**Overview**

The nonprofit foundation Alphabet Soup wants a tool that can help it select the applicants for funding with the best chance of success in their ventures. Using machine learning and neural networks and with access to more than 34,0000 organization applicants, I build a model that help to predict whether applicants will be successful if funded by Alphabet Soup. The model target is to reach predictive accuracy higher than 75%.

**Results**

Data Preprocessing

* What variable(s) are the target(s) for your model?

**IS\_SUCCESSFUL** is thetarget that measured if funds used effectively or not.

* What variable(s) are the features for your model?

Other variables besides identification variables are the features in the model such as application type, organization type, classification etc. For the categorical data with more than ten unique values like application types, and classification types, I collapse minor groups into others.

* What variable(s) should be removed from the input data because they are neither targets nor features?

I dropped the EIN and NAME columns, which does not help with the analysis.

Compiling, Training, and Evaluating the Model

* How many neurons, layers, and activation functions did you select for your neural network model, and why?

The model consists of an input layer, three hidden layers with 60,40, and 10 neurons respectively, and an output layer with a single neuron.

The ReLU activation function is used in the hidden layers to allow the model to learn complex patterns, while the sigmoid activation function is the output layer is suitable for binary classification.

* Were you able to achieve the target model performance?

The final mode was not able to achieve the target. The final model accuracy is 72.63%.

* What steps did you take in your attempts to increase model performance?

The first attempt is using two hidden layers with 80, 30 neurons. The model accuracy is 72.43%

The second attempt is changing the neuron number to 40 in the second layer, and the model accuracy is 72.44%. it dones improve the performance.

The third attempt is to change the cutoff value of application types from 200 to 100, which increase of the columns of application type binary. Also, I use three hidden layers with 60,40, and 10 neurons. The model accuracy is 72.50%

The last attempt is to change back the cutoff value to 100 with use three hidden layers with 60,40, and 10 neurons. The model accuracy is 72.63%

**Summary** in this classification problem the reprocess the categorical data is important for the model building. Also, review the dataset before determine the number of neurons and layers could help improve the model accuracy.