



Your computer's timezone does not seem to match your Coursera account's timezone setting of America/Los\_Angeles. Change your Coursera timezone setting

## Practice Lab: Advice for Applying Machine Learning

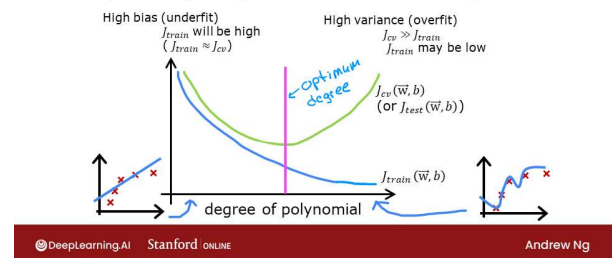
In this lab, you will explore techniques to evaluate and improve your machine learning models.

### Outline

- [1 - Packages](#)
- [2 - Evaluating a Learning Algorithm \(Polynomial Regression\)](#)
  - [2.1 Splitting your data set](#)
  - [2.2 Error calculation for model evaluation, linear regression](#)
    - [Exercise 1](#)
  - [2.3 Compare performance on training and test data](#)
- [3 - Bias and Variance](#)
  - [3.1 Plot Train, Cross-Validation, Test](#)
  - [3.2 Finding the optimal degree](#)
  - [3.3 Tuning Regularization](#)
  - [3.4 Getting more data: Increasing Training Set Size \(m\)](#)
- [4 - Evaluating a Learning Algorithm \(Neural Network\)](#)
  - [4.1 Data Set](#)
  - [4.2 Evaluating categorical model by calculating classification error](#)
    - [Exercise 2](#)
- [5 - Model Complexity](#)
  - [Exercise 3](#)
  - [5.1 Simple model](#)
    - [Exercise 4](#)
- [6 - Regularization](#)
  - [Exercise 5](#)
- [7 - Iterate to find optimal regularization value](#)
  - [7.1 Test](#)

### Diagnosing bias and variance

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



### 1 - Packages

First, let's run the cell below to import all the packages that you will need during this assignment.

- [numpy \(https://numpy.org/\)](https://numpy.org/) is the fundamental package for scientific computing Python.
- [matplotlib \(http://matplotlib.org\)](http://matplotlib.org) is a popular library to plot graphs in Python.
- [scikitlearn \(https://scikit-learn.org/stable/\)](https://scikit-learn.org/stable/) is a basic library for data mining
- [tensorflow \(https://www.tensorflow.org/\)](https://www.tensorflow.org/) a popular platform for machine learning.

```
In [1]: import numpy as np
%matplotlib widget
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression, Ridge
from sklearn.preprocessing import StandardScaler, PolynomialFeatures
from sklearn.model_selection import train_test_split
from sklearn.metrics import mean_squared_error
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from tensorflow.keras.activations import relu, linear
from tensorflow.keras.losses import SparseCategoricalCrossentropy
from tensorflow.keras.optimizers import Adam

import logging
logging.getLogger("tensorflow").setLevel(logging.ERROR)

from public_tests_a1 import *

tf.keras.backend.set_floatx('float64')
from assignment_utils import *

tf.autograph.set_verbosity(0)
```

### 2 - Evaluating a Learning Algorithm (Polynomial Regression)