```
import pandas as pd
```

```
df=pd.read_csv("data.csv")
```

```
df.dtypes
```

```
Age                 int64
BMI               float64
Glucose             int64
Insulin           float64
HOMA              float64
Leptin            float64
Adiponectin       float64
Resistin          float64
MCP.1             float64
Classification     object
dtype: object
```

```
df.describe()
```

	Age	BMI	Glucose	Insulin	HOMA	Leptin	Adiponectin	Resistin	MCP.1
count	116.000000	116.000000	116.000000	116.000000	116.000000	116.000000	116.000000	116.000000	116.000000
mean	57.301724	27.582111	97.793103	10.012086	2.694988	26.615080	10.180874	14.725966	534.647000
std	16.112766	5.020136	22.525162	10.067768	3.642043	19.183294	6.843341	12.390646	345.912663
min	24.000000	18.370000	60.000000	2.432000	0.467409	4.311000	1.656020	3.210000	45.843000
25%	45.000000	22.973205	85.750000	4.359250	0.917966	12.313675	5.474283	6.881763	269.978250
50%	56.000000	27.662416	92.000000	5.924500	1.380939	20.271000	8.352692	10.827740	471.322500
75%	71.000000	31.241442	102.000000	11.189250	2.857787	37.378300	11.815970	17.755207	700.085000
max	89.000000	38.578759	201.000000	58.460000	25.050342	90.280000	38.040000	82.100000	1698.440000

```
df.groupby(by=['Age']).size()
```

```
Age
24    1
25    1
28    1
29    2
32    1
34    3
35    2
36    2
38    2
40    2
41    1
42    2
43    3
44    4
45    7
46    3
47    1
48    4
49    5
50    1
51    4
52    1
53    1
54    3
55    1
57    1
58    1
59    2
60    2
61    1
62    2
64    2
65    3
66    5
67    1
68    3
69    5
71    3
72    3
73    2
74    1
75    4
76    4
77    2
```

```
78    1
81    1
82    2
83    1
85    2
86    3
89    1
dtype: int64
```

```
df.isna().sum()
```

```
Age               0
BMI               0
Glucose           0
Insulin           0
HOMA              0
Leptin            0
Adiponectin       0
Resistin          0
MCP.1             0
Classification    0
dtype: int64
```

```
df.isnull()
```

	Age	BMI	Glucose	Insulin	HOMA	Leptin	Adiponectin	Resistin	MCP.1	Classification
0	False	False	False	False	False	False	False	False	False	False
1	False	False	False	False	False	False	False	False	False	False
2	False	False	False	False	False	False	False	False	False	False
3	False	False	False	False	False	False	False	False	False	False
4	False	False	False	False	False	False	False	False	False	False
...	...	...	...	...	...	...	...	...	...	...
111	False	False	False	False	False	False	False	False	False	False
112	False	False	False	False	False	False	False	False	False	False
113	False	False	False	False	False	False	False	False	False	False
114	False	False	False	False	False	False	False	False	False	False
115	False	False	False	False	False	False	False	False	False	False

116 rows × 10 columns

```
type("Age")
```

```
str
```

```
type("BMI")
```

```
str
```

```
df.Age.astype(float)
```

```
0      48.0
1      83.0
2      82.0
3      68.0
4      86.0
       ...
