# Support Vector Machine (SVM)

- **Support Vector Machine** or **SVM** is one of the most popular Supervised Learning algorithms, which is used for Classification as well as Regression problems. However, primarily, it is used for Classification problems in Machine Learning.

- The goal of the SVM algorithm is to create the **best line** or **decision boundary** that can segregate n-dimensional space into classes so that we can easily put the new data point in the correct category in the future. This best decision boundary is called a **hyperplane**.

- SVM chooses the extreme points/vectors that help in creating the hyperplane.

- These extreme cases are called as **support vectors**, and hence algorithm is termed as **Support Vector Machine**.

- Consider the given diagram in which there are two different categories that are classified using a decision boundary or hyperplane:
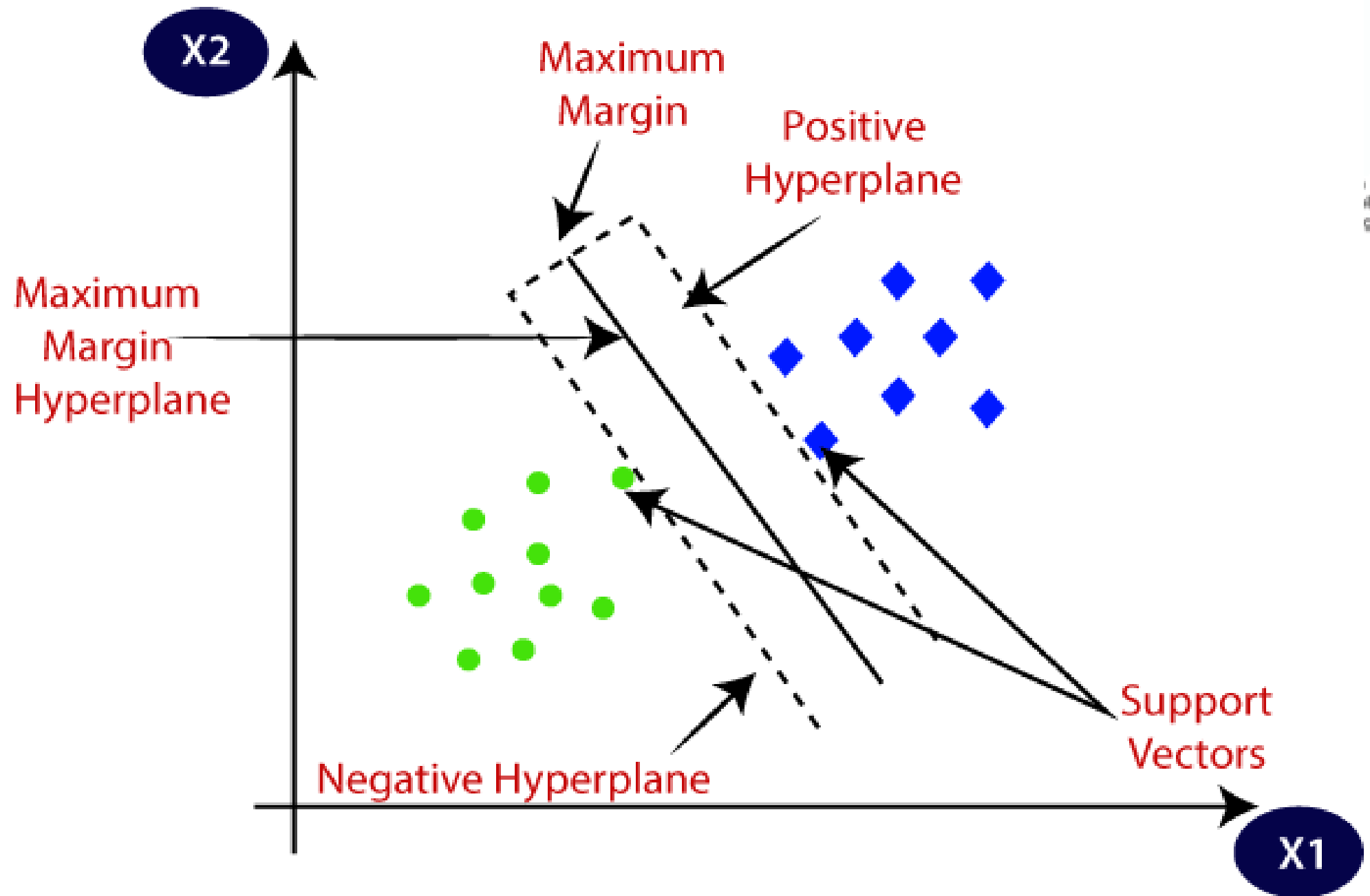
Example

- SVM can be understood with the example that we have used in the KNN classifier.

- Suppose we see a strange cat that also has some features of dogs, so if we want a model that can accurately identify whether it is a cat or dog, so such a model can be created by using the SVM algorithm.

