**Neural Network Report**

**Overview**: The purpose of this analysis for the nonprofit foundation Alphabet Soup is to use a neural network model to accurately select applicants for funding with the best chance of success for their ventures.

**Results**:

Data Preprocessing:

* The target variable of this model was the “IS\_SUCCESSFUL”
* The target features of this model are the following: “APPLICATION\_TYPE”, “CLASSIFICATION”, ‘USE\_CASE”, “STATUS”, “INCOME\_AMT”, “SPECIAL\_CONSIDERATIONS”, “ASK\_AMT”, “AFFILIATION”
* The variables removed for them not being a feature or a target are: “EIN”, “NAME”, “ORGANIZATION”

Compiling, Training, and Evaluating the Model:

* For creating the neural network model I used a total of 4 hidden layers with 1 output layer. The number of units per layer are the following in order of which layer they were used: 200, 120, 80, 40, 1. The number of layers and neurons were chosen to add as much complexity as possible to the model to get as high of accuracy as possible. For the activation function the hidden layers used was ‘relu’ with the output layer using the ‘sigmoid’ function
* The model did not reach target performance as outlined in the assignment information
* The original model only had 2 hidden layers and to assist with optimization I added 2 extra hidden layers and increased the units in each of the hidden layers respectively. The column “ORGANIZATION” was also removed to help increase accuracy as the organization itself should not impact the decision making process.

Summary:

* The overall performance of the model with the included optimizations reached a total accuracy of 72% which is below the requested 75% leading to a recommendation to not use this model. With the optimizations performed they were determined by me as a best judgement for what the model would need. A random forest model could be used better for a more accurate decision or for more efficient optimization using Keras Tuner would be good to use as it would be able to determine the best parameters for an accurate neural network model.