ML Experiment 7

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Aim : To implement Support Vector Machine (SVM)

Theory :

Support Vector Machine (SVM) is a used for linear / non linear classification, regression & even outlier detection.

It is supervised ML algorithm

The main objective of the SVM is to find the optimal hyperplane in an N-dimensional space that can separate the data points in different classes in the feature space

The hyperplane tries that the margin between the closest points of different classes should be as maximum as possible.

The dimension of the hyperplane depends upon the number of features

Mathematical Intuition

$$w^T x + b = 0$$

$$d_i = \frac{w^T x_i + b}{\|w\|}$$

$$\hat{y} = \begin{cases} 1 & : \ w^T x + b \geq 0 \\ 0 & : \ w^T x + b < 0 \end{cases}$$

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Types of SVM
(1) Linear
(2) Non linear

Advantages
(1) Effective in high dimensional cases
(2) It's memory is efficient as it uses a subset of training points in the decision function called support vectors
(3) Different Kernel functions can be specified for the decision functions & its possible to specify custom Kernels

Conclusion : Thus, we implemented SVM


```
from sklearn.datasets import load_breast_cancer from
sklearn.model_selection import train_test_split from
sklearn.naive_bayes import GaussianNB
```

```
from sklearn.metrics import accuracy_score data =
load_breast_cancer()
X = data.data y =
data.target X

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3,
random_state=42)
classifier = GaussianNB() classifier.fit(X_train,
y_train) y_pred = classifier.predict(X_test)
accuracy = accuracy_score(y_test, y_pred)
print(accuracy)

from sklearn.metrics import confusion_matrix
confusion_matrix(y_test, y_pred)
```