111    45.0
112    62.0
113    65.0
114    72.0
115    86.0
Name: Age, Length: 116, dtype: float64
```

```
df.Age=df.Age.astype(float)
```

```
df.describe()
```

```
df.dtypes
```

```
Age               float64
BMI               float64
```

```
Glucose             int64
Insulin           float64
HOMA              float64
Leptin            float64
Adiponectin       float64
Resistin          float64
MCP.1             float64
Classification     object
dtype: object
```

```
df.sort_values('Age')
```

```
df.sort_values('Age',ascending=False)
```

```
df.rename(columns={'Age':'Year Old'})
```

```
df.sort_index()
```

```
df.reset_index()
```

```
df.drop(columns=['Age'])
```

```
pd.melt(df)
```

```
df.drop_duplicates()
```

```
df.head(5)
```

```
df.tail(5)
```

```
df.count()
```

```
Age               116
BMI               116
Glucose           116
Insulin           116
HOMA              116
Leptin            116
Adiponectin       116
Resistin          116
MCP.1             116
Classification    116
dtype: int64
```

```
for col in df.columns:
    print(f"Unique values in {col}: {df[col].unique()}")

# Convert non-numeric values to NaN for the 'Classification' column
df['Classification'] = pd.to_numeric(df['Classification'], errors='coerce')

# Calculate the median for numeric columns only
df.median()
```

```
Unique values in Age: [48. 83. 82. 68. 86. 49. 89. 76. 73. 75. 34. 29. 25. 24. 38. 44. 47. 61.
 64. 32. 36. 35. 54. 45. 50. 66. 53. 28. 43. 51. 67. 69. 60. 77. 71. 78.
 85. 42. 62. 59. 46. 72. 55. 41. 81. 65. 58. 40. 52. 74. 57.]
Unique values in BMI: [23.5        20.69049454 23.12467037 21.36752137 21.11111111 22.85445769
 22.7        23.8        22.         23.         21.47       23.01
 22.86       18.67       23.34       20.76       22.03       32.03895937
 34.5297228  36.51263743 28.57667585 31.97501487 32.27078777 30.27681661
 30.48315806 37.03560819 38.57875854 31.44654088 35.2507611  34.17489
 36.21227888 36.7901662  35.85581466 34.42217362 27.68877813 29.60676726
 31.2385898  35.09270153 26.34929208 35.58792924 29.2184076  27.2
 27.3        32.5        30.3        27.7        25.7        25.3
 29.4        26.6        27.1        25.9        21.30394858 20.82999519
 20.9566075  24.24242424 21.35991456 21.08281329 19.13265306 22.65625
 22.4996371  21.51385851 22.89281998 22.83287935 23.14049587 24.21875
 22.22222222 20.83       19.56       20.26       24.74       18.37
 23.62       22.21       26.5625     31.25       26.66666667 26.6727633
 28.67262608 31.64036818 32.46191136 25.51020408 29.296875   29.666548
 28.125      29.15451895 30.83653053 31.21748179 30.8012487  31.23140988
 29.77777778 27.88761707 27.63605442 27.91551882 28.44444444 28.65013774
 30.91557669 29.13631634 34.83814777 37.109375   29.38475666 33.18
 35.56       30.48       36.05       26.85       26.84       32.05
 25.59       27.18      ]
Unique values in Glucose: [ 70  92  91  77 118  97  83  78  82  88  75  86  84  85  95  87  90 106
  80 101  89  79 103  76  94  93 102  60  96 110  74 112  98 116 114 105
 201 100  99 196 199 139 128 134 131 104 108 152 119 138]
Unique values in Insulin: [ 2.707  3.115  4.498  3.226  3.549  4.69   6.47   3.35   4.952  3.469
  5.663  4.09   6.107  5.782  7.553  2.869 18.077  4.427 14.026  4.345
  4.53   5.81   4.376  5.537  6.76   6.703  9.245  6.817  6.59  15.533
