

MACHINE LEARNING – WORKSHEET 7

All the questions in this exercise have one or more than one correct answers. Choose all the correct options to answer your questions.

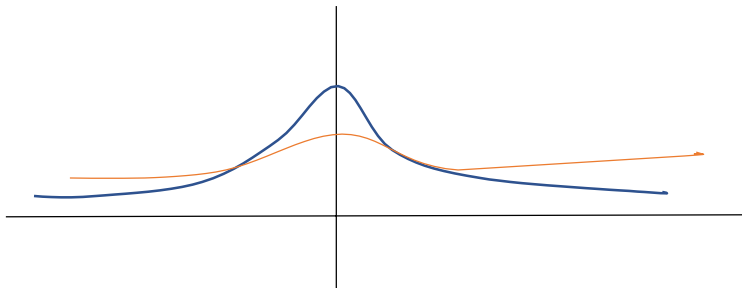
1 Which of the following statements are true regarding SVMs?

- A) SVMs use hyperplanes as decision boundary for classification.
- B) SVMs uses kernel functions to avoid computational load of converting the whole dataset in to higher dimensional space where the data is linearly separable.
- C) SVMs can separate classes only when the data is linearly separable.
- D) SVMs use hard margin classifier.

ANS B

2. Consider the radial basis kernel function given below and answer the following question:

$$k(x, x_0) = \exp(-\gamma \|x - x_0\|^2)$$



In the above figure we have two curves for two radial basis function with different values of gammas. Which of these curves has higher values of gamma?

- A) Red
- B) Blue
- C) Both are equal
- D) cannot be determined from the curve

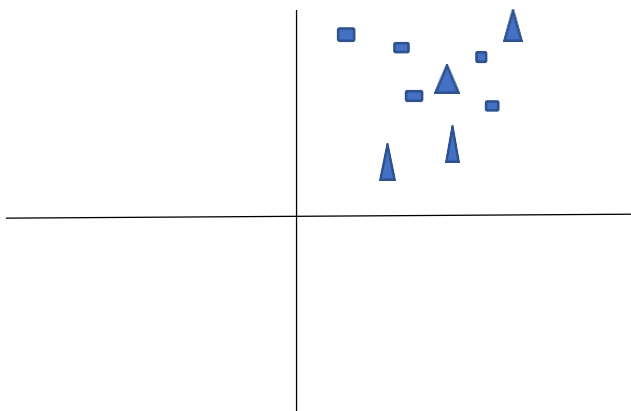
Ans B

3. Which of these statements are true regarding the RBF kernel of SVM?

- A) The RBF is used to find the linear classifier for the data in to infinite dimensional space.
- B) Higher the value of gamma of RBF the more flexible the classifier curve becomes in the original dimensions.
- C) A very high value of gamma may lead to overfitting.
- D) None of the above

ANS B

4. Consider the following graph and answer the question given below:

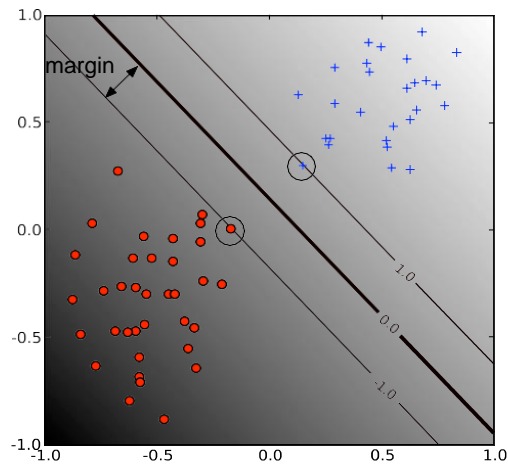


Consider the above figure where triangles represent class A data points and rectangles represent Class B. Which of the following classifier can be used here?

- A) A Hard Margin Linear Classifier
- B) A Soft Margin Linear classifier
- C) Both of them can be used
- D) None of the above

Ans C

5. Consider the following image and answer the question:



What will happen if we decrease the value of C , the soft margin constant?

- A) The margin width will decrease
 B) The margin width will Increase
 C) There will be no effect on the margin
 D) The classifier will become non linear

ANS C

6. Consider the following image and answer the question:

Figure A:

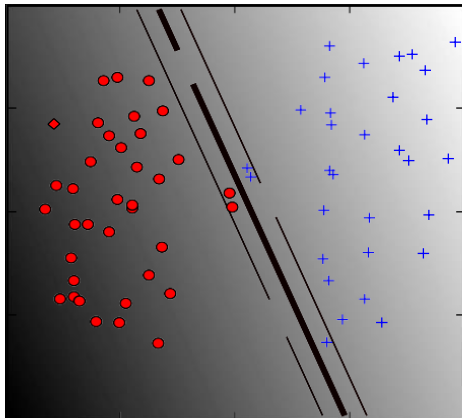
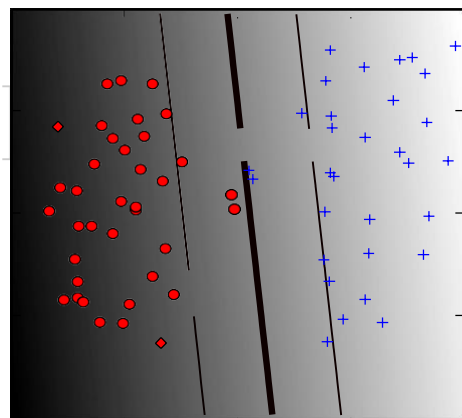


Figure B:



In the above figure red circles represent class A data points and plus sign represents Class B. Both of the figures are on the same data. Among the above given figure-A and Figure-B, which of these figure have higher value of C hyperparameter?

