



[Unit 1 Linear Classifiers and
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6. Introduction to Classifiers: Let's
bring in some geometry!

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6. Introduction to Classifiers: Let's bring in some geometry!

Introduction to Linear Classifiers



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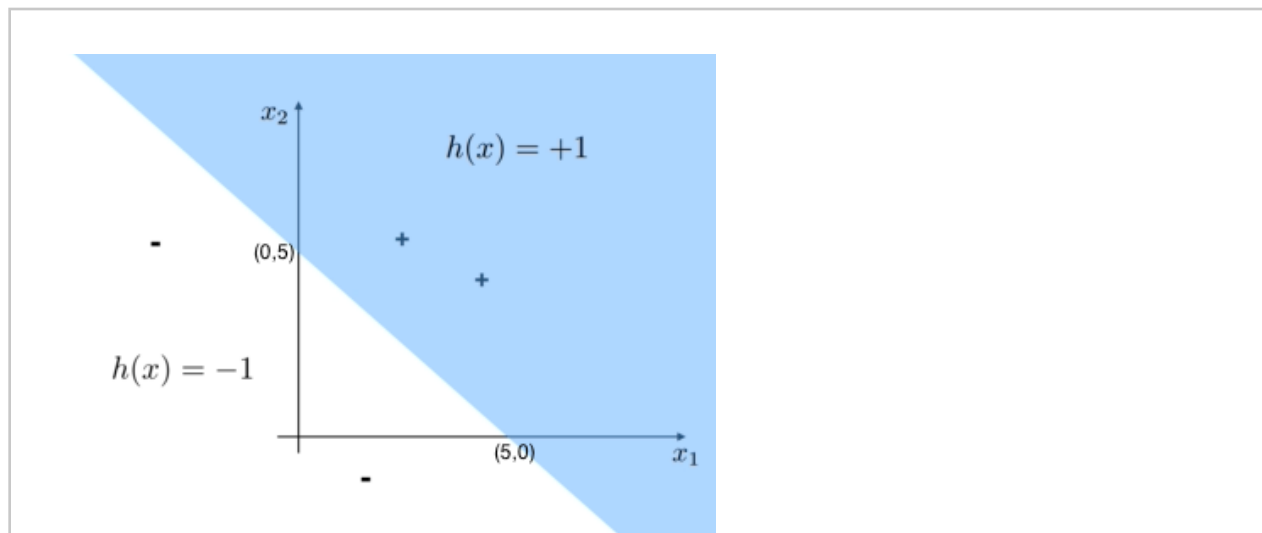
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Training data can be graphically depicted on a (hyper)plane. **Classifiers** are **mappings** that take **feature vectors as input** and produce **labels as output**. A common kind of classifier is the **linear classifier**, which linearly divides space(the (hyper)plane where training data lies) into two. Given a point x in the space, the classifier h outputs $h(x) = 1$ or $h(x) = -1$, depending on where the point x exists in among the two linearly divided spaces.

Linear Classifier

1/1 point (graded)

We have a linear classifier h that takes in any point on a two-dimensional space. The linear classifier h divides the two-dimensional space into two, such that on one side $h(x) = +1$ and on the other side $h(x) = -1$, as depicted below.



For $x = (10, 10)$, would $h(x)$ be -1 or $+1$?

☒ +1☐ -1

As an aside, classifiers need not be linear. They can be of any shape!

Solution:

(10, 10) belongs to the region where $h(x) = +1$.

You have used 1 of 2 attempts

 Answers are displayed within the problem

Training Error

1/1 point (graded)

Suppose a classifier correctly classifies 5 points in the training set and 1 points in the test set. Suppose it incorrectly classifies 5 points in the training set and 2 points in the test set. What is the training error? Is it better than chance?

☒ 0.5, equal to chance☐ 0.46, worse than chance☐ 0.55, better than chance☐ 0.33, worse than chance

Solution:

We only focus on the training points since the question is asking for training error. We correctly classify 50 percent of points, making this classifier equal to chance.

You have used 1 of 3 attempts

i Answers are displayed within the problem

Hypothesis Space

1/1 point (graded)

What is the meaning of the "hypothesis space"?

☐ the set of test points☒ the set of possible classifiers☐ the set of training points☐ the positive test examples**Solution:**

Each classifier represents a possible "hypothesis" about the data; thus, the set of possible classifiers can be seen as the space of possible hypothesis

You have used 1 of 3 attempts

i Answers are displayed within the problem

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	<u>In the summation formula for the training error, are we summing the 2 test errors and dividi...</u>	
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	<u>Given the nature of the question (one correct answer), shouldn't the options be presented in ...</u>	
	<u>tricky to understand the question</u>	2
	<u>just some quick feedback: I had to read this 4 times to understand the question =x "Suppose ...</u>	
	<u>Training Error</u>	5
	<u>I found the question a tad odd to read at first. I would write it as: "Suppose a classifier correct...</u>	
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