ASSIGNMENT SET VI

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Assignment 6 of
Deep Learning Course Given by
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written in LaTeX

Observations After Adding Regularization

We have added dropout, data augmentation, L1 and L2 regularization to models used in assignment 2 and here are some general observations made:

- Regularization decreases the difference between validation loss and training loss.

- Indeed, regularizing the model reduces the risk of over fitting see Figure 3.

DRAWBACK Adding (dropout) regularization may lead loss to become more susceptible to noise. As shown in Figure 2, the validation learning curve is not flat even after 25 epochs.

DRAWBACK Adding regularization does NOT necessarily improves the performance. Consider HR pay rate regression (Figure 1) for example, models designed in assignment 2 were highly efficient, adding regularization, consequently, resulted in a minor degradation with respect to validation loss.

DRAWBACK Despite of all its improvements, it decreases the convergence rate. thus one may need to train his model for more epochs to get the same performance accuracy as of non regularized one see Figure 4.

```
In [ ]:  #@title Evaluation of The L2 Regularized Model and Non Regularized Model
         print(np.sqrt(non_regularized_model.evaluate(X_test, y_test)))
         print(np.sqrt(l2_regularized_model.evaluate(X_test, y_test)))

         3/3 [==============================] - 0s 2ms/step - loss: 133.9108
         11.571984602336746
         3/3 [==============================] - 0s 2ms/step - loss: 115.8447
         10.763116331097526

In [ ]:  #@title Evaluation of The Old Model (Assignment 2)
         np.sqrt(model.evaluate(X_test, y_test))

         3/3 [==============================] - 0s 2ms/step - loss: 90.1005
Out[ ]:  9.492127620052898
```
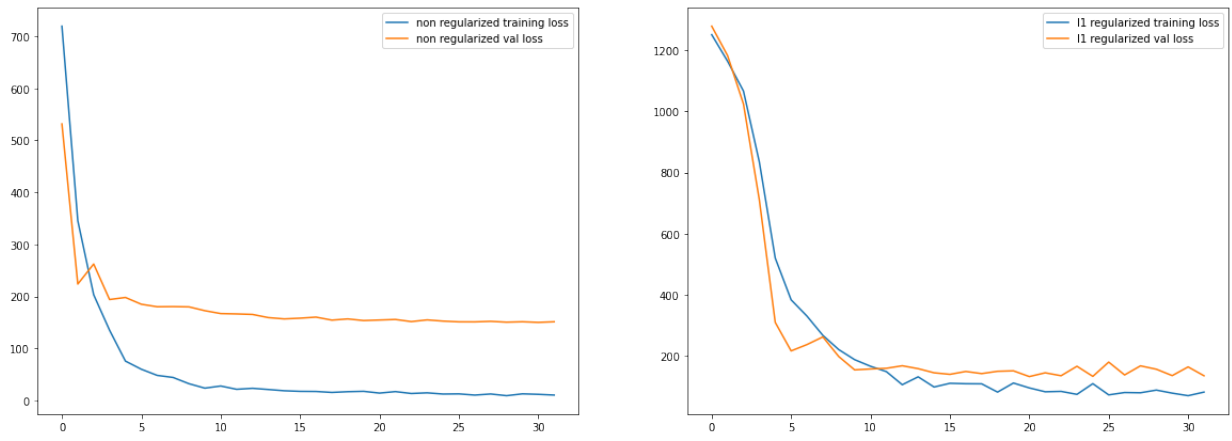
Figure 1: Performance loss
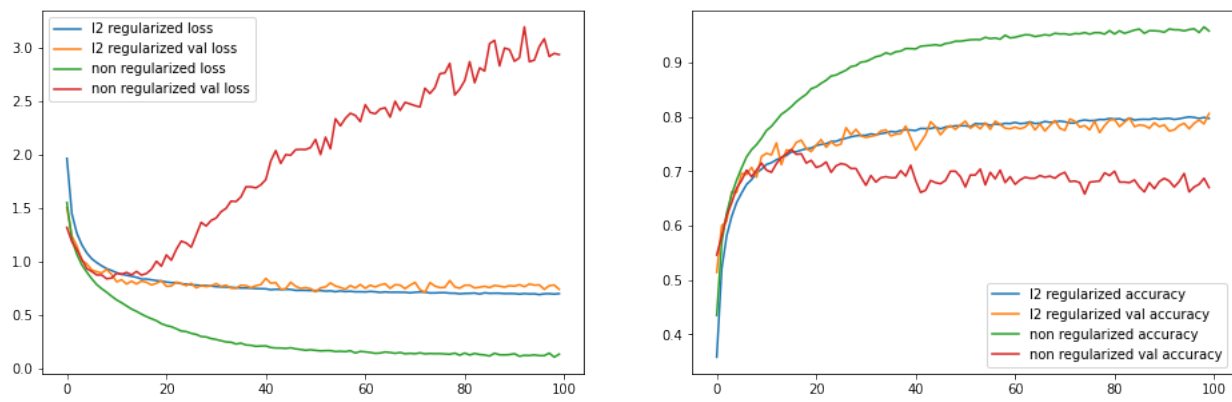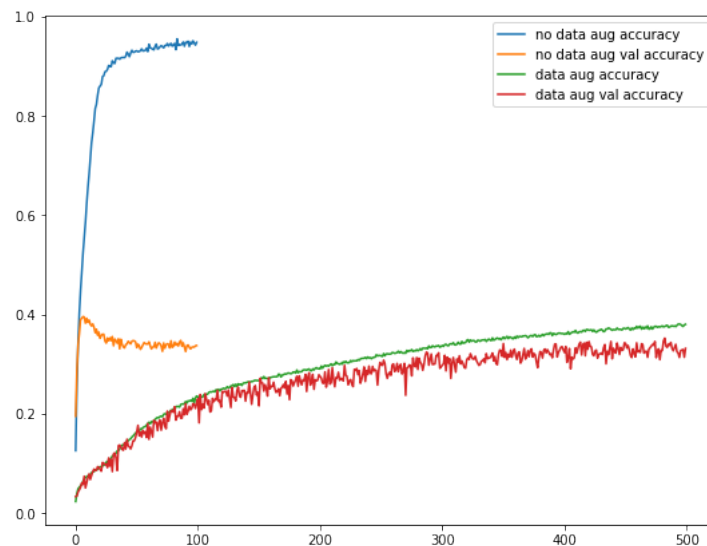
Figure 2: Noise susceptibility

Figure 3: Avoid over fitting

Figure 4: Slowing down the rate of convergence