Indian Institute of Information Technology Guwahati
CS360: Machine Learning

Lab 2: Least squares and Norms

Date: 06.08.2019   Total Marks: 20
Deadline: 12.08.2019

Implement the following questions in Matlab:

Q.1) You are given a set of two dimensional data points, (1,1), (1,3), (2,3), (3,1), (3,5), (5,1) , (6,5), to fit on a line using least squares. Do the following:

a) Plot the given data points

b) Plot the line to fit on given points using least squares

c) Add the new data point (10,10) to the existing set and plot new line to fit all data points

d) Compute difference in errors before and after adding the new data point (10,10). (Hint: the error is $\|\mathbf{Ax} - \mathbf{b}\|_2^2$)

10 marks

Q.2) Compute l_0, l_1, l_2, and l_∞ norms of (1,2,0,2,0) without using any Matlab functions.   2 marks

Q.3) Plot the solutions of $\|x\|_0 = 1$, $\|x\|_1 = 1$, $\|x\|_2 = 1$ and $\|x\|_\infty = 1$ in two dimensional plane.   8 marks