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**Roll no. 315**

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- **Fetching data**

```
import pandas as pd
df=pd.read_csv("/content/drive/MyDrive/Automobile.csv")
print(df)
```

**OUTPUT**

	name	mpg	cylinders	displacement
horsepower \				
0	chevrolet chevelle malibu	18.0	8	307.0
130.0				
1	buick skylark 320	15.0	8	350.0
165.0				
2	plymouth satellite	18.0	8	318.0
150.0				
3	amc rebel sst	16.0	8	304.0
150.0				
4	ford torino	17.0	8	302.0
140.0				
..	...	...	...	...
...				
393	ford mustang gl	27.0	4	140.0
86.0				
394	vw pickup	44.0	4	97.0
52.0				
395	dodge rampage	32.0	4	135.0
84.0				
396	ford ranger	28.0	4	120.0
79.0				
397	chevy s-10	31.0	4	119.0
82.0				
	weight	acceleration	model_year	origin

0	3504	12.0	70	usa
1	3693	11.5	70	usa
2	3436	11.0	70	usa
3	3433	12.0	70	usa
4	3449	10.5	70	usa
..	...	...	...	...
393	2790	15.6	82	usa
394	2130	24.6	82	europa
395	2295	11.6	82	usa
396	2625	18.6	82	usa
397	2720	19.4	82	usa

- **Maximum value**

```
df1=pd.read_csv("/content/drive/MyDrive/Automobile.csv",usecols=['displacement'])
print(df1.max())
```

### Output

```
displacement    455.0
dtype: float64
```

- **Describe()**

```
df1=pd.read_csv("/content/drive/MyDrive/Automobile.csv",usecols=['displacement'])
print(df1.describe())
```

### Output

```
displacement
count    398.000000
mean     193.425879
std      104.269838
min       68.000000
25%      104.250000
```

```
50%      148.500000
75%      262.000000
max       455.000000
```

- **Mean()**

```
df1=pd.read_csv("/content/drive/MyDrive/Automobile.csv",usecols=['ac
celeration'])
print(df1.mean())
```

### Output

```
acceleration      15.56809
dtype: float64
```

- **Median**

```
df1=pd.read_csv("/content/drive/MyDrive/Automobile.csv",usecols=['cy
linders'])
print(df1.median())
```

### Output

```
cylinders        4.0
dtype: float64
```

- **Min()**

```
df1=pd.read_csv("/content/drive/MyDrive/Automobile.csv",usecols=['di
splacemnt'])
print(df1.min())
```

### Output

```
displacement      68.0
dtype: float64
```

- **corr()**

```
print(df.corr())
```

## Output()

```
mpg  cylinders  displacement  horsepower  weight  \
mpg          1.000000  -0.775396    -0.804203   -0.778427 -
0.831741
cylinders    -0.775396    1.000000     0.950721    0.842983
0.896017
displacement -0.804203    0.950721     1.000000    0.897257
0.932824
horsepower   -0.778427    0.842983     0.897257    1.000000
0.864538
weight       -0.831741    0.896017     0.932824    0.864538
1.000000
acceleration  0.420289   -0.505419    -0.543684   -0.689196 -
0.417457
model_year   0.579267   -0.348746    -0.370164   -0.416361 -
0.306564

          acceleration  model_year
mpg          0.420289    0.579267
cylinders    -0.505419   -0.348746
displacement -0.543684   -0.370164
horsepower   -0.689196   -0.416361
weight       -0.417457   -0.306564
acceleration  1.000000    0.288137
model_year   0.288137    1.000000
```

- **# duplicated rows**

```
print(df.drop_duplicates())
```

```
          name  mpg  cylinders  displacement
horsepower  \
0  chevrolet chevelle malibu  18.0         8        307.0
130.0
1         buick skylark 320   15.0         8        350.0
165.0
2         plymouth satellite  18.0         8        318.0
150.0
```

```

3          amc rebel sst  16.0          8          304.0
150.0

4          ford torino  17.0          8          302.0
140.0

..          ...      ...      ...      ...
...

393        ford mustang gl  27.0          4          140.0
86.0

394                vw pickup  44.0          4           97.0
52.0

395        dodge rampage  32.0          4          135.0
84.0

396                ford ranger  28.0          4          120.0
79.0

397                chevy s-10  31.0          4          119.0
82.0

```

```

      weight  acceleration  model_year  origin
0      3504           12.0           70     usa
1      3693           11.5           70     usa
2      3436           11.0           70     usa
3      3433           12.0           70     usa
4      3449           10.5           70     usa
..      ...           ...           ...     ...
393    2790           15.6           82     usa
394    2130           24.6           82  europe
395    2295           11.6           82     usa
396    2625           18.6           82     usa
397    2720           19.4           82     usa

