# Statistical Methods in AI

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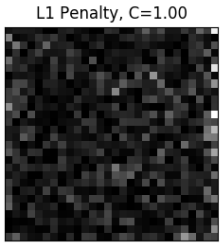
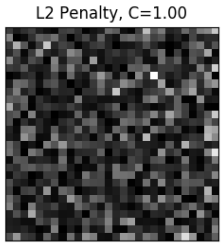
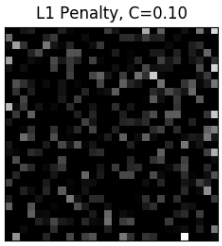
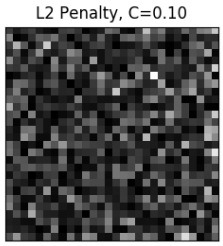
## 1 Problem 3

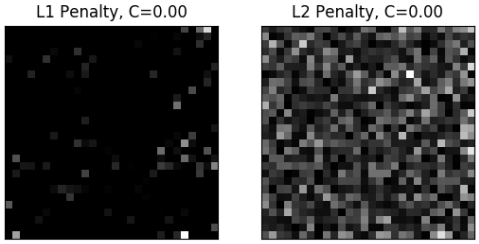
The required weight vectors have been analysed by making the plot of this vector. The L1 and L2 plots have been obtained for 5 values of parameter 'C'. The plots obtained are as follows:

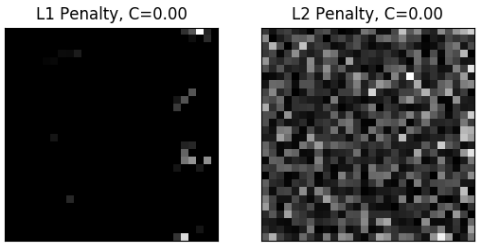


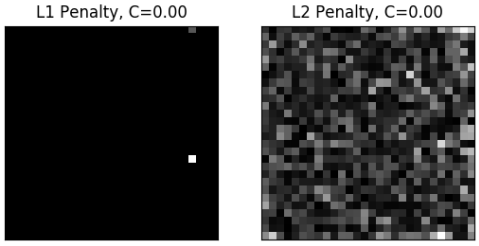






We observe that L2 penalty output has more brighter pixels than corresponding L1 penalty output. Moreover, with decrease in value of parameter

'C', we notice that the bright pixels reduce considerably in both L1 and L2 penalty outputs. 'C' and $'\lambda'$ are inversely proportional and hence by decreasing 'C', i.e. by increasing $'\lambda'$, we try to make the values of the weight vector smaller. Hence, the weight vector values become closer to 0 with decreasing 'C' and hence you get more darker pixels. The accuracies obtained in each case are as follows:

**L1 Penalty:**

- C=1, accuracy=0.940
- C=0.1, accuracy=0.942
- C=0.001, accuracy=0.956
- C=0.0001, accuracy=0.945
- C=0.00001, accuracy=0.891

**L2 Penalty:**

- C=1, accuracy=0.937
- C=0.1, accuracy=0.936
- C=0.001, accuracy=0.937
- C=0.0001, accuracy=0.940
- C=0.00001, accuracy=0.953