Machine Learning – COMP3032

Tutorial and Lab Practice 2 – Week 3

This lab pactice focuses on the concept of supervised learning: linear regression.

Tutorial

1. Review the terminology introduced and concepts taught in Lecture 2.
2. Review related concepts of linear algebra.
3. What is the general form of linear regression? What is its vector form?
4. What is the purpose of cost function? What is Mean Square Error (MSE)? What is the normal equation that minimizes the cost function MSE(θ)?
5. Describe differences between Batch gradient descent, Stochastic gradient descent and Mini-batch gradient descent.

Lab Practice

1. Download, open and run the program linear-reg1.py. Read and understand the program.
2. Download, open and run the programs linear-reg2.py. Read and understand the program.
3. Revise linear-reg2.py:
    1) Generate 300 linear looking random training points
    2) For the Batch gradient descent implemenation, change the learning rate η to 0.02, and compare the results (θ_0 and θ_1). Then change η to 0.2, and compare the results.
    3) For the Stochastic Gradient Descent implementation, try three different learning schedules (e.g. change $t1$)and compare the results.
    4) For the skleran's SGDRegressor, change the learning rate η to three different values, and compare the results.
    5) Plot Batch and Stochastic descent regression predictions for the trainting points.