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For my final project, I decided to focus on neural networks and work to create a model that produces the best performance on my chosen dataset. The data that I have decided to use is the Fashion-MNIST dataset that is included in the Keras package. This dataset includes 60,000 training images and 10,000 test images that can each be classified as a particular clothing item. Classifying images into different categories is a common real-world use for neural networks, and clothing items are just one example.

The model that I started with, which can be seen below, had only one layer, and a validation split of 20%. This model produced a validation accuracy of 89%.

Chart, line chart

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Next, I created a model with an additional third layer, but this model did not have a significsnt improvement from my first model.

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For my third model, I reverted to using only one layer and also switched to using the mse loss function instead of categorical\_crossentropy.

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This third model had less validation loss than the prior two, but the accuracy did not surpass the first model, it remained around 89%.

The next model that I created used tanh activation instead of relu, and also maintained using only one layer and the mse loss function. The loss of this model was low, but the accuracy remains around 89%.

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I then decided to attempt a model using adam as the optimizer. This version of the model also produced an accuracy of about 89%.

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The next model I tested used adam as the optimizer and a learning rate of 0.003. This model produced a validation accuracy of 87%, slightly underperforming compared to prior models.

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For my next attempt, I tried using the dropout method with a rate of 0.4. This model also underperformed in comparison to prior models.

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After testing each of these models, I decided to create one final model utilizing multiple methods that I had tested above. I chose to continue to use the mse loss function, adam as the optimizer, and I added a third layer. I also decided to increase the batch size to 500 and the validation split to 40%.

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This combination of factors resulted in validation loss of 0.012 and a validation accuracy of 92%. This is the highest validation accuracy of all the models I have tested. As my final recommendation to top-level management, I would suggest that we choose to implement this final model, model 8, as the solution for classifying fashion images. Each of the tested models performed fairly well, but this final model will be the most accurate and lead to the best results.