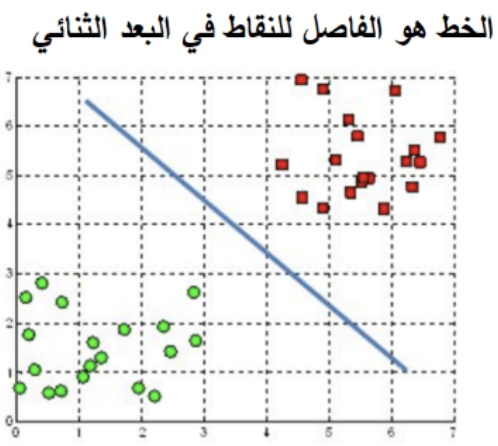
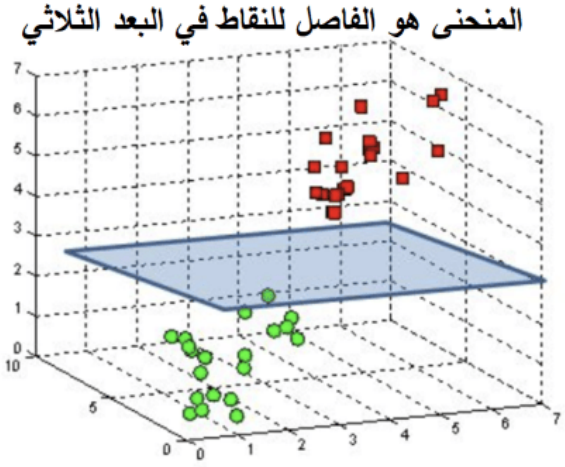
Support vector machine Support vector machine (SVM)

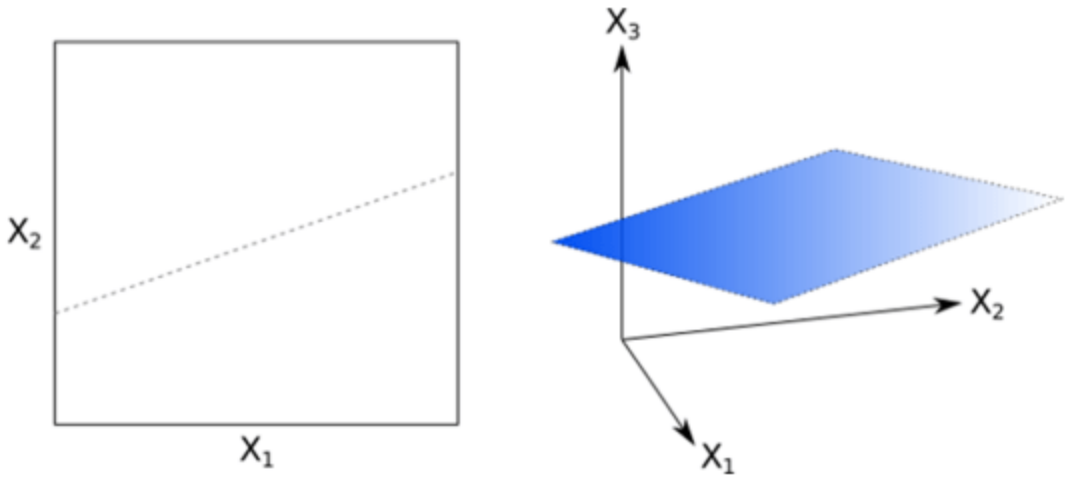
It is one of the ways Machine learning. Support vector machine(SVM) a linear is probabilistic - data classification method and is a nonlinear classifier.This method is considered one of the supervisedmachine learning methods. we want to If classify data binaryly based on known previous classifications, for example, classifying text that contains a person's opinion about a product into negative and positive, or classifying incoming email into spam and not spam. Therefore, it is And the Classification Tasks in Used Automated Learning Algorithms e ofOn an on It depends on ,only Classification Tasks in It is used Mostly in but ,decline Data He distinguishes In a way new pattern to Original Data transformation idea Data season During it from We can where Original Its space from higher space in . And classify it





How to use Support Vector Machine(SVM) method to classify data

InSVM we construct a vector in space that represents a certain property of an input. The goal of the algorithm is to train the model and determine where a new input is located. We have divided the space linearly into two classes through a line or plane(linear hyperplane) and determine where the new input is located as . shown in the following figure



) Shape on Category with Features or Points acting It is done x_i where ($\vec{x} = (x_1, x_2, \ldots, x_p)$ and that x_j and Explanatory variables One of she y Represent .(1- or 1 Values take often) As a dependent variable Category

to set during from Points season It was completed how Shows the next Shape . For them season region

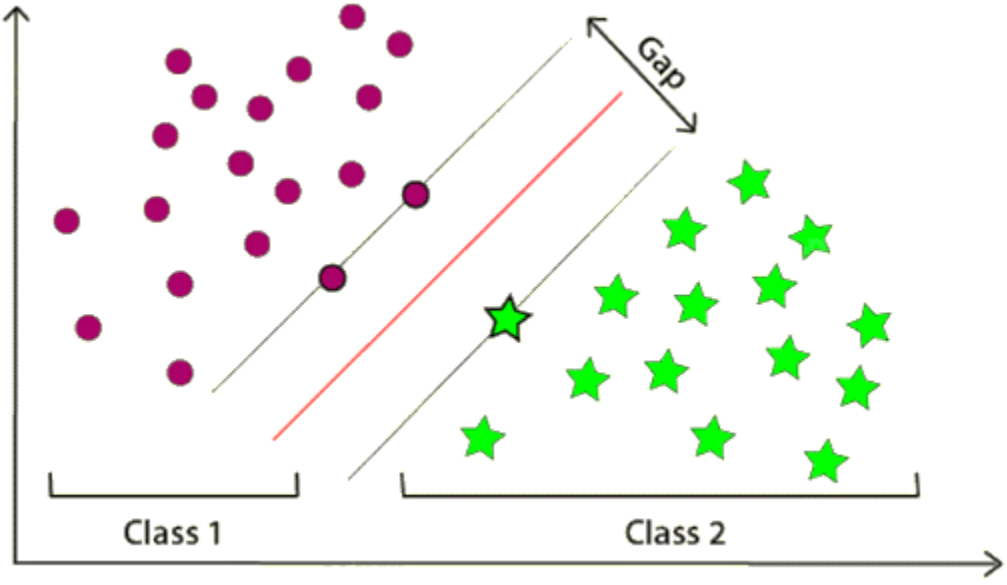


Image reference –Linear space separation https://data-flair.training/blogs/svm-support-vector-machine-tutorial/

