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Practice quiz: Bias and variance

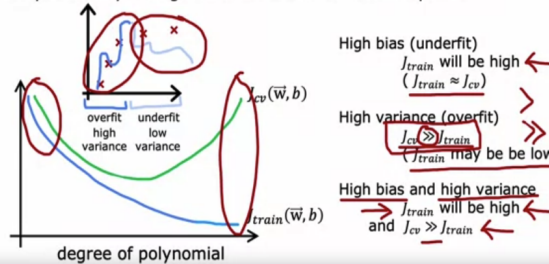
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1.

1 / 1 point

Diagnosing bias and variance

How do you tell if your algorithm has a bias or variance problem?



If the model's cross validation error J_{cv} is much higher than the training error J_{train} , this is an indication that the model has...

- ☒ high variance
- ☐ Low bias
- ☐ high bias
- ☐ Low variance

✓ Correct

When $J_{cv} \gg J_{train}$ (whether J_{train} is also high or not, this is a sign that the model is overfitting to the training data and performing much worse on new examples.

2.

1 / 1 point

Bias/variance examples

Baseline performance	: 10.6%				
Training error (J_{train})	: 10.8%	↑ 0.2%	10.6%	↑ 4.4%	10.6%
Cross validation error (J_{cv})	: 14.8%	↓ 4.0%	15.0%	↓ 0.5%	15.0%
		high variance	high bias	high bias	high variance

Which of these is the best way to determine whether your model has high bias (has underfit the training data)?

- ☒ Compare the training error to the baseline level of performance
- ☐ Compare the training error to the cross validation error.
- ☐ See if the cross validation error is high compared to the baseline level of performance
- ☐ See if the training error is high (above 15% or so)

✓ Correct

Correct. If comparing your model's training error to a baseline level of performance (such as human level performance, or performance of other well-established models), if your model's training error is much higher, then this is a sign that the model has high bias (has underfit).

3.

1 / 1 point

Debugging a learning algorithm

You've implemented regularized linear regression on housing prices

$$J(\vec{w}, b) = \frac{1}{2m} \sum_{i=1}^m (f_{\vec{w}, b}(\vec{x}^{(i)}) - y^{(i)})^2 + \frac{\lambda}{2m} \sum_{j=1}^n w_j^2$$

But it makes unacceptably large errors in predictions. What do you try next?

- Get more training examples
 - Try smaller sets of features x_1, x_2, \dots
 - Try getting additional features $(x_1^2, x_2^2, x_1 x_2, \dots)$
 - Try adding polynomial features
 - Try decreasing λ
 - Try increasing λ
- fixes high variance
fixes high variance
fixes high bias
fixes high bias
fixes high bias
fixes high variance

You find that your algorithm has high bias. Which of these seem like good options for improving the algorithm's performance? Hint: two of these are correct.

- ☒ Decrease the regularization parameter λ (lambda)

✓ Correct

Correct. Decreasing regularization can help the model better fit the training data.

- ☐ Collect more training examples

- ☒ Collect additional features or add polynomial features

✓ Correct

Correct. More features could potentially help the model better fit the training examples.

- ☐ Remove examples from the training set

4.

1 / 1 point

You find that your algorithm has a training error of 2%, and a cross validation error of 20% (much higher than the training error). Based on the conclusion you would draw about whether the algorithm has a high bias or high variance problem, which of these seem like good options for improving the algorithm's performance? Hint: two of these are correct.

- ☒ Collect more training data

✓ Correct

Yes, the model appears to have high variance (overfit), and collecting more training examples would help reduce high variance.

- ☒ Increase the regularization parameter λ

✓ Correct

Yes, the model appears to have high variance (overfit), and increasing regularization would help reduce high variance.

- ☐ Decrease the regularization parameter λ

- ☐ Reduce the training set size