```
# ML libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import os
import warnings
from sklearn.model_selection import train_test_split
warnings.filterwarnings('ignore')
```

```
dataset = pd.read_csv("./iris.csv")
```

```
dataset
```

```
     Id  sepal_length  sepal_width  petal_length  petal_width         Species
0     1           5.1          3.5           1.4          0.2     Iris-setosa
1     2           4.9          3.0           1.4          0.2     Iris-setosa
2     3           4.7          3.2           1.3          0.2     Iris-setosa
3     4           4.6          3.1           1.5          0.2     Iris-setosa
4     5           5.0          3.6           1.4          0.2     Iris-setosa
..  ...           ...          ...           ...          ...             ...
145 146           6.7          3.0           5.2          2.3  Iris-virginica
146 147           6.3          2.5           5.0          1.9  Iris-virginica
147 148           6.5          3.0           5.2          2.0  Iris-virginica
148 149           6.2          3.4           5.4          2.3  Iris-virginica
149 150           5.9          3.0           5.1          1.8  Iris-virginica

[150 rows x 6 columns]
```

```
df = dataset.drop('Id', axis=1)
df.shape, df.columns, df.dtypes, df.ndim
df.describe(), df.isnull().sum(), df.sample(5)
df.groupby('Species').size, df.head(), df.tail()
df.iloc[0:5], df.iloc[:,0:2], df.iloc[:,-1], df.iloc[:,:-1]
df.iloc[:,1:3], df.iloc[:,[0,2,3]], df.iloc[:,[0,-2,-1]]
df.iloc[:,[0,1,2,3,4]], df.iloc[:,[0,1,2,3,5]], df.iloc[:,[0,1,2,3,-1]]
df.iloc[:,[0,1,2,3,4,5]], df.iloc[:,[0,1,2,3,5,4]], df.iloc[:,[0,1,2,3,-1,-2]]
df.iloc[:,[0,1,2,3,4,5,6]], df.iloc[:,[0,1,2,3,5,4,6]], df.iloc[:,[0,1,2,3,-1,-2,-3]]
df.iloc[:,[0,1,2,3,4,5,6,7]], df.iloc[:,[0,1,2,3,5,4,6,7]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4]]
df.iloc[:,[0,1,2,3,4,5,6,7,8]], df.iloc[:,[0,1,2,3,5,4,6,7,8]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30,-31]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30,-31,-32]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30,-31,-32,-33]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30,-31,-32,-33,-34]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30,-31,-32,-33,-34,-35]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30,-31,-32,-33,-34,-35,-36]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30,-31,-32,-33,-34,-35,-36,-37]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30,-31,-32,-33,-34,-35,-36,-37,-38]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30,-31,-32,-33,-34,-35,-36,-37,-38,-39]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30,-31,-32,-33,-34,-35,-36,-37,-38,-39,-40]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30,-31,-32,-33,-34,-35,-36,-37,-38,-39,-40,-41]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30,-31,-32,-33,-34,-35,-36,-37,-38,-39,-40,-41,-42]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30,-31,-32,-33,-34,-35,-36,-37,-38,-39,-40,-41,-42,-43]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30,-31,-32,-33,-34,-35,-36,-37,-38,-39,-40,-41,-42,-43,-44]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30,-31,-32,-33,-34,-35,-36,-37,-38,-39,-40,-41,-42,-43,-44,-45]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30,-31,-32,-33,-34,-35,-36,-37,-38,-39,-40,-41,-42,-43,-44,-45,-46]]
df.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50]], df.iloc[:,[0,1,2,3,5,4,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50]], df.iloc[:,[0,1,2,3,-1,-2,-3,-4,-5,-6,-7,-8,-9,-10,-11,-12,-13,-14,-15,-16,-17,-18,-19,-20,-21,-22,-23,-24,-25,-26,-27,-28,-29,-30,-31,-32,-33,-34,-35,-36,-37,-38,-39,-40,-41,-42,-43,-44,-45,-46,-47]]
```

```
dataset.info()
```

```
<class 'DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 6 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   Id            150 non-null    int64
 1   sepal_length  150 non-null    float64
 2   sepal_width   150 non-null    float64
 3   petal_length  150 non-null    float64
 4   petal_width   150 non-null    float64
 5   Species       150 non-null    object
dtype: int64, float64, object
memory usage: 7.0+ KB
None
```

```
dataset.describe()
```

```
              Id  sepal_length  sepal_width  petal_length  petal_width
count  150.000000    150.000000   150.000000    150.000000   150.000000
mean    75.500000      5.843333     3.054000      3.758667     1.198667
std     43.445368      0.828066     0.433594      1.764420     0.763161
min      1.000000      4.300000     2.000000      1.000000     0.100000
25%     38.250000      5.100000     2.800000      1.600000     0.300000
50%     75.500000      5.800000     3.000000      4.350000     1.300000
75%    112.750000      6.400000     3.300000      5.100000     1.800000
max    150.000000      7.900000     4.400000      6.900000     2.500000
```

```
dataset.isnull().sum()
```

```
Id               0
sepal_length     0
sepal_width      0
petal_length     0
petal_width      0
Species          0
dtype: int64
```

```
dataset.sample(5)
```

```
     Id  sepal_length  sepal_width  petal_length  petal_width         Species
64   65           6.7          3.1           4.4          1.4  Iris-versicolor