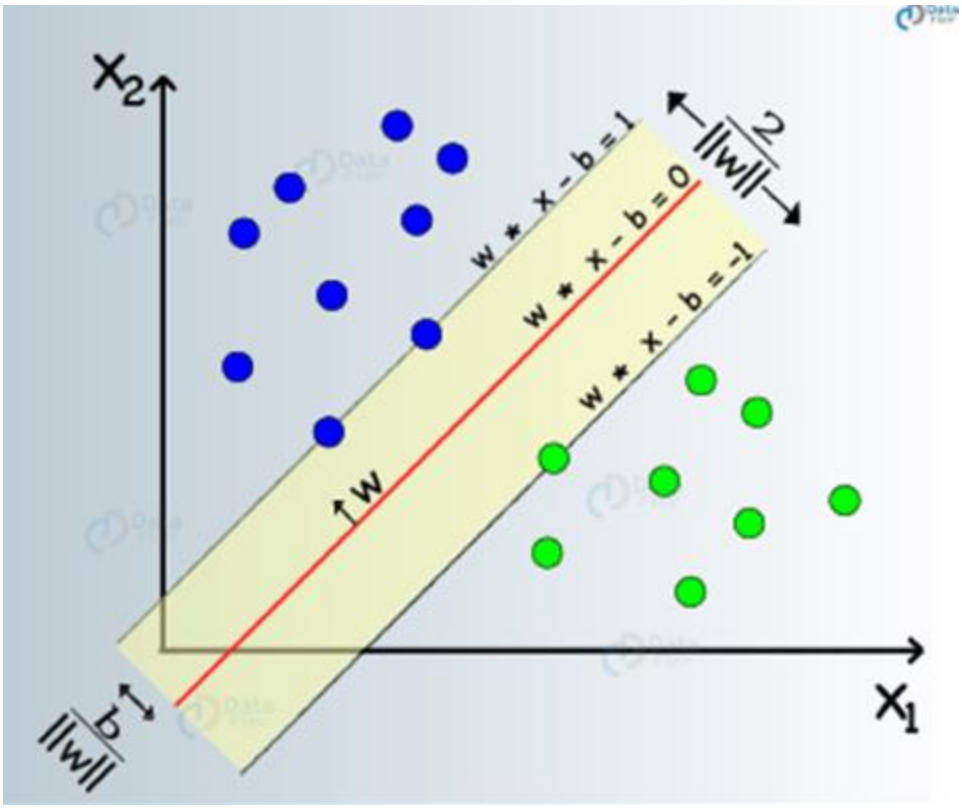
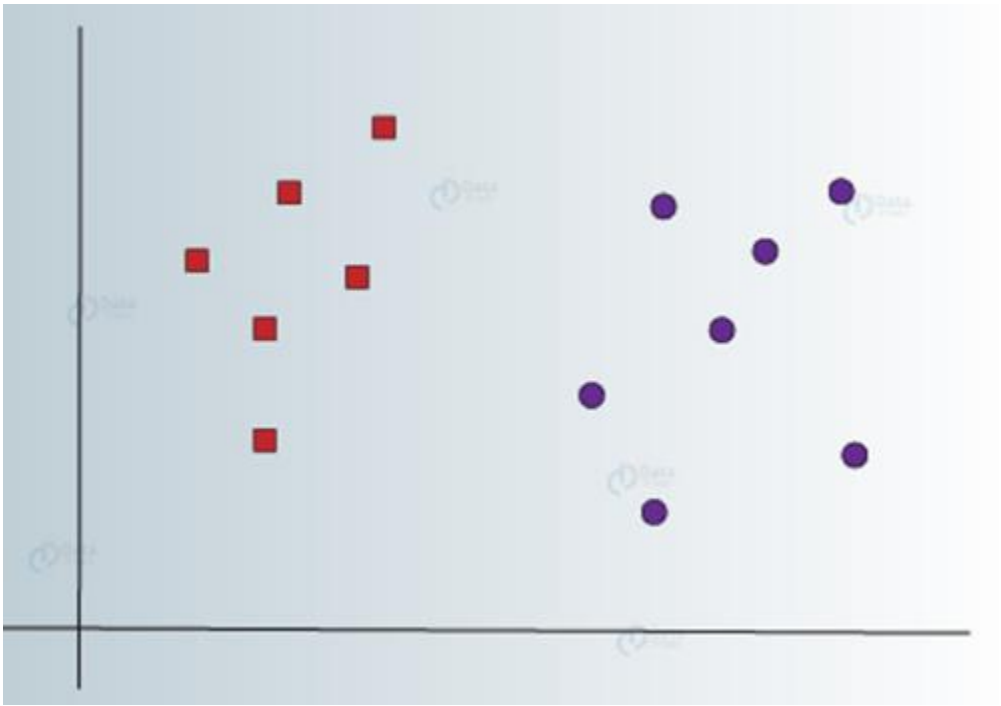
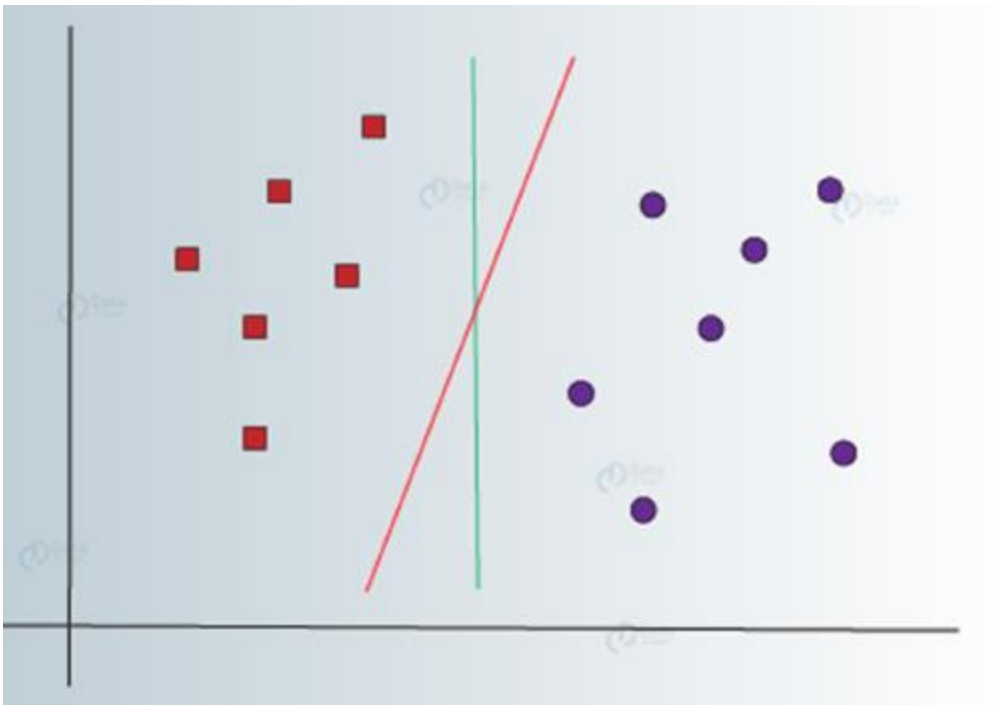


