Lab Assignment 6: Optimization for Machine Learning

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(1) Consider the car pricing data set. Write code for least square problem using gradient descent method. Choose $f(\beta) = \frac{1}{2N}\sum_{i=1}^{N}({a^i}^T x - y_i)^2$ and stopping condition $\|\nabla f(x)\| < 0.01$. Estimate the price of a car with inputs $\hat{a} = (R.r, 100 + R.2r, (R-1).r, 54.3, r.R)$, where R is last two digits of your roll no and r is the last digit of your roll no. If last two digits of your roll no is 23 then $\hat{a} = (23.3, 123.6, 22.3, 54.3, 3.23)$. Use $\nabla f(x)_j = \frac{1}{N}\sum_{i=1}^{N} a_j^i({a^i}^T x - y_i)\ j = 1, 2, \ldots, n$.

(2) Write code for stochastic gradient for the above problem with 10 random points in every iterations with 100 iterations. Estimate the price of a car with inputs $\hat{a} = (R.r, 100 + R.2r, (R-1).r, 54.3, r.R)$

(3) Consider the''Concrete_Data_Yeh" data set. Write code for best fitting quadratic polynomial using gradient descent method. Choose stopping condition $\|\nabla f(x)\| < 0.01$.

(4) Write code for stochastic gradient for the above problem with 20 random points in every iterations.