

```
import pandas as pd #importing pandas
import numpy as np #importing numpy
```

```
df = pd.read_csv('m.csv') #read csv file
```

```
df.tail()
```

	Unnamed: 0	#	Name	Type 1	Type 2	HP	Attack	Defense	Sp. Atk	Sp. Def	Speed	Ge
795	795	719	Diancie	Rock	Fairy	50	100	150	100	150	50	
796	796	719	DiancieMega Diancie	Rock	Fairy	50	160	110	160	110	110	
797	797	720	HoopaHoopa Confined	Psychic	Ghost	80	110	60	150	130	70	

```
df.columns
```

```
Index(['Unnamed: 0', '#', 'Name', 'Type 1', 'Type 2', 'HP', 'Attack',
      'Defense', 'Sp. Atk', 'Sp. Def', 'Speed', 'Generation', 'Legendary',
      'Avg_speed', 'count'],
      dtype='object')
```

```
df.iloc[2,1]
```

```
3
```

```
df.iloc[4,2]
```

```
'Charmander'
```

```
df.head()
```

	Unnamed: 0	#	Name	Type 1	Type 2	HP	Attack	Defense	Sp. Atk	Sp. Def	Speed	Gener
0	0	1	Bulbasaur	Grass	Poison	45	49	49	65	65	45	
1	1	2	Ivysaur	Grass	Poison	60	62	63	80	80	60	
2	2	3	Venusaur	Grass	Poison	80	82	83	100	100	80	
3	3	3	VenusaurMega Venusaur	Grass	Poison	80	100	123	122	120	80	

```
#sort and describe data
```

```
df['HP']
```

```
0      45
1      60
2      80
3      80
4      39
...
795    50
796    50
797    80
798    80
799    80
```

```
Name: HP, Length: 800, dtype: int64
```

```
df.sort_values(['Type 1','HP'],ascending=[1,0])
```

	Unnamed: 0	#	Name	Type 1	Type 2	HP	Attack	Defense	Sp. Atk	Sp. Def	Speed
520	520	469	Yanmega	Bug	Flying	86	76	86	116	56	95
698	698	637	Volcarona	Bug	Fire	85	60	65	135	105	100
231	231	214	Heracross	Bug	Fighting	80	125	75	40	95	85
232	232	214	HeracrossMega Heracross	Bug	Fighting	80	185	115	40	105	75
678	678	617	Accelgor	Bug	NaN	80	70	40	100	60	145
...
106	106	98	Krabby	Water	NaN	30	105	90	25	25	50
125	125	116	Horsea	Water	NaN	30	40	70	70	25	60
129	129	120	Saryu	Water	NaN	30	45	55	70	55	85
139	139	129	Magikarp	Water	NaN	20	10	55	15	20	80
224	224	240	Fishar	Water	NaN	20	15	20	10	55	20

```
df.sort_values(['Name'],ascending=[1])
```

	Unnamed: 0	#	Name	Type 1	Type 2	HP	Attack	Defense	Sp. Atk	Sp. Def	Spe
510	510	460	Abomasnow	Grass	Ice	90	92	75	92	85	
511	511	460	AbomasnowMega Abomasnow	Grass	Ice	90	132	105	132	105	
68	68	63	Abra	Psychic	NaN	25	20	15	105	55	
392	392	359	Absol	Dark	NaN	65	130	60	75	60	
393	393	359	AbsolMega Absol	Dark	NaN	65	150	60	115	60	
...	
632	632	571	Zoroark	Dark	NaN	60	105	60	120	60	
631	631	570	Zorua	Dark	NaN	40	65	40	80	40	

```
df['total']=df['HP']+df['Attack']+df['Defense']+df['Sp. Atk']+df['Sp. Def']+df['Speed']
```

605	605	634	Zweilous	Dark	Dragon	72	85	70	65	70	
-----	-----	-----	----------	------	--------	----	----	----	----	----	--

```
df['total']
```

0	318
1	405
2	525
3	625
4	309
...	
795	600
796	700
797	600
798	680
799	600

Name: total, Length: 800, dtype: int64

```
df=df.drop(columns='total')
```

```
df.head()
```

	Unnamed: 0	#	Name	Type 1	Type 2	HP	Attack	Defense	Sp. Atk	Sp. Def	Speed	Gener
0	0	1	Bulbasaur	Grass	Poison	45	49	49	65	65	45	
1	1	2	Ivysaur	Grass	Poison	60	62	63	80	80	60	
2	2	3	Venusaur	Grass	Poison	80	82	83	100	100	80	
3	3	3	VenusaurMega Venusaur	Grass	Poison	80	100	123	122	120	80	

```
new_df = df.loc[(df['Type 1'] == 'Grass') & (df['Type 2'] == 'Poison') & (df['HP'] > 70)]
```

```
print(new_df)
```

	Unnamed: 0	#	Name	Type 1	Type 2	HP	Attack	\
2	2	3	Venusaur	Grass	Poison	80	82	
3	3	3	VenusaurMega Venusaur	Grass	Poison	80	100	
50	50	45	Vileplume	Grass	Poison	75	80	
77	77	71	Victreebel	Grass	Poison	80	105	
652	652	591	Amoonguss	Grass	Poison	114	85	