Image reference –Linear space separation with margin https://data-flair.training/blogs/svm-support-vector-machine-tutorial/

To separate it line fee We came Next Points We have Lucan for example

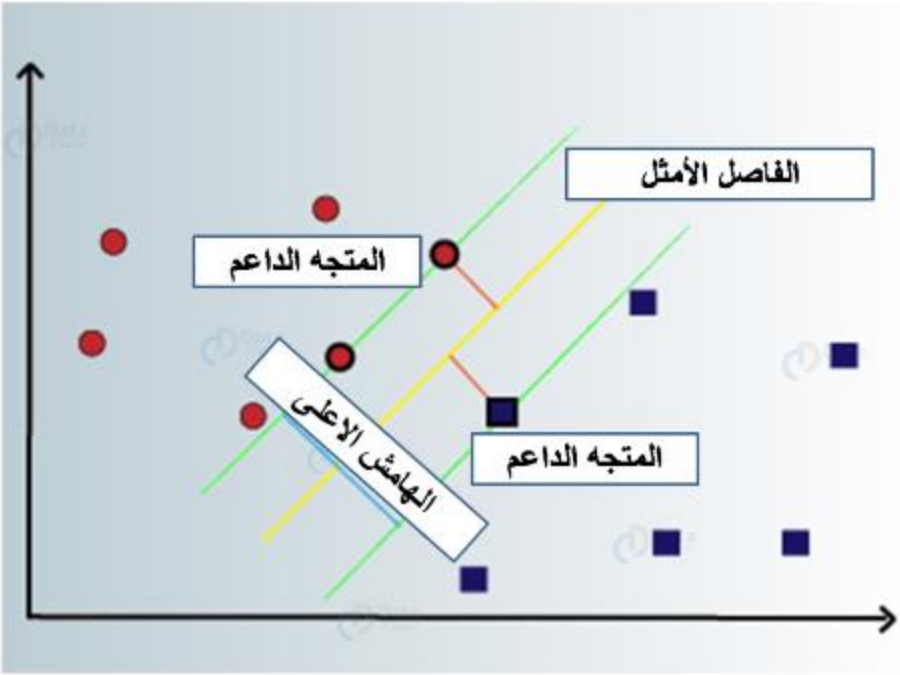


as follows Two lines fee We can for example Many Lines fee We can



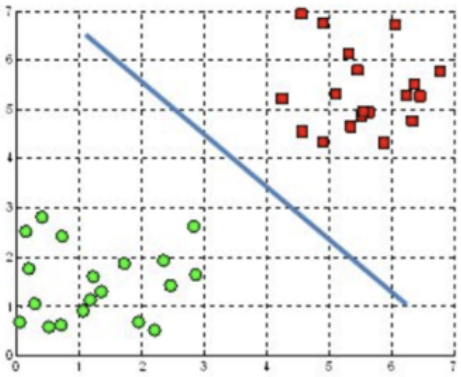
It is Green The line because Green The line from better Red The line here . Red For points closer considered

road inSVMAnd we The two classes No one The closest Points Find We have to Points This is amazing callsupport vectorsThe near bezel By finding We do then from separator linesupport vectors Margin It is called Distance And this margin separator The line He is So that margin greater Find he Algorithm And the goal account during from With that . We do . The best he The two classes between separator And the line Points between Vertical Distance

