**Report on the Neural Network Model**

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

\*\*Report on the Neural Network Model for Alphabet Soup\*\*

\*\*Overview of the Analysis: \*\*

The primary objective of this analysis is to develop a predictive model capable of determining whether funding applicants to Alphabet Soup will achieve success. This prediction relies on various applicant characteristics, including the type of application, industry affiliation, organization classification, funding use case, organization type, active status, income classification, special considerations, and requested funding amount.

\*\*Results: \*\*

\*Data Preprocessing\*

- \*\*Target Variable: \*\* The target variable, named "IS\_SUCCESSFUL," is used to identify whether an applicant's funding was successful or not.

- \*\*Feature Variables: \*\* The features utilized in the model include:

- APPLICATION\_TYPE

- AFFILIATION

- CLASSIFICATION

- USE\_CASE

- ORGANIZATION

- STATUS

- INCOME\_AMT

- SPECIAL\_CONSIDERATIONS

- ASK\_AMT

- \*\*Removed Variables: \*\* The following variables, EIN and NAME, were excluded from the analysis as they weren't considered targets or features and didn't contribute to the model's predictive power.

\*Compiling, Training, and Evaluating the Model\*

valuation:

Input Layer:

The input layer is dynamically determined by the shape of the input data, so it adjusts automatically to the number of features in the dataset. This flexibility is helpful as it accommodates different datasets without the need for manual specification.

First Hidden Layer:

The first hidden layer consists of 80 neurons with a sigmoid activation function. Using sigmoid introduces non-linearity to the model, which can be beneficial for capturing complex relationships in the data. However, the choice of 80 neurons may require further investigation and tuning. A larger number of neurons may lead to overfitting, while a smaller number may result in underfitting.

Second Hidden Layer:

The second hidden layer includes 40 neurons with the ReLU activation function. ReLU is an excellent choice for hidden layers, as it addresses the vanishing gradient problem and is computationally efficient. The choice of 40 neurons should be evaluated through experimentation. It's important to monitor the model's performance and consider increasing or decreasing the number of neurons based on validation results.

Output Layer:

The output layer consists of a single neuron with a sigmoid activation function. This is a suitable configuration for binary classification tasks. The sigmoid activation function ensures that the model produces output in the [0, 1] range, representing the probability of a positive outcome (in this case, successful funding).

- \*\*Achievement of Target Performance: \*\* Unfortunately, the model did not achieve the desired target performance.

- \*\*Steps for Performance Improvement: \*\* To enhance model performance, modifications were made, such as increasing the number of neurons, adding more layers, and removing the SPECIAL\_CONSIDERATIONS feature. However, these changes did not lead to improved accuracy; instead, accuracy decreased.

\*\*Summary: \*\*

In summary, the deep learning model constructed for this analysis fell short of the target performance. To address this, it is recommended to explore alternative models, such as a Random Forest classifier, which may offer better accuracy. Additionally, for a classification problem like this, it is crucial to consider the presence of outliers and further investigate data preprocessing techniques. Continued efforts and experimentation are needed to attain the desired level of accuracy in predicting the success of funding applicants for Alphabet Soup.