**Deep Learning Challenge**

**Overview:**

The nonprofit foundation Alphabet Soup needs an algorithmic model to determine whether applicants will be successful if funded. The business team provided information on organizations that they have funded over the years in order to create a classifier which would predict the success of applicants.

**Results:**

The information provided by Alphabet Soup contains 34,000 organizations with 12 columns for each. To begin, the EIN and NAME columns were removed because they would not contribute any relevant data to the model. Next, the APPLICATION\_TYPE and CLASSIFICATION columns were reduced to avoid overfitting the model. The data was converted to numeric values, split into test and training sets, and scaled to finalize the preprocessing.

***Variables:***

* The target for the model was the IS\_SUCCESSFUL column.
* The features for the model were all remaining columns as numeric values.
* The EIN and NAME columns were initially removed from the input data.

***Model:***

* The initial model contained three hidden layers with 9,18, & 6 neurons respectively. These layers utilized the ‘relu’ activation function while the output layer used the ‘sigmoid’ function.
* The initial model fell short of the target accuracy of 75%, with accuracy coming in at 72%.
* To optimize the model, the NAME column was included as a feature. The random state of the ‘train\_test\_split’ data was changed to 42. The number of layers was reduced to two with 10 & 5 neurons for each layer. In compiling the model, the ‘loss’ attribute was changed to ‘sparse\_categorical\_crossentropy’.

**Summary:**

The optimized model rendered an accuracy value of 78%, increasing the model’s performance by %4. This accuracy performance is an improvement but there may be better models for this problem. For example, tree-based algorithms can be effective in providing a clear result or decision for the problem of determining the success of an applicant.