 10.175  8.576 23.194  3.855  5.819  4.181  5.646  5.138  3.881  5.376
 14.07   5.197  5.43   8.34   6.042  8.079  3.508 10.704  4.462 26.211
  4.58  13.852  4.56  12.305 21.699  2.999  6.2    4.364  3.482  5.261
  6.683  2.64   2.74   6.862  4.902  3.73   5.7    3.42  15.89   3.44
 58.46   6.03   4.42  36.94  10.555 16.635  4.328 41.611 22.033  3.188
  9.669 28.677 10.395  4.172 14.649  2.54  51.814 12.162 16.582 41.894
 30.212 24.887 30.13   8.396  9.208  2.432 18.2    8.808  3.012  6.524
 10.491 10.949 12.548  5.636  4.713  5.75   8.15   7.01  11.91   3.33
  5.73   2.82  19.91 ]
Unique values in HOMA: [ 0.46740867  0.70689733  1.00965107  0.61272493  0.8053864   0.73208693
  0.89078733  1.88320133  0.80154333  1.01383947  0.6674356   1.14543613
  0.82727067  1.33        1.06967     1.6         0.59        3.79014433
  1.03739367  3.0099796   0.92171933  0.972138    1.203832    0.9067072
  1.229214    1.38399733  1.75261107  2.05239     1.513374    1.30042667
  3.86978807  2.53493167  1.8404096   5.09185613  0.732193    1.13392913
  0.84567693  1.4066068   1.30539453  0.72755813  1.1006464   3.262364
  1.08963767  1.245642    2.098344    1.341324    1.8732508   0.519184
  2.3498848   1.0566016   7.111918    0.96027333  3.4851632   0.832352
  2.85311933  4.9242264   0.6879706   1.55992     1.0011016   0.79018187
  1.23282767  1.84629013  0.507936    0.69614267  1.65877413  1.4026256
  0.79125733  1.37788     0.742368    4.468268    0.78065067 15.28534133
  1.56177     1.14478     7.83620533  2.62960233  3.775036    1.09960053
 20.6307338   5.27176247  0.60550747  2.38502     7.0029234   2.871792
  1.00851147  3.071407    0.56388    25.05034187  5.9699204   5.68541507
 13.22733227  4.45899333  6.4834952   8.22598307  9.73600733  1.44970933
  2.2485936   0.61789013  4.66890667  2.3464512   0.6538048   1.43223547
  2.5101466   2.24162527  2.94041467  1.86288587  1.046286    1.30486667
  2.63353667  2.62828267  3.495982    0.755688    1.1174      1.370998
  0.570392    6.777364  ]
Unique values in Leptin: [ 8.8071  8.8438 17.9393  9.8827  6.6994  6.8317  6.964   4.311   4.47
```

```
df.quantile
```

```
<bound method DataFrame.quantile of       Age        BMI  Glucose  Insulin      HOMA   Leptin  Adiponectin  \
0    48.0  23.500000       70    2.707  0.467409   8.8071     9.702400
1    83.0  20.690495       92    3.115  0.706897   8.8438     5.429285
2    82.0  23.124670       91    4.498  1.009651  17.9393    22.432040
3    68.0  21.367521       77    3.226  0.612725   9.8827     7.169560
4    86.0  21.111111       92    3.549  0.805386   6.6994     4.819240
..    ...        ...      ...      ...       ...      ...          ...
111  45.0  26.850000       92    3.330  0.755688  54.6800    12.100000
112  62.0  26.840000      100    4.530  1.117400  12.4500    21.420000
113  65.0  32.050000       97    5.730  1.370998  61.4800    22.540000
114  72.0  25.590000       82    2.820  0.570392  24.9600    33.750000
115  86.0  27.180000      138   19.910  6.777364  90.2800    14.110000

     Resistin    MCP.1  Classification
0     7.99585  417.114             1.0
1     4.06405  468.786             1.0
2     9.27715  554.697             1.0
3    12.76600  928.220             1.0
4    10.57635  773.920             1.0
..        ...      ...             ...
