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Unit 1 Linear Classifiers and

Lecture 2. Linear Classifier and

<u>Course</u> > <u>Generalizations (2 weeks)</u>

> Perceptron

2. Review of Basic Concepts

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2. Review of Basic Concepts Review of Basic Concepts

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ig[ig[Aig]ig] either takes value 1 or 0 depending on whether A is True or False. For example, ig[ig[1=3ig]ig]=0, ig[ig[1=1ig]ig]=1, and $ig[ig[1\neq3ig]ig]=1$

Concept Review Problem: car accident prediction 1

1/1 point (graded)

In this problem, we will put ourselves in the shoes of a car insurance company. Our goal is to find out whether customers were involved in an accident on July 4th, 1998.

For 8 customers, we know the following information:

- 1. number of accidents the customer made in the past.
- 2. number of miles the customer has driven.
- 3. the customer's age

Also, for 5 of the customers, we know whether each of them was involved in an accident on July 4th, 1998.

If we want to learn a model in a supervised way, what is n, the number of training examples?

$$n= \boxed{ }$$
 5 $ightharpoonup$ Answer: 5

Solution:

We have 5 data points with known labels.

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You have used 1 of 3 attempts

1 Answers are displayed within the problem

Concept Review Problem: car accident prediction 2

1/1 point (graded)

The insurance company recorded relevant information for all 8 customers, as illustrated in the table below.

	number of past accidents	miles customer drove so far	customer's age	
customer 1	0	2710.9	21	
customer 2	2	13209.2	40	
customer 3	1	89001.4	32	
customer 4	3	12381.1	18	

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customer 5	0	1893.5	24
customer 6	2	32493.5	24
customer 7	1	5443.5	30
customer 8	0	4493.5	28

What is the dimension of each feature vector?

$$d= \boxed{3}$$
 \checkmark Answer: 3

Solution:

Each feature vector has length ${\bf 3}$ (columns in the table), and thus its dimension is ${\bf 3}$.

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Concept Review Problem: car accident prediction 3

1/1 point (graded)

How many feature vectors are there in the above table?

Number of Feature vectors 8

✓ Answer: 8

Solution:

There are 8 rows in the table.

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Concept Review Problem: Classifier and Training Error 1

1/1 point (graded)

Assume we have training data and a classifier like the following: (where $h\left(x\right)$ denotes the value outputted by the classifier with the data point as input)

What is the training error?

Solution:

We have 5 data points total, two of which $h\left(x\right)$ does not match y (data2 and data4). Thus $\varepsilon_n\left(h\right)=\frac{1}{5}\sum_{i=1}^5\left[\left[h\left(x_i\right)\neq y\right]\right]=\frac{2}{5}$

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You have used 1 of 3 attempts

1 Answers are displayed within the problem

Concept Review Problem: Classifier and Training Error 2

1/1 point (graded)

Now let's examine the training error $\varepsilon_n(h)$ in a general sense. $\varepsilon_n(h)$ is a function of: (choose all those apply)

- ightharpoonup n, the number of training data
- ightharpoonup h, the classifier
- the number of test data



Solution:

By definition, $\varepsilon_n\left(h\right)=\frac{1}{n}\sum_{i=1}^n\left[\left[h\left(x^i\right)\neq y^i\right]\right]$. Because x,y (training set) is given, $\varepsilon_n\left(h\right)$ depends on n and h. It does no thave any term related to the test data.

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You have used 1 of 3 attempts

1 Answers are displayed within the problem

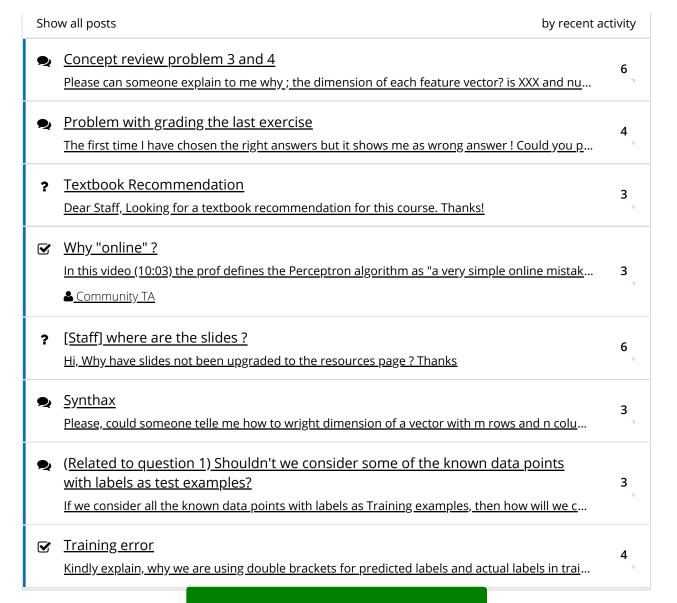
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