Evaluating a Learning Algorithm

- **Video:** Deciding What to Try Next 5 min
- **Video:** Evaluating a Hypothesis 7 min
- **Reading:** Evaluating a Hypothesis 4 min
- **Video:** Model Selection and Train/Validation/Test Sets 12 min
- **Reading:** Model Selection and Train/Validation/Test Sets 3 min

Bias vs. Variance

- **Video:** Diagnosing Bias vs. Variance 7 min
- **Reading:** Diagnosing Bias vs. Variance 3 min
- **Video:** Regularization and Bias/Variance 11 min
- **Reading:** Regularization and Bias/Variance 3 min
- **Video:** Learning Curves 11 min
- **Reading:** Learning Curves 3 min
- **Video:** Deciding What to Do Next Revisited 6 min
- **Reading:** Deciding What to do Next Revisited 3 min

Review

- **Reading:** Lecture Slides 10 min
- **Quiz:** Advice for Applying Machine Learning 5 questions
- **Programming Assignment:** Regularized Linear Regression and Bias/Variance 3h

Building a Spam Classifier

- **Video:** Prioritizing What to Work On 9 min
- **Reading:** Prioritizing What to Work On 3 min

Deciding What to Do Next Revisited

Our decision process can be broken down as follows:

- **Getting more training examples:** Fixes high variance
- **Trying smaller sets of features:** Fixes high variance
- **Adding features:** Fixes high bias
- **Adding polynomial features:** Fixes high bias
- **Decreasing λ:** Fixes high bias
- **Increasing λ:** Fixes high variance.

Diagnosing Neural Networks

- A neural network with fewer parameters is **prone to underfitting**. It is also **computationally cheaper**.
- A large neural network with more parameters is **prone to overfitting**. It is also **computationally expensive**. In this case you can use regularization (increase λ) to address the overfitting.

Using a single hidden layer is a good starting default. You can train your neural network on a number of hidden layers using your cross validation set. You can then select the one that performs best.

Model Complexity Effects:

- Lower-order polynomials (low model complexity) have high bias and low variance. In this case, the model fits poorly consistently.
- Higher-order polynomials (high model complexity) fit the training data extremely well and the test data extremely poorly. These have low bias on the training data, but very high variance.
- In reality, we would want to choose a model somewhere in between, that can generalize well but also fits the data reasonably well.

✓ Complete   Go to next item