111  10.96000  268.230             2.0
112   7.32000  330.160             2.0
113  10.33000  314.050             2.0
114   3.27000  392.460             2.0
115   4.35000   90.090             2.0

[116 rows x 10 columns]>
```

```
df.min()
```

```
Age                24.000000
BMI                18.370000
Glucose            60.000000
Insulin             2.432000
```

```
HOMA               0.467409
Leptin             4.311000
Adiponectin        1.656020
Resistin           3.210000
MCP.1             45.843000
Classification     1.000000
dtype: float64
```

```
df.max()
```

```
Age                  89.000000
BMI                  38.578759
Glucose             201.000000
Insulin              58.460000
HOMA                 25.050342
Leptin               90.280000
Adiponectin          38.040000
Resistin             82.100000
MCP.1              1698.440000
Classification        2.000000
dtype: float64
```

```
for col in df.columns:
    print(f"Unique values in {col}: {df[col].unique()}")

df.mean()
```

```
Unique values in Age: [48. 83. 82. 68. 86. 49. 89. 76. 73. 75. 34. 29. 25. 24. 38. 44. 47. 61.
 64. 32. 36. 35. 54. 45. 50. 66. 53. 28. 43. 51. 67. 69. 60. 77. 71. 78.
 85. 42. 62. 59. 46. 72. 55. 41. 81. 65. 58. 40. 52. 74. 57.]
Unique values in BMI: [23.5        20.69049454 23.12467037 21.36752137 21.11111111 22.85445769
 22.7        23.8        22.         23.         21.47       23.01
 22.86       18.67       23.34       20.76       22.03       32.03895937
 34.5297228  36.51263743 28.57667585 31.97501487 32.27078777 30.27681661
 30.48315806 37.03560819 38.57875854 31.44654088 35.2507611  34.17489
 36.21227888 36.7901662  35.85581466 34.42217362 27.68877813 29.60676726
 31.2385898  35.09270153 26.34929208 35.58792924 29.2184076  27.2
 27.3        32.5        30.3        27.7        25.7        25.3
 29.4        26.6        27.1        25.9        21.30394858 20.82999519
 20.9566075  24.24242424 21.35991456 21.08281329 19.13265306 22.65625
 22.4996371  21.51385851 22.89281998 22.83287935 23.14049587 24.21875
 22.22222222 20.83       19.56       20.26       24.74       18.37
 23.62       22.21       26.5625     31.25       26.66666667 26.6727633
 28.67262608 31.64036818 32.46191136 25.51020408 29.296875   29.666548
 28.125      29.15451895 30.83653053 31.21748179 30.8012487  31.23140988
 29.77777778 27.88761707 27.63605442 27.91551882 28.44444444 28.65013774
 30.91557669 29.13631634 34.83814777 37.109375   29.38475666 33.18
 35.56       30.48       36.05       26.85       26.84       32.05
 25.59       27.18      ]
Unique values in Glucose: [ 70  92  91  77 118  97  83  78  82  88  75  86  84  85  95  87  90 106
  80 101  89  79 103  76  94  93 102  60  96 110  74 112  98 116 114 105
 201 100  99 196 199 139 128 134 131 104 108 152 119 138]
Unique values in Insulin: [ 2.707  3.115  4.498  3.226  3.549  4.69   6.47   3.35   4.952  3.469
  5.663  4.09   6.107  5.782  7.553  2.869 18.077  4.427 14.026  4.345
  4.53   5.81   4.376  5.537  6.76   6.703  9.245  6.817  6.59  15.533
 10.175  8.576 23.194  3.855  5.819  4.181  5.646  5.138  3.881  5.376
 14.07   5.197  5.43   8.34   6.042  8.079  3.508 10.704  4.462 26.211
  4.58  13.852  4.56  12.305 21.699  2.999  6.2    4.364  3.482  5.261
  6.683  2.64   2.74   6.862  4.902  3.73   5.7    3.42  15.89   3.44
 58.46   6.03   4.42  36.94  10.555 16.635  4.328 41.611 22.033  3.188
  9.669 28.677 10.395  4.172 14.649  2.54  51.814 12.162 16.582 41.894
 30.212 24.887 30.13   8.396  9.208  2.432 18.2    8.808  3.012  6.524
 10.491 10.949 12.548  5.636  4.713  5.75   8.15   7.01  11.91   3.33
  5.73   2.82  19.91 ]
Unique values in HOMA: [ 0.46740867  0.70689733  1.00965107  0.61272493  0.8053864   0.73208693
  0.89078733  1.88320133  0.80154333  1.01383947  0.6674356   1.14543613