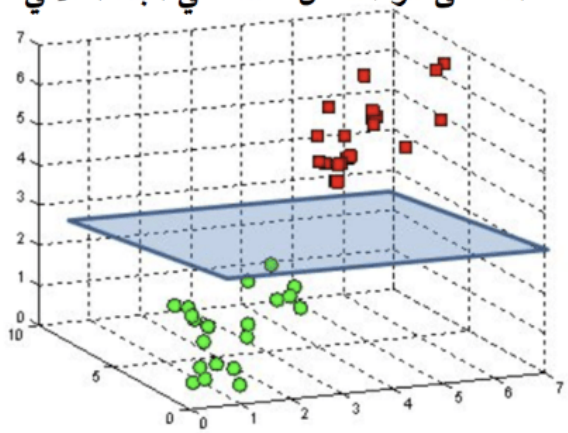


2 after same Points because Example this inD line he separator limit Van binary 1 StraightD after same points We have He was if general In a way , N limit Van after The He is separatorN .1-

الخط هو الفاصل للنقاط في البعد الثنائي

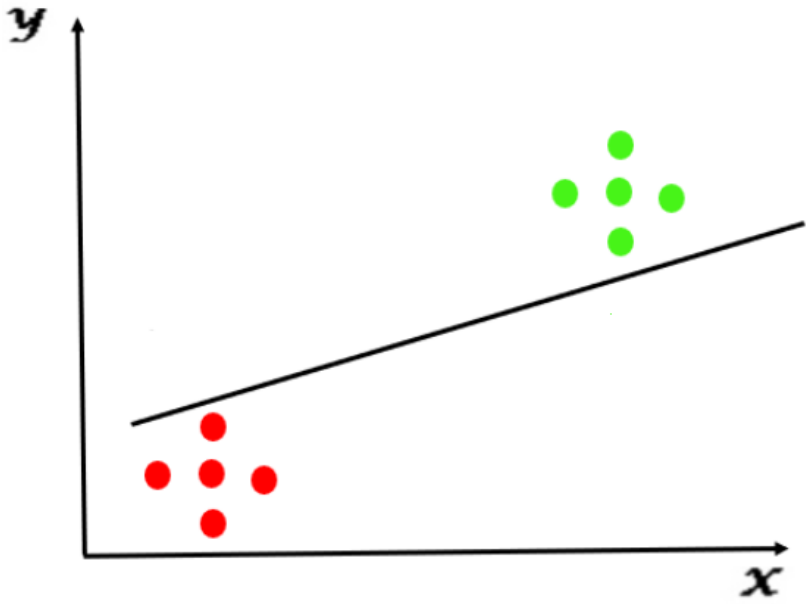


المنحنى هو الفاصل للنقاط في البعد الثلاثي



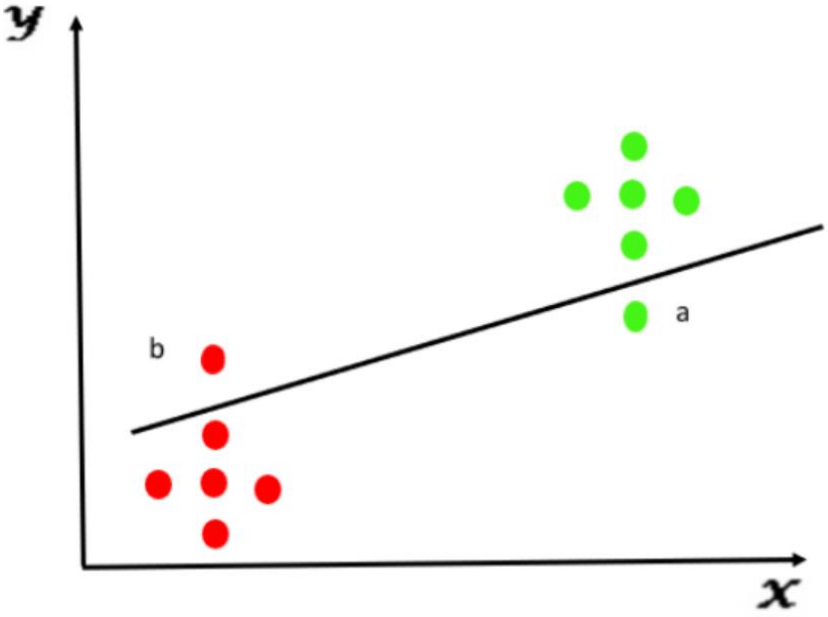
The duo Classification Algorithm weakness a pointBinary Classification

Suppose we have the following graph:



A decision line that separates the data well.

The duo Classification Algorithm I found it that decision line that We notice not But it is And the red Green Points between Classification practical in good : Previously what It is clear the next Shape We will take that To clarify ideal



Good decision line but not perfect for data separation

We the previous Graphic For the shape analysis In operation together We did it if Green The point that notice**a** It will practically But Green Points group to belongs

Red The point ,red For points Subordinate that it on Classify it be**b** to belongs For Subordinate that it on it Classify It will be practically But Red Points group But it is well He is that maybe decision line that We notice Therefore Green points always Ideally not**.**

line To find god to learn Algorithms from Many suggestion It was completed Algorithm The most important from Data season practical in ideal resolution Supporter vector machine**SVM** .

god to learn Types

Supervised by LearningSupervised Learning

Titled Data on Algorithm training To I mean**Labeled**And the Income Data any Algorithm adoption The process This is amazing during And together exit Prediction from Enables it So that and outputs Inputs between what relationship . New Data With outputs

supervision Without LearningUnsupervised Learning

Titled not Data on Algorithm training To I mean**Unlabeled** only Income Data any what relationship Algorithm adoption The process This is amazing during And . Enable it So that Inputs between

