CSC 321 - Assignment 3

Zeeshan Qureshi (997108954)

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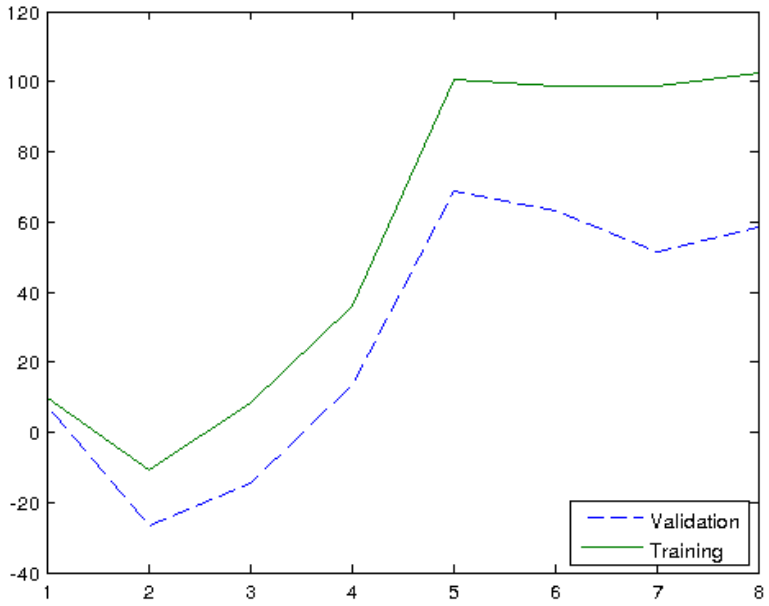
Part 1 - Fitting Gaussians

As can be seen in the figure, the gaussians had the highest validation and training probability when *Gaussians = 5*. As the validation prob rises till *5* and then starts to go down but the training probability stays up means that the model is overfitting.

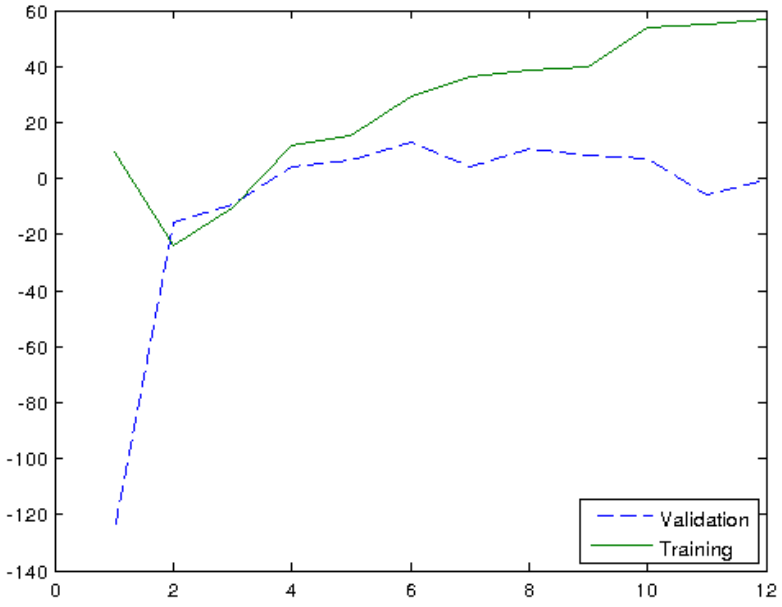
Be decreasing the standard deviation of the data, with lower gaussians they do not tend to move at all. Thus the standard deviation is affecting the maximum step size on each iteration.



Gaussians	Validation Prob	Training Prob
1	7.9600	9.9341
2	-26.8657	-10.5470
3	-14.4738	8.3459
4	13.5253	36.02819
5	68.7349	100.6420
6	63.1940	98.7709
7	51.6067	98.9465
8	58.3877	102.3457

Part 2 - Reduce Data

We see that training probability rises but validation probability stays pretty much zero all the time. This shows that there is *not enough data* to fit the model properly.



Gaussians	Validation Prob	Training Prob
1	-125.8333	9.6329
2	-15.6033	-23.7722
3	-9.5407	-10.7525
4	4.3274	11.5176
5	6.56899	15.1013
6	12.7019	29.3574
7	4.37568	36.1302
8	10.3104	38.5686
9	8.02415	40.0637
10	6.90185	53.9130
11	-6.0408	55.1076
12	-0.4819	55.1076

Part 3 - Mixing Proportions

Proportion	Result	Validation Prob	Training Prob
[0.25 0.25 0.25 0.25]	[59.68 9.78 16.68 13.87]	463.62440	468.65918
[0.3 0.2 0.2 0.3]	[16.68 13.87 9.78 59.68]	463.62440	468.65918
[0.2 0.3 0.3 0.2]	[9.78 16.68 59.68 13.87]	463.62440	468.65918
[0.9 0.05 0.025 0.025]	[31.45 28.95 29.52 10.07]	473.52365	478.62364