**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.

The analysis is intended for a nonprofit foundation called Alphabet Soup. The analysis is to help the nonprofit select which applicants for funding are most likely to have success with their ventures. As part of the analysis, I created a binary classifier that can predict whether Alphabet Soup’s applicants will be successful. This was done by using a CSV file with data regarding 34,000 organizations that have received funding from Alphabet Soup. The data includes columns with metadata about each organization including their affiliated sector of industry, government organization classification, the use of the funding, the type of organization, status of activity, income classification, and whether or not the money was used effectively (successfully). These columns were used to predict whether the campaign would be successful.

1. Results: Using bulleted lists and images to support your answers, address the following questions:
   1. Data Preprocessing
      1. What variable(s) are the target(s) for your model?

The target variable is “IS\_SUCCESSFUL,” in other words, whether or not the funds were used effectively or successfully by the funding applicant.

* + 1. What variable(s) are the features for your model?

The feature variables include APPLICATION\_TYPE, AFFILIATION, CLASSIFICATION, USE\_CASE, ORGANIZATION, STATUS, INCOME\_AMT, SPECIAL\_CONSIDERATIONS, and ASK\_AMT. Two columns were dropped when determining the feature variables. These were EIN and NAME, both identification columns. These were not dropped in the attempt labeled “AlphabetSoupCharity\_Optimization\_2.ipynb.”

* + 1. What variable(s) should be removed from the input data because they are neither targets nor features?

The EIN and NAME variables should be dropped because they are identification columns and should have no bearing on the target variable.

* 1. Compiling, Training, and Evaluating the Model
     1. How many neurons, layers, and activation functions did you select for your neural network model, and why?

The architecture of the neural network includes an input layer with a number of neurons equal to the number of input features, two hidden layers with 8 and 5 neurons respectively, and an output layer with1 neuron for binary classification. The ReLU activation function is used in the hidden layers, and the sigmoid activation function is used in the output layer.

* + 1. Were you able to achieve the target model performance?

I was able to achieve target model performance in “AlphabetSoupCharity\_Optimization\_2.ipynb.” The model performance was 75.5%.

* + 1. What steps did you take in your attempts to increase model performance?

In my first attempt at optimization, I increased the cutoff for the classifications variable from 700 to 1000. This reduced the accuracy from 72.6% to 72.4% In my second attempt at optimization, the accuracy increased to 75.5%. In this attempt I both increased the cutoff for the classifications variable to 1000 and I did not drop the EIN and NAME columns.

1. 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.

This report discusses the performance of a deep learning model created for a nonprofit foundation called Alphabet Soup to help Alphabet Soup select funding applicants who are most likely to succeed. A binary classifier was built using data from a CSV file containing information about 34,000 organizations that received funding from Alphabet Soup. The target variable is "IS\_SUCCESSFUL," indicating whether funds were used effectively. Features for the model include various columns such as APPLICATION\_TYPE, AFFILIATION, CLASSIFICATION, USE\_CASE, ORGANIZATION, STATUS, INCOME\_AMT, SPECIAL\_CONSIDERATIONS, and ASK\_AMT. When optimizing the model, not dropping the identification columns EIN and NAME as well as increasing the cutoff for the classifications improved the accuracy of the model.