Assignment 2

Neural Networks Assignment Report

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Introduction:

Introduction: The purpose of this research is to study various ways to improve the performance of a neural network model using the IMDb dataset. We will alter an existing neural network model and examine the outcomes in various ways such as modifying the number of hidden layers, units, loss function, activation function, and regularization strategies such as dropout.

Methodology:

We began by importing the data and specifying the maximum number of words to be examined in each review as well as the maximum duration of each review. Then, we created a basic neural network model with one hidden layer of 16 units. For the hidden layer, we utilized binary cross-entropy as the loss function and relu as the activation function. We then investigated several ways for improving the model's performance. Then, we played around with the number of hidden layers, creating models with one, two, and three hidden layers. Using the training and test datasets, we trained and assessed the models and compared the outcomes. When compared to employing only one hidden layer, we discovered that having three hidden layers resulted in somewhat greater validation and test accuracy.

Conclusion:

Finally, to avoid overfitting, we tried dropout regularization. We created a new model with dropout layers and trained and tested it on training and test datasets. We discovered that utilizing dropout regularization resulted in greater validation accuracy when compared to the baseline model. It can be inferred that different neural network model modifications have variable levels of accuracy and loss. The Model Hyper obtained the maximum accuracy and loss, which shows that the use of three thick layers with a dropout rate of 0.5 can result in ideal performance for the IMDB dataset. As compared to binary cross-entropy, the MSE loss function had the lowest loss value. Because of the vanishing gradient issue, the tanh activation function has a lesser accuracy. For calculating the model, the Adam optimizer function was shown to be efficient. Regularization minimized overfitting and resulted in lesser losses, with the L-2 model performing marginally better in terms of accuracy. Eventually, the dropout strategy decreased

the loss function while having no effect on accuracy. According to the graph, the Model Hyper has the best accuracy with a relatively modest loss. Model MSE has the lowest loss value but is less accurate than Model Hyper. The Model tanh has a poor accuracy compared to other models, while the model regularization has a large loss and low accuracy compared to the other models. As a result, we may infer that the Model Hyper is the best-performing model among those considered.