What is Feature Scaling?

Feature Scaling is a method to scale numeric feature in the same scale or range (like:-1 to 1, 0 to 1).
This last step involved in Data Preprocessing and before ML Model training.
It is also called data normalization
We apply feature scaling om independent variable.

Why Feature Scaling?

The Scale of raw feature is different according to its units.
Machine learning algorithms can not understand feature units,understand only number
Ex: if hight 140cm and 8.2feet
Types Of Scaler
Min Max Scaler, Standard Scaler, Max Abs Scaler etc

What is Normalization?

- Normalization rescale the feature in fixed range b/w 0 and 1.
- Normalization also calles as Min-Max Scalling.
- If data doesn't follow normal distribution(Gussian Distribution).

Standardization Vs Normalization ?

- There is no any thumb rule to use Standardization or Normalization for Special MI algo.
- But mostly Standardization use clustring analysis,Principal Component Analysis(PCA).
- Normalization prefer for image processing because pixel intensity b/w 0 to 255,neural network algorith require in scale 0-1,K-Nearest Neighbors.

In [3]:
```
import pandas as pd
import seaborn as sns
from sklearn.preprocessing import StandardScaler
from sklearn.preprocessing import MinMaxScaler
```

In [4]:
```
df=sns.load_dataset('titanic')
df.head()
```

Out[4]:

	survived	pclass	sex	age	sibsp	parch	fare	embarked	class	who	adult_male	deck	embark_town	alive	alone
0	0	3	male	22.0	1	0	7.2500	S	Third	man	True	NaN	Southampton	no	False
1	1	1	female	38.0	1	0	71.2833	C	First	woman	False	C	Cherbourg	yes	False
2	1	3	female	26.0	0	0	7.9250	S	Third	woman	False	NaN	Southampton	yes	True
3	1	1	female	35.0	1	0	53.1000	S	First	woman	False	C	Southampton	yes	False
4	0	3	male	35.0	0	0	8.0500	S	Third	man	True	NaN	Southampton	no	True

In [5]:
```
df2=df[['survived','pclass','age','parch']]
df2.head()
```

Out[5]:

	survived	pclass	age	parch
0	0	3	22.0	0
1	1	1	38.0	0
2	1	3	26.0	0
3	1	1	35.0	0
4	0	3	35.0	0

In [6]:
```
#checking to see if there's any null variables
df2.isnull().sum()
```

Out[6]:
```
survived      0
pclass        0
age         177
parch         0
dtype: int64
```

In [7]:
```
df3=df2.fillna(df2.mean())
```

In [8]:
```
X=df3.drop('survived',axis=1)
Y=df3['survived']
```

In [9]:
```
#Train and Test splitting of data
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 = 42)
```

In [10]:
```
# Standard Scaler
sc=StandardScaler()
sc.fit(X_train )
```

Out[10]:
```
StandardScaler()
```

In [11]:
```
sc.mean_
```

Out[11]:
```
array([ 2.33005618, 29.53822538,  0.37921348])
```

In [12]:
```
sc.scale_
```

Out[12]:
```
array([ 0.82400502, 12.98541943,  0.79111317])
```

In [13]:
```
X_train.describe()
```

Out[13]:

	pclass	age	parch
count	712.000000	712.000000	712.000000
mean	2.330056	29.538225	0.379213
std	0.824584	12.994548	0.791669
min	1.000000	0.420000	0.000000
25%	2.000000	22.000000	0.000000
50%	3.000000	29.699118	0.000000
75%	3.000000	35.000000	0.000000
max	3.000000	80.000000	6.000000

In [14]:
```
X_train_sc=sc.transform(X_train)
X_test_sc=sc.transform(X_test)
```

In [15]:
```
X_train_sc
```

Out[15]:
```
array([[-1.61413602,  1.22920747, -0.47934164],
       [-0.40055118, -0.50350514, -0.47934164],
       [ 0.81303367,  0.18957991, -0.47934164],
       ...,
       [ 0.81303367,  0.88266495, -0.47934164],
       [-1.61413602, -1.19659018,  2.04874166],
       [-1.61413602, -0.65752403,  0.78470001]])
```

In [16]:
```
X_train_sc=pd.DataFrame(X_train_sc,columns=['pclass','age','parch'])
X_test_sc=X_train_sc=pd.DataFrame(X_test_sc,columns=['pclass','age','parch'])
```

In [17]:
```
X_test_sc.head()
```

Out[17]:

	pclass	age	parch
0	0.813034	0.012390	0.784700
1	-0.400551	0.112570	-0.479342
2	0.813034	-0.734533	-0.479342
3	-0.400551	-1.812666	0.784700
4	0.813034	-1.196590	-0.479342

In [18]:
```
X_train_sc.describe().round(2)
```

Out[18]:

	pclass	age	parch
count	179.00	179.00	179.00
mean	-0.13	0.06	0.01
std	1.06	1.00	1.09
min	-1.61	-2.21	-0.48
25%	-1.61	-0.58	-0.48
50%	0.81	0.01	-0.48
75%	0.81	0.50	-0.48
max	0.81	3.19	5.84

In [19]:
```
# Min Max Scaler
mmc=MinMaxScaler()
mmc.fit(X_train )
```

Out[19]:
```
MinMaxScaler()
```

In [20]:
```
X_train_mmc=mmc.transform(X_train)
X_test_mmc=mmc.transform(X_test)
```

In [21]:
```
X_train_mmc=pd.DataFrame(X_train_mmc,columns=['pclass','age','parch'])
X_test_mmc=X_train_sc=pd.DataFrame(X_test_mmc,columns=['pclass','age','parch'])
```

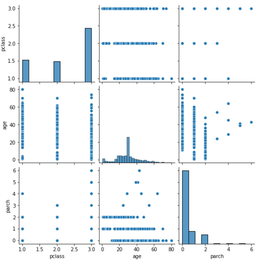
In [22]:
```
X_train_sc.describe().round(2)
```

Out[22]:

	pclass	age	parch
count	179.00	179.00	179.00
mean	0.61	0.38	0.07
std	0.44	0.16	0.14
min	0.00	0.01	0.00
25%	0.00	0.27	0.00
50%	1.00	0.37	0.00
75%	1.00	0.45	0.00
max	1.00	0.89	0.83

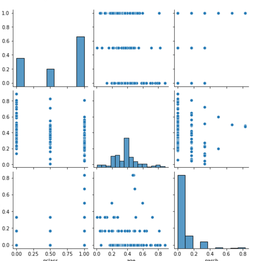
In [23]:
```
sns.pairplot(X_train)
```

Out[23]:
```
<seaborn.axisgrid.PairGrid at 0x16c1ee2a940>
```



In [24]:
```
sns.pairplot(X_train_sc)
```

Out[24]:
```
<seaborn.axisgrid.PairGrid at 0x16c1f9aeb80>
```



In [ ]:
```
```