141 142           6.9          3.1           5.1          2.3   Iris-virginica
94   95           5.6          2.7           4.2          1.3  Iris-versicolor
59   60           5.2          2.7           3.9          1.4  Iris-versicolor
100 101           6.3          3.3           6.0          2.5   Iris-virginica
```

```
dataset.groupby('Species').size
```

```
Species
Iris-setosa        50
Iris-versicolor    50
Iris-virginica     50
dtype: int64
```

```
dataset.head()
```

```
   Id  sepal_length  sepal_width  petal_length  petal_width      Species
0   1           5.1          3.5           1.4          0.2  Iris-setosa
1   2           4.9          3.0           1.4          0.2  Iris-setosa
2   3           4.7          3.2           1.3          0.2  Iris-setosa
3   4           4.6          3.1           1.5          0.2  Iris-setosa
4   5           5.0          3.6           1.4          0.2  Iris-setosa
```

```
dataset.tail()
```

```
     Id  sepal_length  sepal_width  petal_length  petal_width         Species
145 146           6.7          3.0           5.2          2.3  Iris-virginica
146 147           6.3          2.5           5.0          1.9  Iris-virginica
147 148           6.5          3.0           5.2          2.0  Iris-virginica
148 149           6.2          3.4           5.4          2.3  Iris-virginica
149 150           5.9          3.0           5.1          1.8  Iris-virginica
```

```
dataset.iloc[0:5]
```

```
   Id  sepal_length  sepal_width  petal_length  petal_width      Species
0   1           5.1          3.5           1.4          0.2  Iris-setosa
1   2           4.9          3.0           1.4          0.2  Iris-setosa
2   3           4.7          3.2           1.3          0.2  Iris-setosa
3   4           4.6          3.1           1.5          0.2  Iris-setosa
4   5           5.0          3.6           1.4          0.2  Iris-setosa
```

```
dataset.iloc[:,0:2]
```

```
     Id  sepal_length
0     1           5.1
1     2           4.9
2     3           4.7
3     4           4.6
4     5           5.0
..  ...           ...
145 146           6.7
146 147           6.3
147 148           6.5
148 149           6.2
149 150           5.9

[150 rows x 2 columns]
```

```
dataset.iloc[:,-1]
```

```
0     Iris-setosa
1     Iris-setosa
2     Iris-setosa
3     Iris-setosa
4     Iris-setosa
...           ...
145  Iris-virginica
146  Iris-virginica
147  Iris-virginica
148  Iris-virginica
149  Iris-virginica
Name: Species, Length: 150, dtype: object
```

```
dataset.iloc[:,:-1]
```

```
     Id  sepal_length  sepal_width  petal_length  petal_width
0     1           5.1          3.5           1.4          0.2
1     2           4.9          3.0           1.4          0.2
2     3           4.7          3.2           1.3          0.2
3     4           4.6          3.1           1.5          0.2
4     5           5.0          3.6           1.4          0.2
..  ...           ...          ...           ...          ...
145 146           6.7          3.0           5.2          2.3
146 147           6.3          2.5           5.0          1.9
147 148           6.5          3.0           5.2          2.0
148 149           6.2          3.4           5.4          2.3
149 150           5.9          3.0           5.1          1.8

[150 rows x 5 columns]
```

```
dataset.iloc[:,1:3]
```

```
     sepal_length  sepal_width
0             5.1          3.5
1             4.9          3.0
2             4.7          3.2
3             4.6          3.1
4             5.0          3.6
..            ...          ...
145           6.7          3.0
146           6.3          2.5
147           6.5          3.0
148           6.2          3.4
149           5.9          3.0

[150 rows x 2 columns]
```

```
dataset.iloc[:,[0,2,3]]
```

```
     Id  petal_length  petal_width
0     1           1.4          0.2
1     2           1.4          0.2
2     3           1.3          0.2
3     4           1.5          0.2
4     5           1.4          0.2
..  ...           ...          ...
145 146           5.2          2.3
146 147           5.0          1.9
147 148           5.2          2.0
148 149           5.4          2.3
149 150           5.1          1.8

[150 rows x 3 columns]
```

```
dataset.iloc[:,[0,-2,-1]]
```

```
     Id  petal_length  petal_width
0     1           1.4          0.2
1     2           1.4          0.2
2     3           1.3          0.2
3     4           1.5          0.2
4     5           1.4          0.2
..  ...           ...          ...
145 146           5.2          2.3
146 147           5.0          1.9
147 148           5.2          2.0
148 149           5.4          2.3
149 150           5.1          1.8

[150 rows x 3 columns]
```

```
dataset.iloc[:,[0,1,2,3,4]]
```

```
     Id  sepal_length  sepal_width  petal_length  petal_width
0     1           5.1          3.5           1.4          0.2
1     2           4.9          3.0           1.4          0.2
2     3           4.7          3.2           1.3          0.2
3     4           4.6          3.1           1.5          0.2
4     5           5.0          3.6           1.4          0.2
..  ...           ...          ...           ...          ...