The enhancer LearningReinforcement Learning

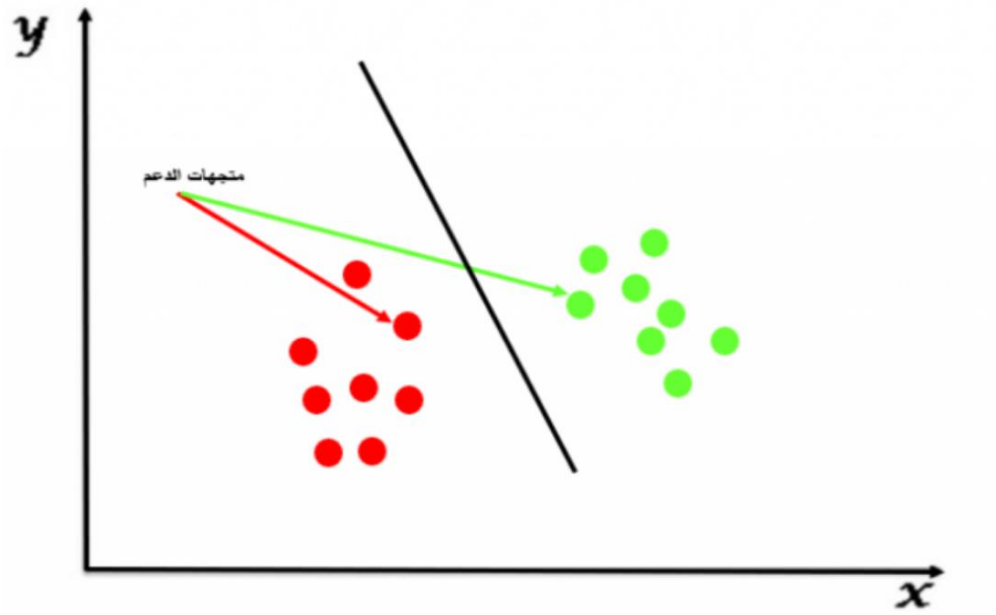
. Her mistakes And itself By yourself from You learn Algorithm that To It means

Supporter vector machine AlgorithmSupport Vector Machine

, The wave And education Statistics Theory between collects style on phrase I built you researcher before from Developed**Vapnik** an idea Depends on , 1998 to Data To divide road better on Search on Supporter vector machine Algorithm I represent level By putting Two groups**hyperplane** Look Hatred Between them lies Here no or Linear For separation midwife She was whether Data nature on . Its strength source

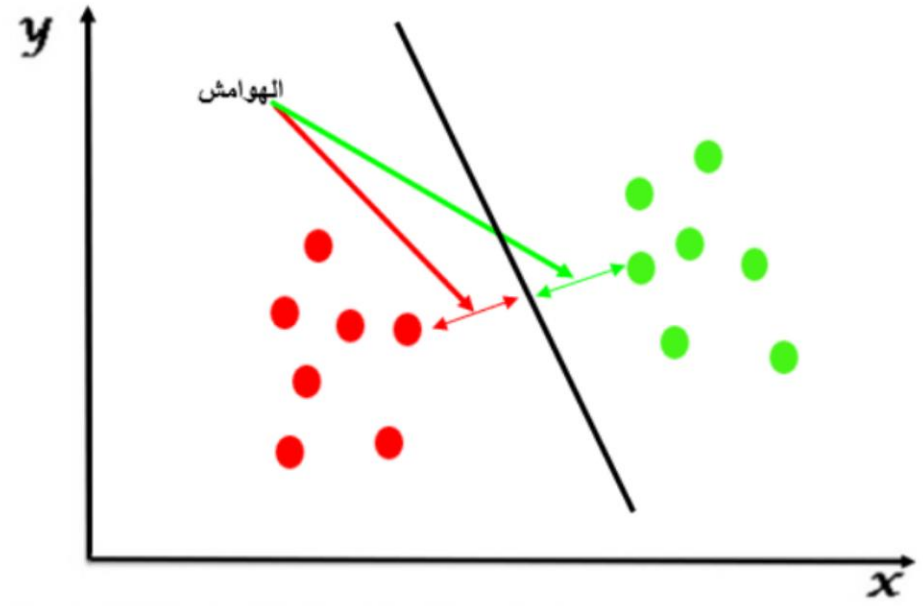
Support vectors Support Vectors

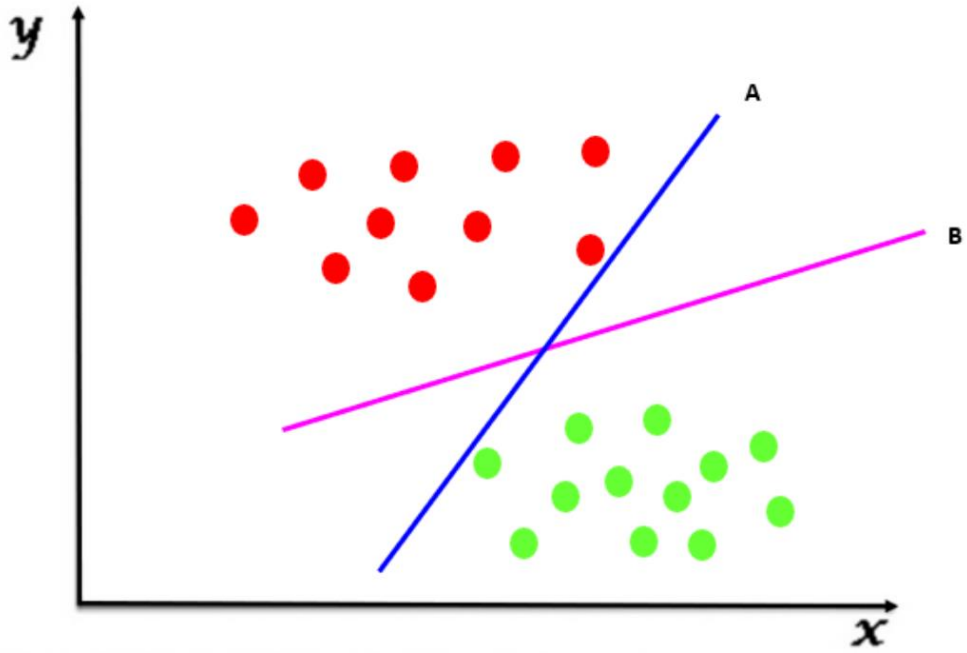
Level on The closest Data points group she Support Vectors It is considered classification practical in Big importance same points As a And it is optimum season practical in The best Level to set It is done During it from Data because I level to set Requires Its location changing or Remove it Therefore ,Data . new from last represent



