**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 purpose of this analysis to use provided data from a nonprofit organization to develop a model that would help select applicants for funding with best chance of success for the venture. A neural network is a method that teaches computers to process data and learn and improve continuously to solve complicated problems. By building a neural network with a high accuracy rate in this project, Alphabet Soup nonprofit organization can easily determine the appropriate selection for applicants with the best chance of a success.

1. **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? The target variable is the “IS\_SUCCESSFUL” column.
  + What variable(s) are the features for your model? The features variables are the Application type, Affiliation, Classification, Income amount and special consideration.
  + What variable(s) should be removed from the input data because they are neither targets nor features? The “Ask\_Amt” variable can be removed because it adds no value in determining the success of the ventures.
* Compiling, Training, and Evaluating the Model
* How many neurons, layers, and activation functions did you select for your neural network model, and why? I started with two neurons and layers and later increased them to three to improve the model’s performance. Used the Sigmoid and ReLU activation functions. The Sigmoid activation function was used because probability as an output was being predicted. Since probability of anything exists only between the range of 0 and 1, sigmoid was the right choice because of its range. The ReLU activation function was used since only a certain number of neurons are activated, the ReLU function is far more computationally efficient when compared to other functions such as the tanh functions.

A screenshot of a computer program

Description automatically generated with medium confidence

* + Were you able to achieve the target model performance? No, but very close to the target. I tried several different model optimization methods but could not get to the accuracy rate of 75%.
  + What steps did you take in your attempts to increase model performance? I dropped the “Ask\_amount” column in case there were outliers, added more hidden layers, added more neurons to a hidden layer, added and reduced the number of epochs.

A screenshot of a computer program

Description automatically generated with low confidence

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.

The model I built for the Alphabet Soup nonprofit organization to determine the appropriate selection for applicants with the best chance of a success has a 73% predictive accuracy. A neural network method in artificial intelligence was used to teach the computer to process data in a way that is inspired by the human brain. A Sigmoid and ReLU activation functions was used to maximize the model’s performance. The target predictive accuracy was set at 75% but after trying a list of model optimization methods such as dropping columns, adding more neurons to a hidden layer, adding more neurons to a hidden layer and adding/subtracting number of epochs to the training regimen to optimize the model, the highest accuracy rate was at 73%. I would recommend removing some of the irrelevant data to the prediction instead of binning them. Binning is great but it may not represent the actual data and hence information can be lost in the process. A logistic regression is a simpler classification technique that could solve this classification problem. Logistic Regression is one of the most efficient techniques for solving classification problems. It is easier to implement, interpret, and very efficient to train. It is very fast at classifying unknown records.