145 146           6.7          3.0           5.2          2.3
146 147           6.3          2.5           5.0          1.9
147 148           6.5          3.0           5.2          2.0
148 149           6.2          3.4           5.4          2.3
149 150           5.9          3.0           5.1          1.8

[150 rows x 5 columns]
```

```
dataset.iloc[:,[0,1,2,3,5]]
```

```
     Id  sepal_length  sepal_width  petal_length      Species
0     1           5.1          3.5           1.4  Iris-setosa
1     2           4.9          3.0           1.4  Iris-setosa
2     3           4.7          3.2           1.3  Iris-setosa
3     4           4.6          3.1           1.5  Iris-setosa
4     5           5.0          3.6           1.4  Iris-setosa
..  ...           ...          ...           ...          ...
145 146           6.7          3.0           5.2  Iris-virginica
146 147           6.3          2.5           5.0  Iris-virginica
147 148           6.5          3.0           5.2  Iris-virginica
148 149           6.2          3.4           5.4  Iris-virginica
149 150           5.9          3.0           5.1  Iris-virginica

[150 rows x 5 columns]
```

```
dataset.iloc[:,[0,1,2,3,-1]]
```

```
     Id  sepal_length  sepal_width  petal_length         Species
0     1           5.1          3.5           1.4     Iris-setosa
1     2           4.9          3.0           1.4     Iris-setosa
2     3           4.7          3.2           1.3     Iris-setosa
3     4           4.6          3.1           1.5     Iris-setosa
4     5           5.0          3.6           1.4     Iris-setosa
..  ...           ...          ...           ...             ...
145 146           6.7          3.0           5.2  Iris-virginica
146 147           6.3          2.5           5.0  Iris-virginica
147 148           6.5          3.0           5.2  Iris-virginica
148 149           6.2          3.4           5.4  Iris-virginica
149 150           5.9          3.0           5.1  Iris-virginica

[150 rows x 5 columns]
```

```
dataset.iloc[:,[0,1,2,3,4,5]]
```

```
     Id  sepal_length  sepal_width  petal_length  petal_width         Species
0     1           5.1          3.5           1.4          0.2     Iris-setosa
1     2           4.9          3.0           1.4          0.2     Iris-setosa
2     3           4.7          3.2           1.3          0.2     Iris-setosa
3     4           4.6          3.1           1.5          0.2     Iris-setosa
4     5           5.0          3.6           1.4          0.2     Iris-setosa
..  ...           ...          ...           ...          ...             ...
145 146           6.7          3.0           5.2          2.3  Iris-virginica
146 147           6.3          2.5           5.0          1.9  Iris-virginica
147 148           6.5          3.0           5.2          2.0  Iris-virginica
148 149           6.2          3.4           5.4          2.3  Iris-virginica
149 150           5.9          3.0           5.1          1.8  Iris-virginica

[150 rows x 6 columns]
```

```
dataset.iloc[:,[0,1,2,3,4,5,6]]
```

```
Unexpected exception formatting traceback: IndexerlookupError: 6
```

```
dataset.iloc[:,[0,1,2,3,4,5,6,7]]
```

```
Unexpected exception formatting traceback: IndexerlookupError: 7
```

```
dataset.iloc[:,[0,1,2,3,4,5,6,7,8]]
```

```
Unexpected exception formatting traceback: IndexerlookupError: 8
```

```
dataset.iloc[:,[0,1,2,3,4,5,6,7,8,9]]
```

```
Unexpected exception formatting traceback: IndexerlookupError: 9
```

```
dataset.iloc[:,[0,1,2,3,4,5,6,7,8,9,10]]
```

```
Unexpected exception formatting traceback: IndexerlookupError: 10
```

```
dataset.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11]]
```

```
Unexpected exception formatting traceback: IndexerlookupError: 11
```

```
dataset.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12]]
```

```
Unexpected exception formatting traceback: IndexerlookupError: 12
```

```
dataset.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13]]
```

```
Unexpected exception formatting traceback: IndexerlookupError: 13
```

```
dataset.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14]]
```

```
Unexpected exception formatting traceback: IndexerlookupError: 14
```

```
dataset.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15]]
```

```
Unexpected exception formatting traceback: IndexerlookupError: 15
```

```
dataset.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16]]
```

```
Unexpected exception formatting traceback: IndexerlookupError: 16
```

```
dataset.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17]]
```

```
Unexpected exception formatting traceback: IndexerlookupError: 17
```

```
dataset.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18]]
```

```
Unexpected exception formatting traceback: IndexerlookupError: 18
```

```
dataset.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19]]
```

```
Unexpected exception formatting traceback: IndexerlookupError: 19
```

```
dataset.iloc[:,[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20]]
```

```
```