ROB 313: Assignment 3

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In this assignment, we implement a GD and SVD model to predict on the iris dataset, before implementing a hidden layer with 100 neurons to predict hand written numbers.

1. The value of the log likelihood would be -∞. This is reasonable behavior since the predicted value is completely off and the error would be at its maximum

Plots of losses for a 0.005 learning rate.

A screenshot of a cell phone

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Description automatically generated

Plots of losses for a 0.0005 learning rate.

A screenshot of a cell phone

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Plots of losses for a 0.00005 learning rate.

A picture containing bird

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Using a learning rate of 0.005

|  |  |  |
| --- | --- | --- |
|  | Test accuracy | Log-likelihood |
| GD | 0.73 | -6.9171321 |
| SGD | 0.73 | -6.9324264 |

Using a Log-likelihood estimate would better, since we would get a better relative estimate of the error, as opposed to whether the result is above or below a threshold.

2)

A screenshot of a cell phone

Description automatically generated

Implementation is as follows. We find the max value per row, and minus the Fhat values by that. Thus the maximum value in Fhat will be 0 and all other numbers will be negative, thus never exploding

b)

A close up of a logo

Description automatically generated

c)

A screenshot of a cell phone

Description automatically generated

We can see that the training loss approaches 0, as the validation loss get more stable at about 28400. The network preforms with an accuracy of 1 for the training, .834 for the validation and .847 for the test set.

d)

predicts a 7 which is correct, but I see it as a one.

A picture containing drawing

Description automatically generated

This 0 is predicted to be a 5, maybe due to certain aspects of its curve

A picture containing drawing

Description automatically generated

This is predicted to be a 7 when it’s a 2

A picture containing drawing, clock

Description automatically generated