

Neural Networks Summary

ADVANCED MACHINE LEARNING (BA-64061-001)

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Below are some different approaches affect the performance of the model:

1. You used two hidden layers. Try using one or three hidden layers and see how doing so affects validation and test accuracy.

When using a single hidden layer, validation accuracy begins to decline after the fourth epoch, while training accuracy continues to improve. The graph clearly shows a downward trend in training loss; however, the validation loss, which initially decreases, starts increasing after the fifth epoch, indicating overfitting. With three hidden layers, accuracy improves for the first two epochs before becoming unstable. Overall, adding more layers resulted in a decrease in accuracy.

2. Try using layers with more hidden units or fewer hidden units: 32 units, 64 units, and so on

While validation loss is analyzed more closely from the third epoch onward, training loss is examined less throughout the training process. After the third epoch, validation accuracy initially increased before starting to decline. As the number of nodes increased, the network's accuracy decreased.

3. Try using the mse loss function instead of binary_crossentropy.

Accuracy is more consistent when using MSE rather than binary_crossentropy. For the first two epochs, training and validation loss followed a similar pattern before diverging significantly. However, reliability began to decline after the fourth epoch when MSE was used as the loss function.

4. Try using the tanh activation (an activation that was popular in the early days of neural networks) instead of relu.

Validation accuracy increased until the second epoch before starting to decline, while training accuracy continued to rise. When ReLU was used instead of Tanh, validation loss increased more significantly, and validation accuracy fluctuated more with ReLU.

5. Use any technique we studied in class, and these include regularization, dropout, etc., to get your model to perform better on validation.

Validation accuracy improved until the eighth epoch before dropping by nearly half, whereas training accuracy steadily increased. With the dropout technique, accuracy improved over multiple epochs, and the graph showed no significant change in validation accuracy.