  0.82727067  1.33        1.06967     1.6         0.59        3.79014433
  1.03739367  3.0099796   0.92171933  0.972138    1.203832    0.9067072
  1.229214    1.38399733  1.75261107  2.05239     1.513374    1.30042667
  3.86978807  2.53493167  1.8404096   5.09185613  0.732193    1.13392913
  0.84567693  1.4066068   1.30539453  0.72755813  1.1006464   3.262364
  1.08963767  1.245642    2.098344    1.341324    1.8732508   0.519184
  2.3498848   1.0566016   7.111918    0.96027333  3.4851632   0.832352
  2.85311933  4.9242264   0.6879706   1.55992     1.0011016   0.79018187
  1.23282767  1.84629013  0.507936    0.69614267  1.65877413  1.4026256
  0.79125733  1.37788     0.742368    4.468268    0.78065067 15.28534133
  1.56177     1.14478     7.83620533  2.62960233  3.775036    1.09960053
 20.6307338   5.27176247  0.60550747  2.38502     7.0029234   2.871792
  1.00851147  3.071407    0.56388    25.05034187  5.9699204   5.68541507
 13.22733227  4.45899333  6.4834952   8.22598307  9.73600733  1.44970933
  2.2485936   0.61789013  4.66890667  2.3464512   0.6538048   1.43223547
  2.5101466   2.24162527  2.94041467  1.86288587  1.046286    1.30486667
  2.63353667  2.62828267  3.495982    0.755688    1.1174      1.370998
  0.570392    6.777364  ]
Unique values in Leptin: [ 8.8071  8.8438 17.9393  9.8827  6.6994  6.8317  6.964   4.311   4.47
```

```
# Convert all numeric columns
df = df.apply(pd.to_numeric, errors='coerce')
df.std()
```

```
Age                16.112766
BMI                 5.020136
Glucose            22.525162
Insulin            10.067768
HOMA                3.642043
Leptin             19.183294
Adiponectin         6.843341
Resistin           12.390646
MCP.1             345.912663
Classification      0.498406
dtype: float64
```

```
pd.get_dummies(df['Age'])
```

```
pd.get_dummies(df['Glucose'])
```

```
df.iloc[2:50]
```

```
print(pd.get_dummies(df['Glucose']))
```

```
        60     70     74     75     76     77     78     79     80     82   \
0    False   True  False  False  False  False  False  False  False  False
1    False  False  False  False  False  False  False  False  False  False
2    False  False  False  False  False  False  False  False  False  False
3    False  False  False  False  False   True  False  False  False  False
4    False  False  False  False  False  False  False  False  False  False
..     ...    ...    ...    ...    ...    ...    ...    ...    ...    ...
111  False  False  False  False  False  False  False  False  False  False
112  False  False  False  False  False  False  False  False  False  False
113  False  False  False  False  False  False  False  False  False  False
114  False  False  False  False  False  False  False  False  False   True
115  False  False  False  False  False  False  False  False  False  False

     ...    119    128    131    134    138    139    152    196    199    201
0    ...  False  False  False  False  False  False  False  False  False  False
1    ...  False  False  False  False  False  False  False  False  False  False
2    ...  False  False  False  False  False  False  False  False  False  False
3    ...  False  False  False  False  False  False  False  False  False  False
4    ...  False  False  False  False  False  False  False  False  False  False
..   ...    ...    ...    ...    ...    ...    ...    ...    ...    ...    ...
111  ...  False  False  False  False  False  False  False  False  False  False
112  ...  False  False  False  False  False  False  False  False  False  False
113  ...  False  False  False  False  False  False  False  False  False  False
114  ...  False  False  False  False  False  False  False  False  False  False
115  ...  False  False  False  False   True  False  False  False  False  False

[116 rows x 50 columns]
```