Support Vector Machine (SVM) Algorithm

Support Vector Machine (SVM) is a powerful machine learning algorithm used for linear or nonlinear classification, regression, and even outlier detection tasks.

SVMs can be used for a variety of tasks, such as text classification, image classification, spam detection, handwriting identification, gene expression analysis, face detection, and anomaly detection.

SVMs are adaptable and efficient in a variety of applications because they can manage high-dimensional data and nonlinear relationships.

SVM algorithms are very effective as we try to find the maximum separating hyperplane between the different classes available in the target feature

Support Vector Machine

Support Vector Machine (SVM) is a supervised machine learning algorithm used for both classification and regression.

Though we say regression problems as well it’s best suited for classification.

The main objective of the SVM algorithm 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.

If the number of input features is two, then the hyperplane is just a line.

If the number of input features is three, then the hyperplane becomes a 2-D plane. It becomes difficult to imagine when the number of features exceeds

Types of Support Vector Machine

Based on the nature of the decision boundary, Support Vector Machines (SVM) can be divided into two main parts:

Linear SVM:

- Linear SVMs use a linear decision boundary to separate the data points of different classes.
- When the data can be precisely linearly separated, linear SVMs are very suitable.
- This means that a single straight line (in 2D) or a hyperplane (in higher dimensions) can entirely divide the data points into their respective classes.
- A hyperplane that maximizes the margin between the classes is the decision boundary.

Non-Linear SVM:

- Non-Linear SVM can be used to classify data when it cannot be separated into two classes by a straight line (in the case of 2D).
- By using kernel functions, nonlinear SVMs can handle nonlinearly separable data.
- The original input data is transformed by these kernel functions into a higher-dimensional feature space, where the data points can be linearly separated.
- A linear SVM is used to locate a nonlinear decision boundary in this modified space.

Advantages of SVM

- Effective in high-dimensional cases.

Its memory is efficient as it uses a subset of training points in the decision function called support vectors.

Different kernel functions can be specified for the decision functions and its possible to specify custom kernels

In [ ]: