Phase 2 Report

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1 Summary

In this phase, I used Tensorflow and Keras to build a neural network. To ensure the same results each time, I set a seed of 123. In the beginning, I started off with a logistic regression model. This meant creating a neural network with a single neuron and a single layer with sigmoid as the activation function. The loss function I used was binary cross-entropy which is a standard loss for binary classification. I also used RMSprop as the optimizer which is also a standard. I trained with 128, 256, 512, and 1024 epochs, all of which did not increase accuracy much at 0.7608 with 1024 epochs.

Since the goal of this phase is to overfit and find the maximum size of the neural network for this problem, I added layers and increased the number of neurons. Each layer, from last to first, has 1, 4, 16, 64, 256, and 1024 neurons respectively. This made a model with 288,153 total parameters. Using 1024 epochs and the same loss function and optimizer, I achieved an accuracy of 0.9997.

Model: "sequential_11"

Layer (type)	Output Shape	Param #
dense_41 (Dense)	(None, 1024)	8,192
dense_42 (Dense)	(None, 256)	262,400
dense_43 (Dense)	(None, 64)	16,448
dense_44 (Dense)	(None, 16)	1,040
dense_45 (Dense)	(None, 4)	68
dense_46 (Dense)	(None, 1)	5

Total params: 288,153 (1.10 MB)
Trainable params: 288,153 (1.10 MB)
Non-trainable params: 0 (0.00 B)

Figure 1: Structure of Overfit Neural Network