ASSIGNMENT 5

Aim: Implement SVM for performing classification and find its accuracy on the given data.

Theory:

SVM offers very high accuracy compared to the other classifiers such as logistic regression and decision trees. It is known for its kernel trick to handle non linear input spaces. It is used in a variety of applications such as face detection intrusion detection, classification of emails, news articles and webpages, classification of genes and hand writing recognition.

SVM is an exciting algorithm and the concepts are relatively simple. The classifier separates data points using a hyperplane with the largest amount of margin. That's why an SVM classifier is also known as discriminative classifier. SVM finds an optimal hyperplane which helps in classifying new data points.

Support vector machines: Generally, support vector machies is considered to be a classification approach, it but can be employed in both types of classification and regression problems. It can easily handle multiple continuous and categorical variables. SVM constructs a hyperplane in multidimensional space to seperate different classes. SVM generates optimal hyperplane in an iterative manner, which is used to minimise an error. The core idea of SVM is to find a maximum marginal hyperplane the best divides the dataset into classes.

Support vectors: Support vectors are the data points, which are closest to the hyperplane. These points will define the separating line better by calculating margins. These points are most relevant to the construction of the classifier.

Hyperplane: A hyperplane is a decision plane which separates between a set of objects having different class memberships.

Margin: A margin is a gap between the two lines on the closest class points. This is calculated as the perpendicular distance from the line to support vectors or closest points. If the margin is larger in between the classes, then it is considered a good margin, a smaller margin is a bad margin.

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SVM Kernels: The SVM algorithm is implemented in practice using a kernel. A kernel transforms an input data space into the required form. SVM uses a technique called the kernel trick. Here, the kernel takes a low-dimensional input space and transforms it into a higher dimensional space. In other words, you can say that it converts non separable problem to separable problem by adding more dimensions to it. It is most useful in non-linear separation problem. kernel trick helps you to build a more accurate classifier

- Liner Kernel: A linear kernel can be used as normal dot product any two given observations. The product between two vectors is the sum of the multiplication of each pair of input values.

- Polynomial kernel: A polynomial kernel is a more generalised form of the linear kernel. The polynomial kernel can distinguish curved or non linear input space.

Conclusion: SVM was implemented in this assignment successfully.