**Alphabet Soup Report**

**Overview of Analysis:** The purpose of this analysis was to create a model that can help the Alphabet Soup foundation select the applicants for funding with the best chance of success in their ventures. A neural network model was selected as the data contained a significant amount of variables and complexity so an equally complex neural network model should be successful.

**Results:** Firstly I’d like to discuss the data preprocessing

* Target Variables: IS\_SUCCESFUL was our target variable as it demonstrates if a given application is successful and therefore is what we are attempting to predict.
* Feature Variables: Our feature variables are as follows: APPLICATION\_TYPE AFFILIATION CLASSIFICATION USE\_CASE ORGANIZATION STATUS INCOME\_AMT SPECIAL\_CONSIDERATIONS ASK\_AMT
* Dropped Variables: Name and EIN columns were dropped from the dataset as they have no effect on the outcome of the application and are simply for identification purposes.

**Compiling, Training, and Evaluating the Model:** Originally, I had created a model manually using one input layer, with two hidden layers, and an output layer. However, during the optimization process I choose to use a tuner to create the model automatically in order to increase accuracy levels. It was only moderately successful as it saw accuracy increase from 72.3% to 73.3%. The final model chosen had 10 hidden layers with a total of 102 neurons in the whole model.

**Optimization:** In order to optimize the model there were three approaches I took, first I increased the binning minimum for the classification and application types in order to take the more rare instances and convert them to a singular ‘other’ value. Next I used the auto-optimization using tuner, and finally I allowed the auto-optimizer far more room to test by increasing maximum epochs from 20 to 30 and maximum layers from 6 to 10.

**Summary:** In the end I was unable to achieve the goal of 75% model accuracy, if I were to continue working on the model I would attempt to increase the number of layers allowed even further as increasing from 5 to 10 layers saw a 1% increase in accuracy. I would also play around with different binning of the data as that also saw significant changes in overall accuracy.