# Alphabet Soup Charity Neural Network Model Analysis

### Overview:

This purpose of this analysis was to understand what the most important and impactful data points in the dataset that can help train a neural network model to predict the most likely applicants that will be successful in their ventures.

### Results:

The results of the analysis are broken down by Data Preprocessing of the data and Compiling, Training, and Evaluating the Model.

#### Data Processing:

* The target used for training the model to predict was the “Is\_Successful” field.
* The variables used that produced the best predictions were:
  + Applicant\_Type
    - Reduced by combining the lower values to a combined “Other”
  + Affiliation
  + Classification
    - Reduced by combining the lower values to a combined "Other”
  + Use\_Case
  + Organization
  + Status
  + Income\_Amt
  + Special\_Considerations
  + Ask\_Amt
* We removed the EIN and Name fields from the data because these fields are not a feature that the model can use to predict the outcome.

#### Compiling, Training, and Evaluating the Model:

* On the most successful model I used 4 hidden layers and 1 output layer with 5, 9, 9, 3, 1 nodes equaling 27 total neurons. I also used the ‘tanh’ activation function on the 4 hidden layers and ‘sigmoid’ on the output layer.
  + The reason I chose this configuration was because I used the kerastuner to run a loop and provide me the best configuration of neurons, layers, and activation function.
* The request was to achieve a 75% accuracy in the model prediction. The best I was able to achieve was a 72.64% accuracy.
* I tried to reduce the number of features in the model, but that only made the prediction worse. Next, I tried to change the amount of the classification and application type that were being reduced, while also using the Kerastuner to provide the right neurons, layers, and activation function. Lastly, I tried again to provide more variety in the classification, and application types to provide the model with the most available information, and I chose a different activation type (tanh) with more layers and neurons provided by Kerastuner suggestion.

### Summary:

Overall the results of the model was not the expected outcome but it was a good opportunity to apply the datasets to a ML model and understand how we may be able to make improvements to our data and ML models in the future. Next time I would suggest using the Random Forest model because it could be good for this classification problem where there is not any obvious trend in the data and it can be a little more random as to how succeeds and who doesn’t. The main consideration if choosing Random Forest is that it may take longer to train the dataset to get to the accuracy goals desired.