

سوال یک)

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Predicted 0 Predicted 1 Predicted 2 Predicted 3 Predicted 4 Predicted 5 Predicted 6 Predicted 7 Predicted 8 Predicted 9
Real 0      52         0         0         0         1         0         0         0         0         0
Real 1      16        26         1         0         0         0         0         0         6         1
Real 2      19         0        27         1         0         0         0         0         0         0
Real 3      13         0         1        34         0         0         0         0         5         1
Real 4      27         0         0         0        31         0         0         2         0         0
Real 5      23         0         0         0         0        30         0         0         2        11
Real 6      17         0         0         0         0         0        35         0         1         0
Real 7      18         0         0         1         0         0         0        36         0         0
Real 8      13         2         0         0         0         0         0         0        28         0
Real 9      20         3         0         2         0         1         0         0         2        31
Right Preds = 330 Wrong Preds = 210 Acc = 0.6111111111111112
Predicted 0 Predicted 1 Predicted 2 Predicted 3 Predicted 4 Predicted 5 Predicted 6 Predicted 7 Predicted 8 Predicted 9
Real 0      51         0         0         0         2         0         0         0         0         0
Real 1      0         44         3         0         0         0         0         0         0         3
Real 2      0         0        43         1         0         0         0         0         3         0
Real 3      0         2         0        46         0         0         0         1         3         2
Real 4      0         0         0         0        58         0         0         2         0         0
Real 5      1         2         0         1         2        51         1         0         0         8
Real 6      1         0         0         0         0         0        52         0         0         0
Real 7      0         0         0         0         0         1         0        54         0         0
Real 8      0         3         0         0         0         1         0         0        39         0
Real 9      0         0         0         1         2         1         0         1         4        50
Acc = 0.9015151515151515 Best K = 1

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سوال دو)

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Weights = [ 0.40716417  0.56705271 -1.7693585   0.38065313  0.28503658  1.28728253
            -0.62481387 -0.01252519 -0.81488292]
Accuracy = 0.94
          Predicted Bad Predicted Good
Really Bad          20          1
Really Good          5          74

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سوال سه)

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Accuracy = 0.97
          Predicted Bad Predicted Good
Really Bad          20          1
Really Good          2          77

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سوال چهار)

مقدار loss با حالت استفاده از gradient descent:

(۲۰۰۰۰۰ iteration و learning rate ۰/۰۰۰۱)

175804.97998588663

بهترین ضریب regularization:

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[0.00125349 0.01954428 0.01856586 0.00080829 0.01329356 0.03634907]
409868.6070698423
Best Lambda = 0.001

```