MarginMargin

points from a point And closer optimum Level between Distance on phrase he whenever Big Distance This is amazing She was whenever So that Data group The in clear he as correct In a way New Data classification probability increased optimum Level that We notice ,following two figures**B** Level from better he optimum**A** from a point any And between evidence Distance because And that possibility What allows This maybe what greater Support Vectors points lies Therefore . True In a way Points from number greater classification What we This ,Super For level The best Location on get in Margin importance . The best optimum Level In a word Top in We mean it were

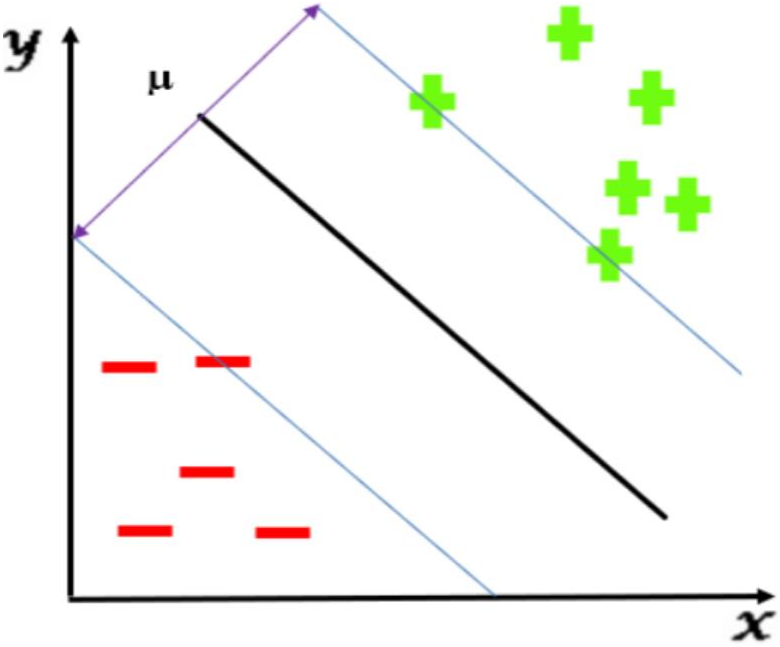


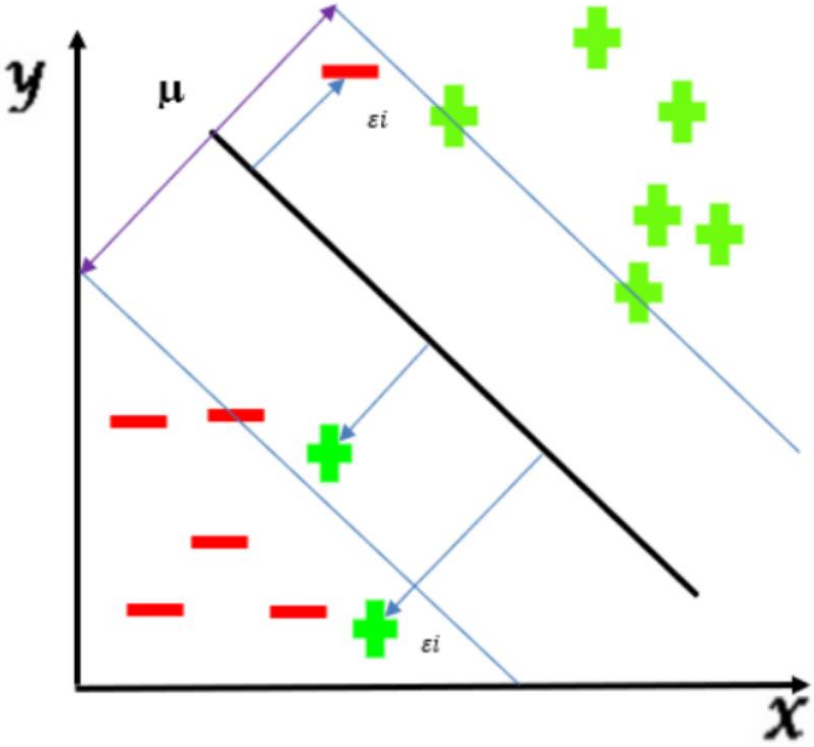


The difference betweensoft margin andhard margin

Data points any Linearly For separation midwife Data group Be Steel Margin in Margin in But the next Shape in as Some Some of them with Intertwined not the practical Prevent that Few Points some on Data group Contains Flexible Points For this Allow It is done the condition This is amazing In . Linear chapter

or Margin region within She was whether wrong In a way Classify it It is done that a point all in Error rate on Expresses Factor addition It is done Therefore Outside . Wrong or correct In a way Classified She was whether Training points from

