

## Step 4: Write a Report on the Neural Network Model

For this part of the assignment, you'll write a report on the performance of the deep learning model you created for Alphabet Soup.

The report should contain the following:

1. **Overview** of the analysis: Explain the purpose of this analysis.
2. **Results**: Using bulleted lists and images to support your answers, address the following questions:
  - Data Preprocessing
    - What variable(s) are the target(s) for your model?
    - What variable(s) are the features for your model?
    - What variable(s) should be removed from the input data because they are neither targets nor features?
  - Compiling, Training, and Evaluating the Model
    - How many neurons, layers, and activation functions did you select for your neural network model, and why?
    - Were you able to achieve the target model performance?
    - What steps did you take in your attempts to increase model performance?
3. **Summary**: Summarize the overall results of the deep learning model. Include a recommendation for how a different model could solve this classification problem, and then explain your recommendation.

## **Overview of the Analysis:**

This project attempts to develop a tool using machine learning in order to help select applicants for funding with the best chances of success. I use bucketing of data, removal of non-essential columns, application of neural networks, training, transforming and fitting the data to attempt to accomplish this task.

## **Data Preprocessing:**

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

IS\_SUCCESSFUL column was used as the target for the model.

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

APPLICATION\_TYPE, AFFILIATION, CLASSIFICATION, USE\_CASE, ORGANIZATION, STATUS, INCOME\_AMT, SPECIAL\_CONSIDERATIONS, ASK\_AMT columns have been used for features.

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

NAME and EIN columns have been removed because they are not contributing to the result. Special Considerations were also removed in one attempt.

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

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

The number of neurons in my hidden layers varied between 7 and 21. I used two hidden layers in my first two attempts and three in my final attempts. In the first two attempts I used the relu activation for hidden layers. In the final attempt relu was used for the hidden layers. All three attempts used sigmoid for the activation layer.

- Were you able to achieve the target model performance?

The maximum attained accuracy was 72.5%. I was unable to hit the target of 75%.

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

In my attempts to increase model performance, I dropped an additional column, varied the number of activation layers, and used a different activation function for the hidden layers.

**Summary:** Summarize the overall results of the deep learning model. Include a recommendation for how a different model could solve this classification problem, and then explain your recommendation.

Based on my results, I think that most of my changes did little to change the overall results. A supervised machine learning can be a better way to classify the groups and result. Since the number of input parameters are higher, I think a random forest classifier may provide a reliable and accurate result. Deep learning algorithms using random forest classifiers might provide better accuracy.