```

- **Cov(): Covariance**

```
print(df.cov())
```

## Output()

```
mpg      cylinders  displacement  horsepower \
```

mpg	61.089611	-10.308911	-655.402318	-233.857926
cylinders	-10.308911	2.893415	168.623214	55.348244
displacement	-655.402318	168.623214	10872.199152	3614.033744
horsepower	-233.857926	55.348244	3614.033744	1481.569393
weight	-5505.211745	1290.695575	82368.423240	28265.620231
acceleration	9.058930	-2.370842	-156.332976	-73.186967
model_year	16.741163	-2.193499	-142.717137	-59.036432

	weight	acceleration	model_year
mpg	-5505.211745	9.058930	16.741163
cylinders	1290.695575	-2.370842	-2.193499
displacement	82368.423240	-156.332976	-142.717137
horsepower	28265.620231	-73.186967	-59.036432
weight	717140.990526	-974.899011	-959.946344
acceleration	-974.899011	7.604848	2.938105
model_year	-959.946344	2.938105	13.672443

- **Apply multiple aggregation functions to each group**

```
print(df.groupby('displacement').agg(['mean', 'max', 'min']))
```

mpg	cylinders	horsepower	\
-----	-----------	------------	---

## Output()

mean	max	min	mean	max	min	mean	max
displacement							
68.0		29.000000	29.0	29.0		4.0	4 4 49.000000
49.0							
70.0		20.233333	23.7	18.0		3.0	3 3 95.666667
100.0							
71.0		31.500000	32.0	31.0		4.0	4 4 65.000000
65.0							
72.0		35.000000	35.0	35.0		4.0	4 4 69.000000
69.0							
76.0		31.000000	31.0	31.0		4.0	4 4 52.000000
52.0							

...	...	...	...	...	..	..	...
...							
400.0 230.0	13.961538	16.0	11.0	8.0	8	8	174.769231
429.0 208.0	12.666667	15.0	11.0	8.0	8	8	201.333333
440.0 215.0	13.500000	14.0	13.0	8.0	8	8	215.000000
454.0 220.0	14.000000	14.0	14.0	8.0	8	8	220.000000
455.0 225.0	13.333333	14.0	12.0	8.0	8	8	225.000000

	weight			acceleration		
\	min	mean	max	min	mean	max
min						
displacement						
68.0 19.5	49.0	1867.000000	1867	1867	19.500000	19.5
70.0 12.5	90.0	2291.333333	2420	2124	13.166667	13.5
71.0 19.0	65.0	1804.500000	1836	1773	20.000000	21.0
72.0 18.0	69.0	1613.000000	1613	1613	18.000000	18.0
76.0 16.5	52.0	1649.000000	1649	1649	16.500000	16.5
...	...	...	...	...	...	...
...						
400.0 9.5	150.0	4521.230769	5140	3761	11.715385	14.0
429.0 10.0	198.0	4642.000000	4952	4341	10.833333	11.5
440.0 8.5	215.0	4523.500000	4735	4312	9.750000	11.0
454.0 9.0	220.0	4354.000000	4354	4354	9.000000	9.0
455.0 10.0	225.0	4154.000000	4951	3086	10.333333	11.0

	model_year		
		mean	max min
displacement			
68.0	73.000000	73	73
70.0	75.000000	80	72
71.0	72.500000	74	71
72.0	71.000000	71	71
76.0	74.000000	74	74
...	...	..	..
400.0	72.923077	77	70
429.0	71.666667	73	70
440.0	71.500000	73	70
454.0	70.000000	70	70
455.0	71.000000	73	70

- **Display the record of first 10 automobile**

```
print(df.iloc[1:10])
```

### Output()

	name	mpg	cylinders	displacement	horsepower	weight	\
1	buick skylark	320	15.0	8	350.0	165.0	
3693							
2	plymouth satellite	18.0	8	318.0	150.0		
3436							
3	amc rebel sst	16.0	8	304.0	150.0		
3433							
4	ford torino	17.0	8	302.0	140.0		
3449							
5	ford galaxie 500	15.0	8	429.0	198.0		
4341							
6	chevrolet impala	14.0	8	454.0	220.0		
4354							
7	plymouth fury iii	14.0	8	440.0	215.0		
4312							



```

8    pontiac catalina  14.0          8          455.0          225.0
4425
9    amc ambassador dpl  15.0          8          390.0          190.0
3850

```

```

      acceleration  model_year origin
1             11.5           70    usa
2             11.0           70    usa
3             12.0           70    usa
4             10.5           70    usa
5             10.0           70    usa
6              9.0           70    usa
7              8.5           70    usa
8             10.0           70    usa
9              8.5           70    usa

```

### To check missing values in data frame

```
print(df.isnull())
```

### Output

```

      name      mpg  cylinders  displacement  horsepower  weight
acceleration \
0    False  False      False          False          False  False
False
1    False  False      False          False          False  False
False
2    False  False      False          False          False  False
False
3    False  False      False          False          False  False
False
4    False  False      False          False          False  False
False
..      ...      ...      ...          ...          ...      ...
...

```

393	False	False	False	False	False	False
False						
394	False	False	False	False	False	False
False						
395	False	False	False	False	False	False
False						
396	False	False	False	False	False	False
False						
397	False	False	False	False	False	False
False						

	model_year	origin
0	False	False
1	False	False
2	False	False
3	False	False
4	False	False
..	...	...
393	False	False
394	False	False
395	False	False
396	False	False
397	False	False