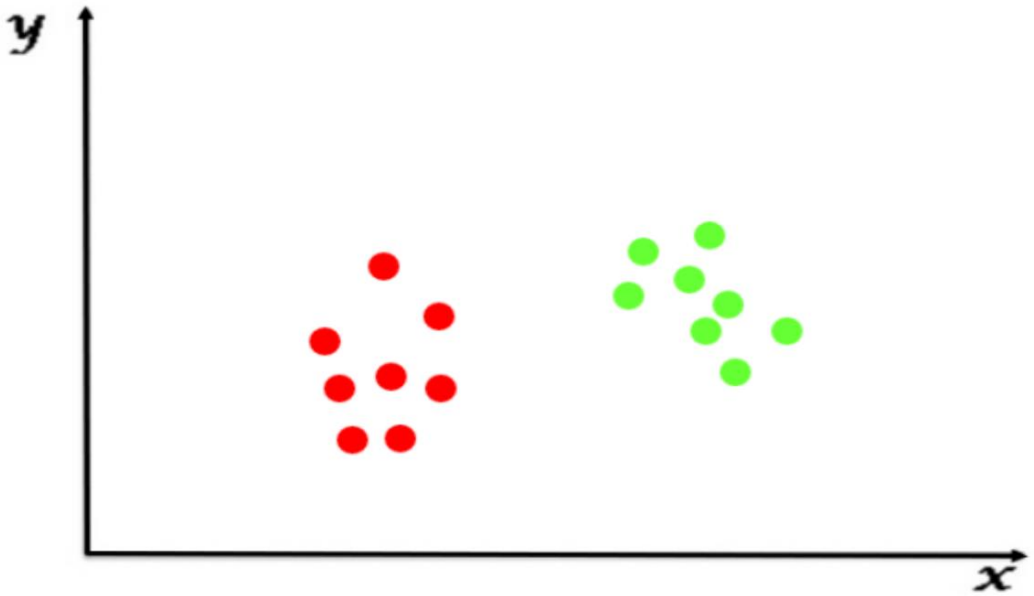




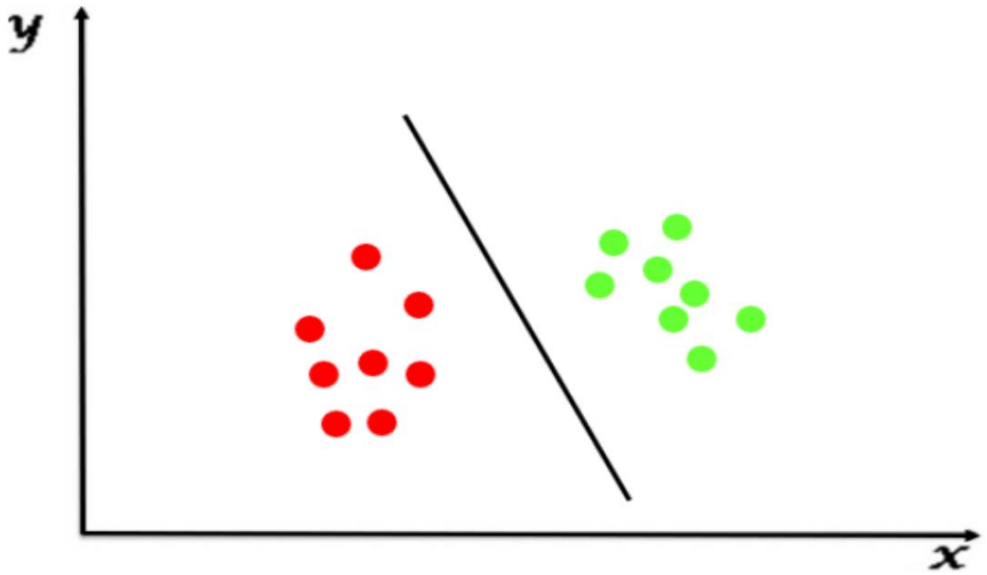
Support vector machine Types

Linearity Support vector machine**Linear SVM**

Classified on phrase**classifier**It is that Data To separate Use it It is done by the next Shape in as Linearly For separation midwife that it characterized by . Two groups to Data group season His mission straight on Expresses Super level

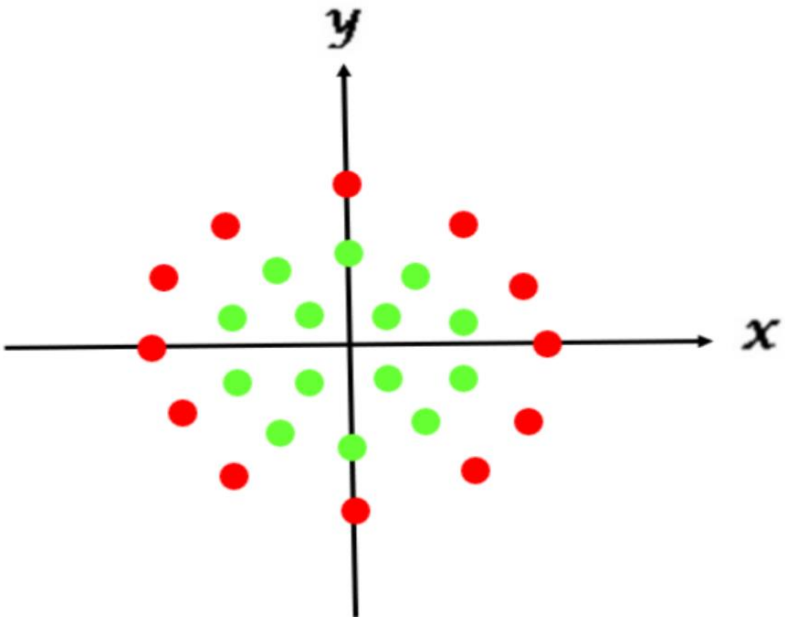


for Classifier this It is called**Linear SVM Classifier** machine Classified any To Ideal Values Find on states currency .And principle . Linear Supporter vector maybe appearance Best Data This is amazing Detail that Straight The line equation what For the margin distance With the largest any The following figure in as . The superior And the level Support Vectors points romf a point any between



Linearity not Support Directional machineNon Linear SVM

It is characterized by that Data To separate Use it It is done Classified on phrase The following figure is in as straight by Linearly For separation midwife not that it Classifier this called**Non Linear SVM Classifier** vector machine Classified any . Linear not Supporter

