Close

Machine Learning System Design

5 questions

1  
point

1.

You are working on a spam classification system using regularized logistic regression. "Spam" is a positive class (y = 1) and "not spam" is the negative class (y = 0). You have trained your classifier and there are m = 1000 examples in the cross-validation set. The chart of predicted class vs. actual class is:

|  |  |  |
| --- | --- | --- |
|  | **Actual Class: 1** | **Actual Class: 0** |
| **Predicted Class: 1** | 85 | 890 |
| **Predicted Class: 0** | 15 | 10 |

For reference:

* Accuracy = (true positives + true negatives) / (total examples)
* Precision = (true positives) / (true positives + false positives)
* Recall = (true positives) / (true positives + false negatives)
* *F*1 score = (2 \* precision \* recall) / (precision + recall)

What is the classifier's accuracy (as a value from 0 to 1)?

Enter your answer in the box below. If necessary, provide at least two values after the decimal point.



1  
point

2.

Suppose a massive dataset is available for training a learning algorithm. Training on a lot of data is likely to give good performance when two of the following conditions hold true.

Which are the two?



We train a learning algorithm with a

small number of parameters (that is thus unlikely to

overfit).



We train a learning algorithm with a

large number of parameters (that is able to

learn/represent fairly complex functions).



When we are willing to include high

order polynomial features of *x* (such as *x*21, *x*22,

*x*1*x*2, etc.).



The features *x* contain sufficient

information to predict *y* accurately. (For example, one

way to verify this is if a human expert on the domain

can confidently predict *y* when given only *x*).

1  
point

3.

Suppose you have trained a logistic regression classifier which is outputing *hθ*(*x*).

Currently, you predict 1 if *hθ*(*x*)≥threshold, and predict 0 if *hθ*(*x*)<threshold, where currently the threshold is set to 0.5.

Suppose you **increase** the threshold to 0.9. Which of thefollowing are true? Check all that apply.



The classifier is likely to now have higher recall.



The classifier is likely to have unchanged precision and recall, and

thus the same *F*1 score.



The classifier is likely to have unchanged precision and recall, but

higher accuracy.



The classifier is likely to now have higher precision.

1  
point

4.

Suppose you are working on a spam classifier, where spam

emails are positive examples (*y*=1) and non-spam emails are

negative examples (*y*=0). You have a training set of emails

in which 99% of the emails are non-spam and the other 1% is

spam. Which of the following statements are true? Check all

that apply.



A good classifier should have both a

high precision and high recall on the cross validation

set.



If you always predict non-spam (output

*y*=0), your classifier will have 99% accuracy on the

training set, and it will likely perform similarly on

the cross validation set.



If you always predict non-spam (output

*y*=0), your classifier will have 99% accuracy on the

training set, but it will do much worse on the cross

validation set because it has overfit the training

data.



If you always predict non-spam (output

*y*=0), your classifier will have an accuracy of

99%.

1  
point

5.

Which of the following statements are true? Check all that apply.



It is a good idea to spend a lot of time

collecting a **large** amount of data before building

your first version of a learning algorithm.



After training a logistic regression

classifier, you **must** use 0.5 as your threshold

for predicting whether an example is positive or

negative.



Using a **very large** training set

makes it unlikely for model to overfit the training

data.



If your model is underfitting the

training set, then obtaining more data is likely to

help.



The "error analysis" process of manually

examining the examples which your algorithm got wrong

can help suggest what are good steps to take (e.g.,

developing new features) to improve your algorithm's

performance.

1 question unanswered

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Incorrect

0 / 1 points

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Currently, you predict 1 if *hθ*(*x*)≥threshold, and predict 0 if *hθ*(*x*)<threshold, where currently the threshold is set to 0.5.

Suppose you **decrease** the threshold to 0.3. Which of the following are true? Check all that apply.



The classifier is likely to now have lower precision.



The classifier is likely to have unchanged precision and recall, and

thus the same *F*1 score.



The classifier is likely to now have lower recall.



The classifier is likely to have unchanged precision and recall, but

higher accuracy.

1  
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It is a good idea to spend a lot of time

collecting a **large** amount of data before building

your first version of a learning algorithm.



After training a logistic regression

classifier, you **must** use 0.5 as your threshold

for predicting whether an example is positive or

negative.



On skewed datasets (e.g., when there are

more positive examples than negative examples), accuracy

is not a good measure of performance and you should

instead use *F*1 score based on the

precision and recall.



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