

Support Vector Machine

```
In [1]: #Exp no.:10
```

```
In [2]: #Aim : Understanding Support Vector Machine
```

```
In [3]: #Exp no.:6  
#Name:Sahil A. Bankar  
#Roll no:04  
#Sec:B  
#Subject:  
#Date:02/10/2025
```

Importing The Libraries

```
In [4]: import pandas as pd  
import numpy as np
```

Data Acquisition using Pandas

```
In [5]: import os
```

```
In [6]: os.getcwd()
```

```
Out[6]: 'C:\\\\Users\\\\DELL'
```

```
In [7]: os.chdir('C:\\\\Users\\\\DELL\\\\Desktop')
```

```
In [8]: data=pd.read_csv("heart.csv")
```

```
In [10]: data.head()
```

```
Out[10]:
```

	age	sex	cp	trestbps	chol	fb	restecg	thalach	exang	oldpeak	slope	ca	thal	target
0	52	1	0	125	212	0	1	168	0	1.0	2	2	3	0
1	53	1	0	140	203	1	0	155	1	3.1	0	0	3	0
2	70	1	0	145	174	0	1	125	1	2.6	0	0	3	0
3	61	1	0	148	203	0	1	161	0	0.0	2	1	3	0
4	62	0	0	138	294	1	1	106	0	1.9	1	3	2	0

```
In [11]: data.tail()
```

```
Out[11]:      age  sex  cp  trestbps  chol  fbs  restecg  thalach  exang  oldpeak  slope  ca  thal  target
1020   59    1    1     140   221    0      1     164     1     0.0     2    0     2     1
1021   60    1    0     125   258    0      0     141     1     2.8     1    1     3     0
1022   47    1    0     110   275    0      0     118     1     1.0     1    1     2     0
1023   50    0    0     110   254    0      0     159     0     0.0     2    0     2     1
1024   54    1    0     120   188    0      1     113     0     1.4     1    1     3     0
```

```
In [12]: data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1025 entries, 0 to 1024
Data columns (total 14 columns):
 #   Column      Non-Null Count  Dtype  
--- 
 0   age         1025 non-null   int64  
 1   sex         1025 non-null   int64  
 2   cp          1025 non-null   int64  
 3   trestbps    1025 non-null   int64  
 4   chol        1025 non-null   int64  
 5   fbs         1025 non-null   int64  
 6   restecg     1025 non-null   int64  
 7   thalach     1025 non-null   int64  
 8   exang       1025 non-null   int64  
 9   oldpeak     1025 non-null   float64
 10  slope       1025 non-null   int64  
 11  ca          1025 non-null   int64  
 12  thal        1025 non-null   int64  
 13  target      1025 non-null   int64  
dtypes: float64(1), int64(13)
memory usage: 112.2 KB
```

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

	age	sex	cp	trestbps	chol	fbs	restecg
count	1025.000000	1025.000000	1025.000000	1025.000000	1025.000000	1025.000000	1025.000000
mean	54.434146	0.695610	0.942439	131.611707	246.000000	0.149268	0.529756
std	9.072290	0.460373	1.029641	17.516718	51.59251	0.356527	0.527878
min	29.000000	0.000000	0.000000	94.000000	126.000000	0.000000	0.000000
25%	48.000000	0.000000	0.000000	120.000000	211.000000	0.000000	0.000000
50%	56.000000	1.000000	1.000000	130.000000	240.000000	0.000000	1.000000
75%	61.000000	1.000000	2.000000	140.000000	275.000000	0.000000	1.000000
max	77.000000	1.000000	3.000000	200.000000	564.000000	1.000000	2.000000

```
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```

```
In [14]: data.shape
```

```
Out[14]: (1025, 14)
```

```
In [15]: data.size
```

```
Out[15]: 14350
```

```
In [16]: data.ndim
```

```
Out[16]: 2
```

Data preprocessing *data cleaning* missing value treatment

```
In [17]: # check Missing Value by record  
data.isna()
```

```
Out[17]:
```

	age	sex	cp	trestbps	chol	fb	restecg	thalach	exang	oldpeak	slope	ca	thal
0	False	False	False	False	False	False	False	False	False	False	False	False	False
1	False	False	False	False	False	False	False	False	False	False	False	False	False
2	False	False	False	False	False	False	False	False	False	False	False	False	False
3	False	False	False	False	False	False	False	False	False	False	False	False	False
4	False	False	False	False	False	False	False	False	False	False	False	False	False
...
1020	False	False	False	False	False	False	False	False	False	False	False	False	False
1021	False	False	False	False	False	False	False	False	False	False	False	False	False
1022	False	False	False	False	False	False	False	False	False	False	False	False	False
1023	False	False	False	False	False	False	False	False	False	False	False	False	False
1024	False	False	False	False	False	False	False	False	False	False	False	False	False

1025 rows × 14 columns



```
In [18]: data.isna().any()
```

```
Out[18]: age      False  
sex      False  
cp       False  
trestbps False  
chol     False  
fb       False  
restecg  False  
thalach  False  
exang    False  
oldpeak  False  
slope    False  
ca       False  
thal     False  
target   False  
dtype: bool
```

Independent and Dependent Variables

```
In [19]: x=data.drop("target", axis=1)  
y=data["target"]
```

Splitting of DataSet into train and Test

```
In [20]: 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_stat
```

Support Vector Classifier / Machine

(SVC/SVM)

```
In [21]: from sklearn import svm  
from sklearn.metrics import accuracy_score  
svm=svm.SVC()  
svm.fit(x_train, y_train)
```

```
Out[21]: SVC()
```

```
In [22]: y_pred3=svm.predict(x_test)
```

```
In [23]: accuracy_score (y_test,y_pred3)
```

```
Out[23]: 0.7463414634146341
```

Conclusion :

The experiment successfully implemented the Support Vector Machine (SVM) algorithm, demonstrating its effectiveness in handling linear and non-linear classification problems.

```
In [ ]:
```