**ASSIGNMENT 1: Advanced Machine Learning**

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**Results with hypertuning the parameters for the IMDB problem**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Title of Model | M1 | M2 | M3 | M4 | M5 |
| Hidden Layers | 2 | 1 | 1 | 3 | 3 |
| Units in hidden layers | 16 | 64 | 64 | 32 | 64 |
| Loss function | Binary\_Crossentropy | Mse | Mse | Binary\_crossentropy | Binary\_crossentropy |
| Activation parameter | Relu | Tanh | Relu | Relu | Relu |
| Dropout/ Regularization | None | Dropout | Regularization | None | None |
| Results |  |  |  |  |  |
| Training Accuracy | 0.998 | 0.974 | 0.880 | 0.948 | 0.993 |
| Training loss | 0.015 | 0.0239 | 0.105 | 0.137 | 0.032 |
| Validation Accuracy | 0.867 | 0.858 | 0.844 | 0.848 | 0.849 |
| Validation loss | 0.559 | 0.110 | 0.124 | 0.419 | 0.476 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Title of model | M6 | M7 | M8 | M9 | M10 |
| Hidden Layers | 1 | 1 | 3 | 3 | 1 |
| Units in hidden layers | 64 | 64 | 32 | 64 | 64 |
| Loss function | Mse | Mse | Mse | Binary\_crossentropy | Mse |
| Activation parameter | Tanh | Relu | Relu | Tanh | Relu |
| Dropout/Regularization | None | None | None | None | Dropout |
| Results |  |  |  |  |  |
| Training Accuracy | 0.984 | 0.897 | 0.931 | 0.898 | 0.892 |
| Training loss | 0.017 | 0.080 | 0.057 | 0.232 | 0.0836 |
| Validation Accuracy | 0.874 | 0.857 | 0.855 | 0.852 | 0.851 |
| Validation Loss | 0.098 | 0.105 | 0.108 | 0.347 | 0.111 |

**Summary :**

In case of Validation accuracy and validation Loss score, as I hypertuned the model based on conditions provided :

1.You used two hidden layers. Try using one or three hidden layers and see how doing so  
affects validation and test accuracy.  
2. Try using layers with more hidden units or fewer hidden units: 32 units, 64 units, and so  
on.  
3. Try using the mse loss function instead of binary\_crossentropy.  
4. Try using the tanh activation (an activation that was popular in the early days of neural  
networks) instead of relu.  
5. Use any technique we studied in class, and these include regularization, dropout, etc., to  
get your model to perform better on validation .

Model M6 seems to be performing the best as it has good Validation Accuracy rate , simultaneously also has the lowest Validation loss score.

Although , overall: Model2 , Model 7 and Model 8 also have around 80% of validation accuracy , it’s the lack of decent Validation loss (with 0.110, 0.105, 0.108 respectively) that makes them not the best model.

However, another factor i.e. Predictions made on Unseen data, as per

(<https://colab.research.google.com/drive/16_SQiOc1SoSRCIvsvilmnfOk70aSACbt#scrollTo=ZS3K13wghiWG>)

The efficiency lies with M2 , where I have used dropout to improve validation score on parameters of M6 , where there’s a whooping 80% prediction accuracy.

**Conclusion :**

On the basis of Validation labels, M6 seems to be absolutely best choice. On contrary based on Model performace on unseen data its M2 which has the best outcome.