

Debugging: Bias and Variance

Thus far, we have seen how to implement several types of machine learning algorithms. Our usual goal is to achieve the highest possible prediction accuracy on novel test data that our algorithm did not see during training. It turns out that the our accuracy on the *training* data is an upper bound on the accuracy we can expect to achieve on the testing data. (We can sometimes get lucky and do better on a small sample of test data; but on average we will tend to do worse.) In some sense, the training data is “easier” because the algorithm has been trained for those examples specifically and thus there is a gap between the training and testing accuracy.

Supervised Learning and Optimization	
Linear Regression (http://ufldl.stanford.edu/tutorial/supervised/LinearRegression)	
Logistic Regression (http://ufldl.stanford.edu/tutorial/supervised/LogisticRegression)	
Vectorization (http://ufldl.stanford.edu/tutorial/supervised/Vectorization)	
Debugging: Gradient Checking (http://ufldl.stanford.edu/tutorial/supervised/DebuggingGradientChecking)	
Softmax Regression (http://ufldl.stanford.edu/tutorial/supervised/SoftmaxRegression)	
Debugging: Bias and Variance (http://ufldl.stanford.edu/tutorial/supervised/DebuggingBiasAndVariance)	
Debugging: Optimizers and Objectives (http://ufldl.stanford.edu/tutorial/supervised/DebuggingOptimizersAndObjectives)	
Supervised Neural Networks	
Multi-Layer Neural Networks (http://ufldl.stanford.edu/tutorial/supervised/MultiLayerNeuralNetworks)	
Exercise: Supervised Neural Network (http://ufldl.stanford.edu/tutorial/supervised/ExerciseSupervisedNeuralNetwork)	
Supervised Convolutional Neural Network	
Feature Extraction Using Convolution (http://ufldl.stanford.edu/tutorial/supervised/FeatureExtractionUsingConvolution)	
Pooling (http://ufldl.stanford.edu/tutorial/supervised/Pooling)	
Exercise: Convolution and Pooling (http://ufldl.stanford.edu/tutorial/supervised/ExerciseConvolutionAndPooling)	
Optimization: Stochastic Gradient Descent (http://ufldl.stanford.edu/tutorial/supervised/OptimizationStochasticGradientDescent)	
Convolutional Neural Network (http://ufldl.stanford.edu/tutorial/supervised/ConvolutionalNeuralNetwork)	
Excercise: Convolutional Neural Network (http://ufldl.stanford.edu/tutorial/supervised/ExerciseConvolutionalNeuralNetwork)	
Unsupervised Learning	
Autoencoders (http://ufldl.stanford.edu/tutorial/unsupervised/Autoencoders)	
PCA Whitening (http://ufldl.stanford.edu/tutorial/unsupervised/PCAWhitening)	
Exercise: PCA Whitening (http://ufldl.stanford.edu/tutorial/unsupervised/ExercisePCAWhitening)	
Sparse Coding (http://ufldl.stanford.edu/tutorial/unsupervised/SparseCoding)	
ICA (http://ufldl.stanford.edu/tutorial/unsupervised/ICA)	
RICA (http://ufldl.stanford.edu/tutorial/unsupervised/RICA)	
Exercise: RICA (http://ufldl.stanford.edu/tutorial/unsupervised/ExerciseRICA)	
Self-Supervised Learning	

Self-Taught Learning
Self-Taught Learning (http://ufldl.stanford.edu/tutorial/selftaughtlearning/SelfTaughtLearning)
Exercise: Self-Taught Learning (http://ufldl.stanford.edu/tutorial/selftaughtlearning/ExerciseSelfTaughtLearning)