6. The Realizable Case - Quadratic program

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The realizable case 1

1/1 point (graded)
In the realizable case, which of the following is true?

- ( ) There is exactly one (θ, θ_0) that satisfies $y^{(i)}\left(\theta \cdot x^{(i)} + \theta_0\right) >= 1$ for $i = 1, \ldots n$.
- ( ) There are more than one, but finite number of (θ, θ_0) that satisfy $y^{(i)}\left(\theta \cdot x^{(i)} + \theta_0\right) >= 1$ for $i = 1, \ldots n$.
- (•) There are infinitely many (θ, θ_0) that satisfy $y^{(i)}\left(\theta \cdot x^{(i)} + \theta_0\right) >= 1$ for $i = 1, \ldots n$.

✔

Solution:

Without any additional constraint, because θ and θ_0 are continuous, there are numerously many (θ, θ_0) that satisfy the zero-error case.

Submit You have used 1 of 2 attempts

Answers are displayed within the problem

The realizable case 2

1/1 point (graded)
Remember the objective function

$$J\left(\theta,\theta_0\right) = \frac{1}{n}\sum_{i=1}^{n} \text{Loss}_h\left(y^{(i)}\left(\theta \cdot x^{(i)} + \theta_0\right)\right) + \frac{\lambda}{2} \mid\mid \theta \mid\mid^2$$

In the realizable case, we can always find $\left(\theta, \theta_0\right)$ such that the sum of the hinge losses is 0. In this case, what does the objective function J reduce to?

- ( ) $\frac{1}{n}\sum_{i=1}^{n} \text{Loss}_h\left(y^{(i)}\left(\theta \cdot x^{(i)} + \theta_0\right)\right)$
- ( ) $\frac{1}{n}\sum_{i=1}^{n} \text{Loss}_h\left(y^{(i)}\left(\theta \cdot x^{(i)} + \theta_0\right)\right) + \frac{\lambda}{2} \mid\mid \theta \mid\mid^2$
- (•) $\frac{1}{2} \mid\mid \theta \mid\mid^2$

✔

Solution:

In the realizable case, we can always find a decision boundary such that the first term of $J\left(\theta,\theta_0\right)$ is 0. Thus $J\left(\theta,\theta_0\right)$ reduces to $\frac{\lambda}{2} \mid\mid \theta \mid\mid^2$. Our goal is to find θ that minimizes J anyways, so J reduces to $\frac{1}{2} \mid\mid \theta \mid\mid^2$

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You have used 1 of 2 attempts

Answers are displayed within the problem

Support Vectors

1/1 point (graded)

Support vectors refer to points that are exactly on the margin boundary. Which of the following is true? Choose all those apply.

- [ ] If we remove one point that is not a support vector, we will get a different θ, θ_0
- [x] If we remove all points that are support vectors, we will get a different θ, θ_0
- [ ] If we remove one point that is a support vector, we will get the same θ, θ_0
- [x] If we remove one point that is not a support vector, we will get the same θ, θ_0

Solution:

Support vectors determine the exact solution θ, θ_0 that minimizes $J(\theta, \theta_0)$. Thus removing/changing all of them changes the θ, θ_0. On the other hand, any training example that is not a support vector has no influence on θ, θ_0. Thus removing/changing them does not affect θ, θ_0.

Submit You have used 1 of 2 attempts

Answers are displayed within the problem

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Not sure about the answer of "Realisable case 2" 4

Community TA

Quadratic programming
As part of this course are we going to implement any kind of the quadratic program? I have n... 3

[staff]: Support Vectors problem 1 new 3

what is "realizable case"?
You've never defined the term "realizable case". In fact, the lecture includes this sentence: "In... 3

The "simple" quadratic case exposed is equivalent to the full minimisation of the J(θ) function with very small λ 1

Community TA

Question 4
Third option of question 4 may be a little confusing without additional information. What hap... 3

About the last question about exercise 4
My question is, if you mean "removing support vector", it means that there are more than 1 s... 2

Are Linear Support Vector Machines good only for linearly separable sets of data?
Since we constrain the SVM to hard margins without hinge loss does that mean we do not all... 2

[staff]: Support Vectors - I don't agree with the correct answer. 2

Points that are not support vectors
Hi, Is it true to say that the points that are not support vectors will only affect the convergenc... 2

Lecture never shows us how to solve theta 1

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