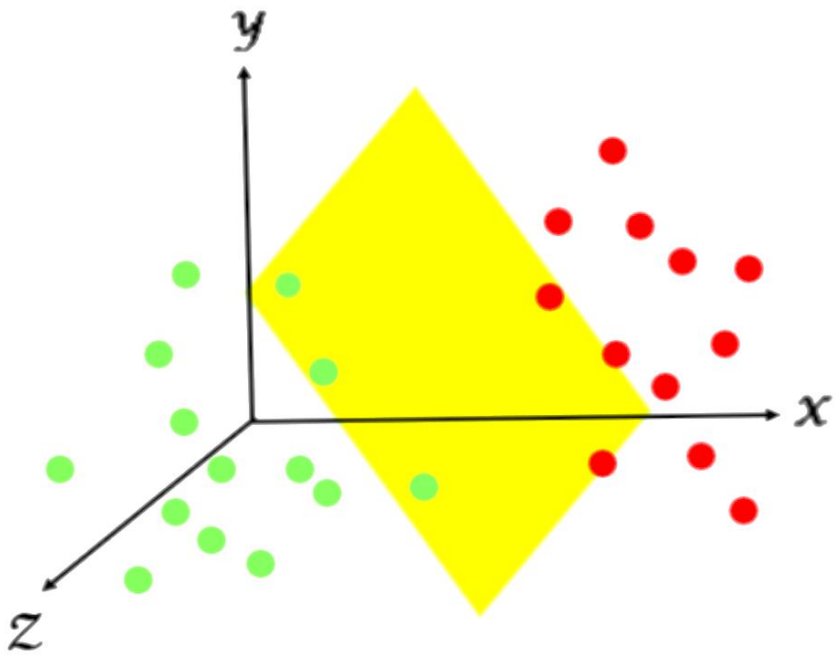


Its space from We have that Data group transformation on states currency principle We can where ,higher space to Dimension bilateral outer space from any present Trying to In a way Algorithm Start Therefore . And distinguish it Data season Let For data third after addition**Z be** group Test And then first the probability Dimensions tripartite space in Actress Data**X,Y,Z** For midwife I became are Level on Algorithm Looking for Then Condition verification if ? no or separation tripartite level maybe the chapter For the process more Suitable optimum Condition It is achieved did not And if ,specific anthropomorphic or Dimensions Let fourth after addition It is done**M** Let it be second be the probability**M** and Dimensions Quad space in Actress Data group Test then**X,Y,Z,M** I became are By adding Algorithm . it continues … And so no or For separation midwife For midwife Data With it Become For the stage Arrive until imensionsD Kernel road It is called The method And this separation**Method.**

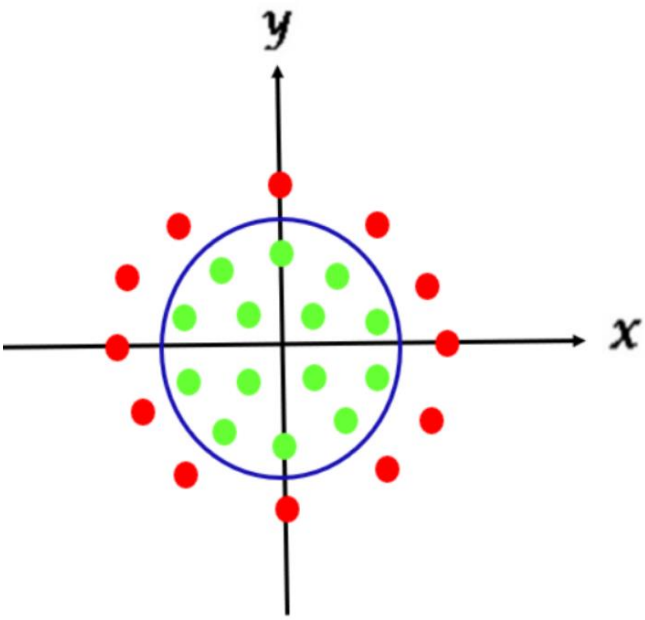
the important The question But ,third after addition probability Trying We begin the Shape in Data group We have By observation ?Its equation What is it equation Be Therefore circle he To separate it The best optimum Level previous : As follows the third Dimension

$$Z = X^2 + Y^2$$

For data Third feature addition With it I mean third after addition practical that Using Students between Differentiation hard from He was if Example way on any As an adjective the weight feature We add Then ,And the length the age Feature Third after addition After - Data group I became Therefore . To differentiate Third as Dimension tripartite level on Expresses Super level by For separation midwife - . the next Shape in



Be previous when The equation We have By observation**Z=1** Represent group By converting We did it if Therefore one Its diameter half circle equation Get rid of any Dimension bilateral space to Dimension tripartite space from Data the third Dimension from**Z** on We will get one Value give it to him during from And . Green Points Classify to Belongs to Inside it Content Data points all circle in as Red Points Classify to Belongs to Outside The incident remaining Points . the next Shape



vector machine Algorithm And negatives PositivesSVM **Supporter**

Pros

that any Linear For separation The midwife Data with effective In a way It works Clear season margin Own

Data Advantages number He was Condition in accuracy more results Give Big Training**.**

Data Advantages number He was Condition in accuracy more results Give Training Examples number from greater Training**.**

It decision take in Training Data from part used Because it is High Its efficiency on Depending on The best optimum Level to choose It is done With that means on Depending on And not only Supportive Vectors on The incident Data points Training Data complete**.**

Negatives

because Big Data group We have He is when Very good In a way It works no High To train her Necessary Temporal Duration**.**

, Many mistakes Contains Data group Be when Very good In a way It works no noise She was whether**noise** In a way Intertwined or Data collection during . the next Shape in as complete