	Defense	Sp. Atk	Sp. Def	Speed	Generation	Legendary	Avg_speed	\
2	83	100	100	80	1	False	101.250000	
3	123	122	120	80	1	False	123.500000	
50	85	110	90	50	1	False	111.800000	
77	65	100	70	70	1	False	101.000000	
652	70	85	80	30	5	False	87.666667	

	count
2	1
3	1
50	1
77	1
652	1

▼ and will not work we have to use &symbol

```
df.groupby(['Type 1', 'Type 2']).count()
```

Unnamed: 0 # Name HP Attack Defense Sp. Atk Sp. Def Speed Generation Le

Type 1 Type 2

df.info()

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 800 entries, 0 to 799
Data columns (total 15 columns):
#   Column          Non-Null Count  Dtype
---  -
0   Unnamed: 0      800 non-null   int64
1   #               800 non-null   int64
2   Name           800 non-null   object
3   Type 1         800 non-null   object
4   Type 2         414 non-null   object
5   HP             800 non-null   int64
6   Attack         800 non-null   int64
7   Defense        800 non-null   int64
8   Sp. Atk        800 non-null   int64
9   Sp. Def        800 non-null   int64
10  Speed          800 non-null   int64
11  Generation     800 non-null   int64
12  Legendary      800 non-null   bool
13  Avg_speed      800 non-null   float64
14  count          800 non-null   int64
dtypes: bool(1), float64(1), int64(10), object(3)
memory usage: 88.4+ KB
```

df.describe()

	Unnamed: 0	#	HP	Attack	Defense	Sp. Atk	Sp. Def	
count	800.0000	800.000000	800.000000	800.000000	800.000000	800.000000	800.000000	8
mean	399.5000	362.813750	69.258750	79.001250	73.842500	72.820000	71.902500	
std	231.0844	208.343798	25.534669	32.457366	31.183501	32.722294	27.828916	
min	0.0000	1.000000	1.000000	5.000000	5.000000	10.000000	20.000000	
25%	199.7500	184.750000	50.000000	55.000000	50.000000	49.750000	50.000000	
50%	399.5000	364.500000	65.000000	75.000000	70.000000	65.000000	70.000000	
75%	599.2500	539.250000	80.000000	100.000000	90.000000	95.000000	90.000000	

!pip3 install numpy

Requirement already satisfied: numpy in /usr/local/lib/python3.7/dist-packages (1.21.5)

```
import numpy as np
```

```
np.zeros((3,2,1))
```

```
array([[[0.],
        [0.]],
       [[0.],
        [0.]],
       [[0.],
        [0.]])
```

```
np.empty((0))
```

```
array([], dtype=float64)
```

```
np.arange(2,10)
```

```
array([2, 3, 4, 5, 6, 7, 8, 9])
```

```
a=np.arange(2,10)
```

```
type(a)
```

```
numpy.ndarray
```

```
np.linspace(10,20)
```

```
array([10.          , 10.20408163, 10.40816327, 10.6122449 , 10.81632653,
        11.02040816, 11.2244898 , 11.42857143, 11.63265306, 11.83673469,
        12.04081633, 12.24489796, 12.44897959, 12.65306122, 12.85714286,
        13.06122449, 13.26530612, 13.46938776, 13.67346939, 13.87755102,
        14.08163265, 14.28571429, 14.48979592, 14.69387755, 14.89795918,
        15.10204082, 15.30612245, 15.51020408, 15.71428571, 15.91836735,
        16.12244898, 16.32653061, 16.53061224, 16.73469388, 16.93877551,
        17.14285714, 17.34693878, 17.55102041, 17.75510204, 17.95918367,
        18.16326531, 18.36734694, 18.57142857, 18.7755102 , 18.97959184,
        19.18367347, 19.3877551 , 19.59183673, 19.79591837, 20.          ])
```

```
10.40816327 - 10.20408163
```

```
0.20408164000000006
```

```
10.20408163 - 10.00
```

```
0.20408162999999924
```

```
np.logspace(1,10)
```

```
array([1.00000000e+01, 1.52641797e+01, 2.32995181e+01, 3.55648031e+01,
       5.42867544e+01, 8.28642773e+01, 1.26485522e+02, 1.93069773e+02,
       2.94705170e+02, 4.49843267e+02, 6.86648845e+02, 1.04811313e+03,
       1.59985872e+03, 2.44205309e+03, 3.72759372e+03, 5.68986603e+03,
       8.68511374e+03, 1.32571137e+04, 2.02358965e+04, 3.08884360e+04,
       4.71486636e+04, 7.19685673e+04, 1.09854114e+05, 1.67683294e+05,
       2.55954792e+05, 3.90693994e+05, 5.96362332e+05, 9.10298178e+05,
       1.38949549e+06, 2.12095089e+06, 3.23745754e+06, 4.94171336e+06,
       7.54312006e+06, 1.15139540e+07, 1.75751062e+07, 2.68269580e+07,
       4.09491506e+07, 6.25055193e+07, 9.54095476e+07, 1.45634848e+08,
       2.22299648e+08, 3.39322177e+08, 5.17947468e+08, 7.90604321e+08,
       1.20679264e+09, 1.84206997e+09, 2.81176870e+09, 4.29193426e+09,
       6.55128557e+09, 1.00000000e+10])
```

