

BIL443/553 Pattern Recognition  
Homework 1

Implement the (vanilla) gradient descent algorithm from scratch (with no libraries) so as to conduct linear regression with the below dataset representing the age and systolic blood pressure of 30 individuals. Our aim is to estimate blood pressure based on age. Performance is to be measured in terms of mean squared error (MSE).

**Age & Systolic pressure**

39	144
47	220
45	138
47	145
65	162
46	142
67	170
42	124
67	158
56	154
64	162
56	150
59	140
34	110
42	128
48	130
45	135
17	114
20	116
19	124
36	136
50	142
39	120
21	120
44	160
53	158
63	144
29	130
25	125
69	175

Use the first 25 samples of data to calculate the regression model, and then test your model on the remaining 5 pairs of data.

You are expected to submit a report and your source code (C/C++, Java or Python). Your report must include your findings (as tables or as charts) on:

- the performance of your model (20p)
- the effect of learning rate on convergence speed and performance (20p)
- the effect of batch size on convergence speed (20p)
- the effect of different initializations, (20p)
- the effect of momentum on convergence speed and performance (20p)

Good luck.