           0
Date.Full                    0
Date.Month                   0
Date.Week of                 0
Date.Year                    0
Station.City                 0
Station.Code                 0
Station.Location             0
Station.State                0
Data.Temperature.Avg Temp    0
Data.Temperature.Max Temp    0
Data.Temperature.Min Temp    0
Data.Wind.Direction          0
Data.Wind.Speed              0
dtype: int64
```

21) Find how many days had wind speed above 30 km/h.

```
high_wind_days = (df['Data.Wind.Speed'] > 30).sum()
print(high_wind_days)
```

```
30
```