- We will first train our model with lots of images of cats and dogs so that it can learn about different features of cats and dogs, and then we test it with this strange creature.

- So as support vector creates a decision boundary between these two data (cat and dog) and chooses extreme cases (support vectors), it will see the extreme case of cat and dog. Based on the support vectors, it will classify it as a cat.

- Consider the below diagram
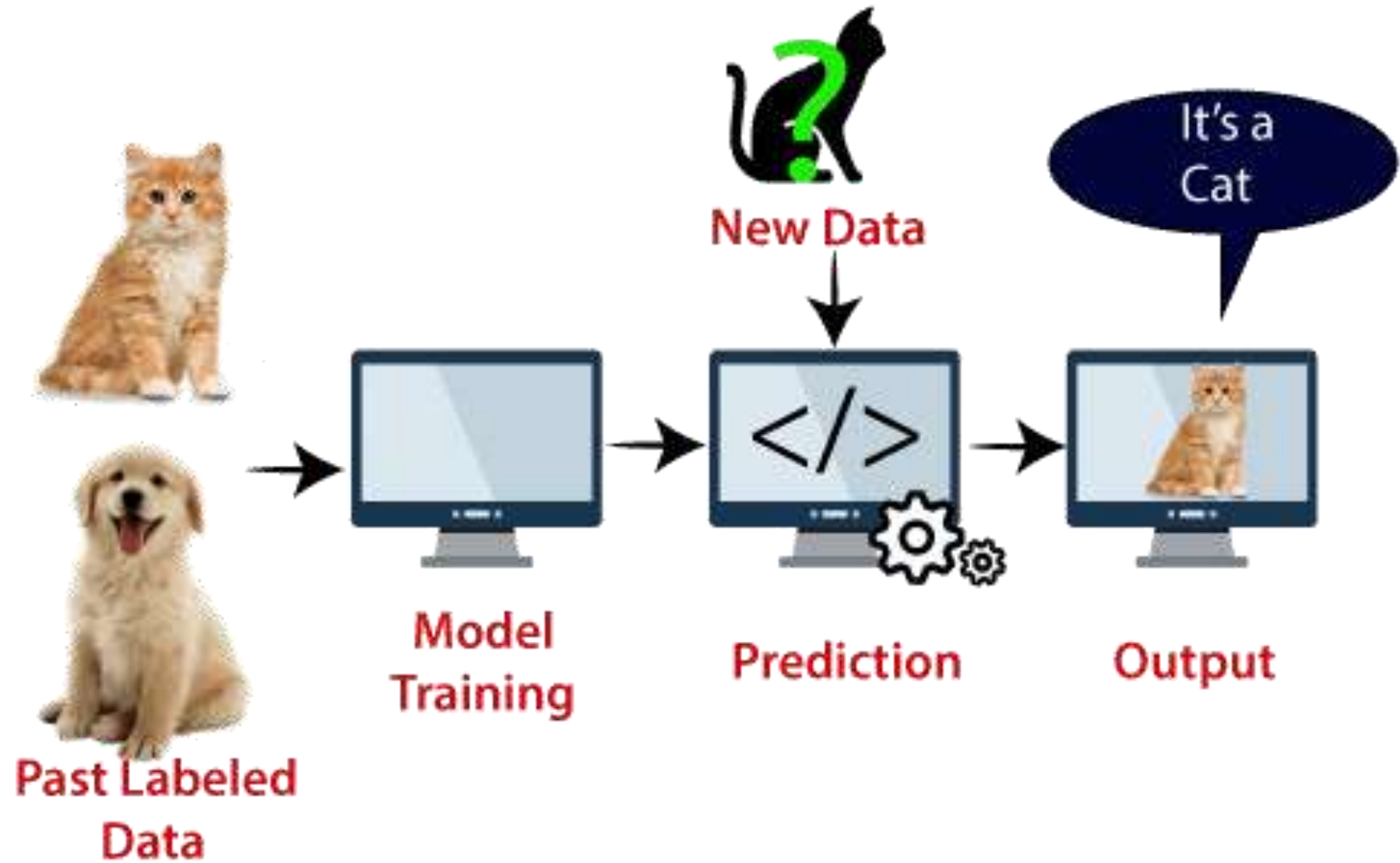
- SVM algorithm can be used for **Face detection**, **image classification**, **text categorization**, etc.

Types of SVM

- **SVM can be of two types**:

- **Linear SVM:** Linear SVM is used for linearly separable data, which means if a dataset can be classified into two classes by using a single straight line, then such data is termed as **linearly separable data**, and classifier is used called as **Linear SVM classifier**.

- **Non-linear SVM:** Non-Linear SVM is used for non-linearly separated data, which means if a dataset cannot be classified by using a straight line, then such data is termed as **non-linear data** and classifier used is called as **Non-linear SVM classifier.**