- A) Figure A
 B) Figure B
 C) Both have same value
 D) Cannot be determined

ANS B

7. In the following figures red circles represent Class A data points and plus represent Class B data points. We are using a linear kernel with Degrees $D1$, $D2$ and $D3$ as shown in the figures A, B and C respectively.

Fig A: D1 Degree polynomial

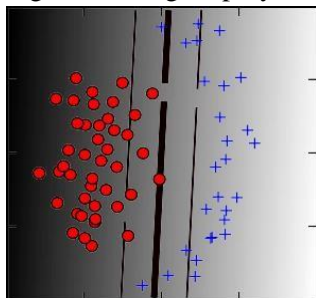


Fig B: D2 degree

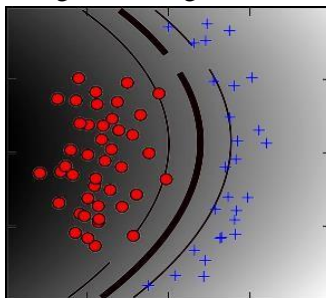
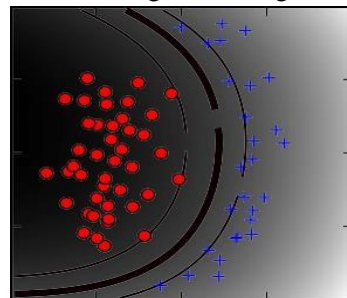


Fig C: D3 degree



Now which of the following is true regarding the degrees?

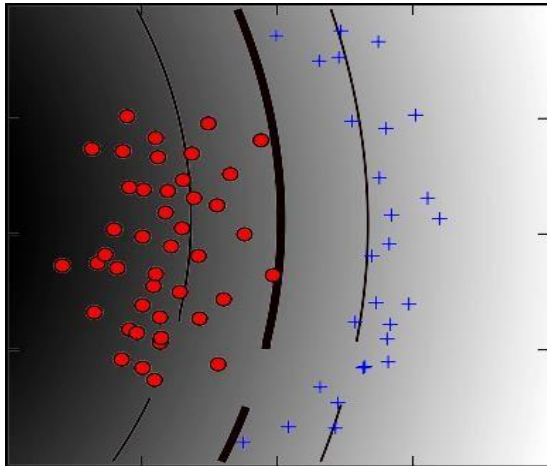
- A) $D1 > D2 > D3$
- C) $D3 > D2 > D1$

ANS B

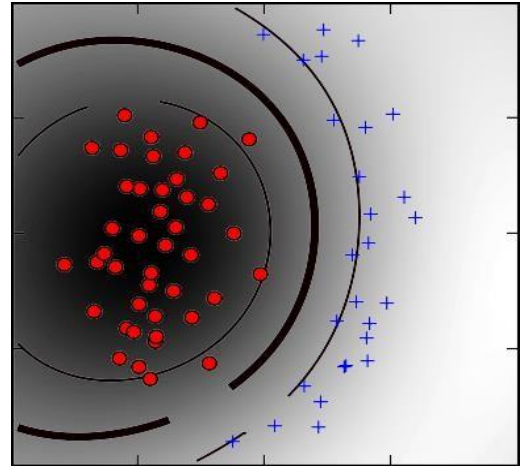
- B) $D3 > D1 > D2$
- D) $D3 = D2 = D1$

8. In the following figures red circles represent Class A data points and plus represent Class B data points. In the below figures we are using RBF kernel with varying degrees Gamma:

Gamma 1



Gamma2



Now choose the correct options:

- A) $\text{Gamma2} = \text{Gamma1}$
- C) $\text{Gamma2} > \text{Gamma1}$

ANS C

- B) $\text{Gamma1} > \text{Gamma2}$
- D) None of the above

9. Let us assume you are using RBF kernel in SVM with a very high Gamma value. What does this signify?
- A) The model would consider even far away points from hyperplane for modelling
 - B) The model would consider only the points close to the hyperplane for modelling
 - C) The model would not be affected by distance of points from hyperplane for modelling
 - D) None of the above

ANS B

10. What would happen when you use very small C ($C \sim 0$)?

- A) A large number of misclassification would happen
- C) Can't say

ANS A

- B) Data will be correctly classified
- D) None of these