```
np.random.rand(2,2,2)
```

```
array([[[0.47440135, 0.83968146],
        [0.6394178 , 0.52385824]],

       [[0.29481082, 0.53529821],
        [0.51752318, 0.20439766]]])
```

```
d= np.random.randint(0,10,size=(5,5))
print(d)
```

```
[[7 3 5 8 7]
 [8 1 4 4 1]
 [0 2 0 9 6]
 [8 2 7 9 1]
 [1 3 9 5 6]]
```

```
d[:,:]
```

```
array([[7, 3, 5, 8, 7],
       [8, 1, 4, 4, 1],
       [0, 2, 0, 9, 6],
       [8, 2, 7, 9, 1],
       [1, 3, 9, 5, 6]])
```

```
#np.vstack([a,b])
#np.hstack([a,b])
```

```
a = np.random.randint(0,10,size=(5,5))
```

```
b = np.random.randint(0,10,size=(5,5))
```

```
a
```

```
array([[7, 6, 2, 6, 0],
       [1, 0, 8, 3, 8],
       [6, 3, 0, 5, 1],
       [5, 9, 8, 8, 3],
       [8, 3, 5, 0, 2]])
```

b

```
array([[0, 3, 6, 4, 0],
       [6, 3, 9, 2, 7],
       [2, 9, 7, 5, 9],
       [7, 1, 0, 2, 7],
       [8, 0, 5, 8, 2]])
```

#d.ndim

#d.shape

np.vstack((a,b))

```
array([[7, 6, 2, 6, 0],
       [1, 0, 8, 3, 8],
       [6, 3, 0, 5, 1],
       [5, 9, 8, 8, 3],
       [8, 3, 5, 0, 2],
       [0, 3, 6, 4, 0],
       [6, 3, 9, 2, 7],
       [2, 9, 7, 5, 9],
       [7, 1, 0, 2, 7],
       [8, 0, 5, 8, 2]])
```

np.vstack([a,b])

```
array([[7, 6, 2, 6, 0],
       [1, 0, 8, 3, 8],
       [6, 3, 0, 5, 1],
       [5, 9, 8, 8, 3],
       [8, 3, 5, 0, 2],
       [0, 3, 6, 4, 0],
       [6, 3, 9, 2, 7],
       [2, 9, 7, 5, 9],
       [7, 1, 0, 2, 7],
       [8, 0, 5, 8, 2]])
```

###splitting

d


```
array([[7, 3, 5, 8, 7],  
       [8, 1, 4, 4, 1],  
       [0, 2, 0, 9, 6],  
       [8, 2, 7, 9, 1],  
       [1, 3, 9, 5, 6]])
```

```
d1,d2=np.vsplit(d,[3])
```

d1

```
array([[7, 3, 5, 8, 7],  
       [8, 1, 4, 4, 1],  
       [0, 2, 0, 9, 6]])
```

d2

```
array([[8, 2, 7, 9, 1],  
       [1, 3, 9, 5, 6]])
```

d.shape

```
(5, 5)
```

d.ndim

```
2
```

d.reshape(25,1)

```
array([[7],  
       [3],  
       [5],  
       [8],  
       [7],  
       [8],  
       [1],  
       [4],  
       [4],  
       [1],  
       [0],  
       [2],  
       [0],  
       [9],  
       [6],  
       [8],  
       [2],  
       [7],  
       [9],  
       [1],  
       [1]])
```

```
[3],  
[9],  
[5],  
[6]])
```

```
d.size
```

```
25
```

```
d.reshape(1,25)
```

```
array([[7, 3, 5, 8, 7, 8, 1, 4, 4, 1, 0, 2, 0, 9, 6, 8, 2, 7, 9, 1, 1, 3,  
       9, 5, 6]])
```

```
import time
```

```
import sys
```

```
s = range(1000)  
print(sys.getsizeof(5)*len(s))
```

```
d=np.arange(1000)
```

```
print(d.size*d.itemsize)
```

```
8000
```

```
a.sum(axis=0)
```

```
array([27, 21, 23, 22, 14])
```

```
np.mean(a)
```

```
4.28
```

```
np.std(a)
```

```
2.9734828064073278
```

```
a=np.array([[1,2,3],[4,5,6]])
```

```
a
```

```
array([[1, 2, 3],
```

```
[4, 5, 6]])
```

```
b=np.array([[7,8,9],[1,2,3]])
```

```
b
```

```
array([[7, 8, 9],  
       [1, 2, 3]])
```

```
print(a+b)
```

```
[[ 8 10 12]  
 [ 5  7  9]]
```

