1 Importing Libraries

In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

2 Load the data

In [2]:
```
path=r'G:\ajay\Ajay\Education\1.1 IT sector\Practice works\Datasets\cell_samples (1).csv'
data=pd.read_csv(path)
data
```

Out[2]:

	ID	Clump	UnifSize	UnifShape	MargAdh	SingEpiSize	BareNuc	BlandChrom	NormNucl	Mit	Class
0	1000025	5	1	1	1	2	1	3	1	1	2
1	1002945	5	4	4	5	7	10	3	2	1	2
2	1015425	3	1	1	1	2	2	3	1	1	2
3	1016277	6	8	8	1	3	4	3	7	1	2
4	1017023	4	1	1	3	2	1	3	1	1	2
...	...	...	...	...	...	...	...	...	...	...	...
694	776715	3	1	1	1	3	2	1	1	1	2
695	841769	2	1	1	1	2	1	1	1	1	2
696	888820	5	10	10	3	7	3	8	10	2	4
697	897471	4	8	6	4	3	4	10	6	1	4
698	897471	4	8	8	5	4	5	10	4	1	4

In [3]:
```
# Check the missing data
data.count()
```

Out[3]:
```
ID             699
Clump          699
UnifSize       699
UnifShape      699
MargAdh        699
SingEpiSize    699
BareNuc        699
BlandChrom     699
NormNucl       699
Mit            699
Class          699
dtype: int64
```

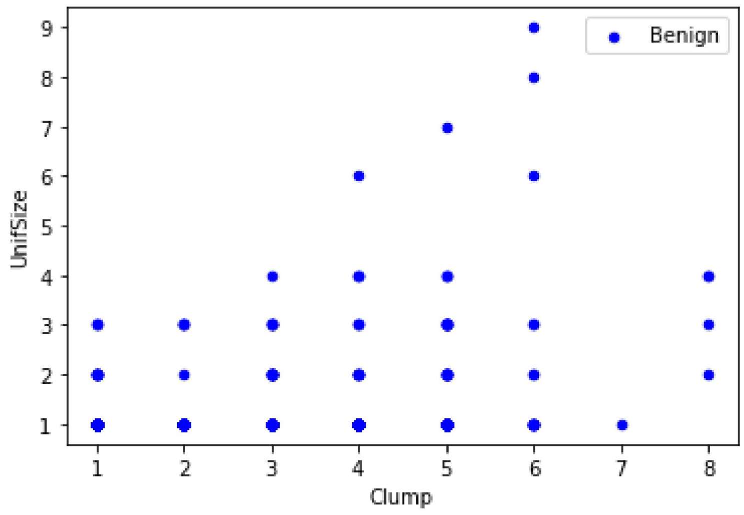
In [4]:
```
# Category of classes with counts
data['Class'].value_counts()
```

Out[4]:
```
2    458
4    241
Name: Class, dtype: int64
```

3 Distribution of the classes

In [5]:
```
belign=data[data['Class']==2]
malignant=data[data['Class']==4]
```

In [6]:
```
# plotting belign class wrt clump and unifsize
bel=belign.plot(kind='scatter', x='Clump', y='UnifSize', color='blue', label='Benign')
```

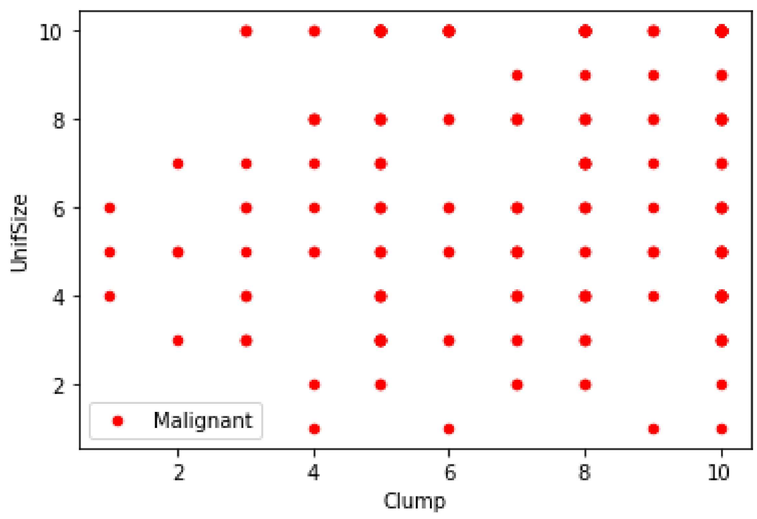


In [7]:

```
# plotting Malignant class wrt clump and unifsize
malignant.plot(kind='scatter', x='Clump', y='UnifSize', color='red', label='Malignant')
```

Out[7]:

```
<AxesSubplot:xlabel='Clump', ylabel='UnifSize'>
```



In [8]:

```
# Both the plots in one plot with ax parameter and bel is first plot name
malignant.plot(kind='scatter', x='Clump', y='UnifSize', color='red', label='Malignant', ax=bel)
```

Out[8]:

```
<AxesSubplot:xlabel='Clump', ylabel='UnifSize'>
```

4 Identifying unwanted rows

In [9]:

```
data.dtypes
```

Out[9]:

```
ID              int64
Clump           int64
UnifSize        int64
UnifShape       int64
MargAdh         int64
SingEpiSize     int64
BareNuc        object
BlandChrom      int64
NormNucl        int64
Mit             int64
Class           int64
dtype: object
```

In [10]:

```
# converting object datatype to numeric
data=data[pd.to_numeric(data['BareNuc'], errors='coerce').notnull()]
data['BareNuc']=data['BareNuc'].astype('int')
```

```
C:\Users\mypc\AppData\Local\Temp\ipykernel_9568\2938685767.py:3: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.htm
l#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#re
turning-a-view-versus-a-copy)
  data['BareNuc']=data['BareNuc'].astype('int')
```

In [11]:

```
data.dtypes
```

Out[11]:

```
ID             int64
Clump          int64
UnifSize       int64
UnifShape      int64
MargAdh        int64
SingEpiSize    int64
BareNuc        int32
BlandChrom     int64
NormNucl       int64
Mit            int64
Class          int64
dtype: object
```

5 Remove unwanted columns

In [22]:

```
data.columns

feature=data[['Clump', 'UnifSize', 'UnifShape', 'MargAdh', 'SingEpiSize',
       'BareNuc', 'BlandChrom', 'NormNucl', 'Mit']]

# Independant var
x=np.asarray(feature)

# Dependant var
y=np.asarray(data['Class'])
```

6 Divide the data for train/ test dataset

In [26]:

```
from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test=train_test_split(x, y, test_size=0.2, random_state=4)
x_train.shape, x_test.shape, y_train.shape, y_test.shape
```

Out[26]:

```
((546, 9), (137, 9), (546,), (137,))
```

7 Modeling SVM with Scikit learn

In [29]:

```
from sklearn import svm
classifier=svm.SVC(kernel='linear', gamma='auto', C=2)
classifier.fit(x_train, y_train)

y_predict= classifier.predict(x_test)
```

8 Evaluation results

In [32]:

```
from sklearn.metrics import classification_report

print(classification_report(y_test, y_predict))
```

```
              precision    recall  f1-score   support

           2       1.00      0.94      0.97        90
           4       0.90      1.00      0.95        47

    accuracy                           0.96       137
   macro avg       0.95      0.97      0.96       137
weighted avg       0.97      0.96      0.96       137
```

In [ ]: