Deep Learning Model Performance Report

**Overview**

Evaluate the use of a neural network and its ability to predict whether or not applicants will be successful if funded by Alphabet Soup.

**Results**

* Data Preprocessing
  + ‘IS\_SUCCESSFUL’ column is the target variable considered for the model.
  + All other columns were the variables considered to be the features for the model.
  + ‘EIN’ and ‘NAME’ columns were considered neither targets nor features and removed from the input data.
* Compiling, Training, and Evaluating the Model
  + For the initial model, three total layers were used using the parameters below:

Graphical user interface, text

Description automatically generated

In the first optimization attempt, the ‘STATUS’ column was removed since an applicant’s status is a non-contributing factor. Parameters used below:

Text

Description automatically generated

In the second optimization attempt, the number of neurons were increased in the input and hidden layers. Parameters used below:

A picture containing text

Description automatically generated

In the third optimization attempt, an additional hidden layer was added. Parameters used below:

A screenshot of a computer

Description automatically generated with medium confidence

ReLU was used as the activation function for the input layer to increase overall computation speed. Sigmoid was used as activation function for the output layer since it’s generally used as the output layer in deep learning models especially in predicting probability-based outputs. Tanh was used in the hidden layer since it supports the overall process of the model.

* + The following evaluations regarding the initial and optimized models:

Initial Model – loss: 0.5696 - accuracy: 0.7289

Optimization #1 – loss: 0.5627 - accuracy: 0.7291

Optimization #2 – loss: 0.5533 - accuracy: 0.7294

Optimization #3 – loss: 0.5531 - accuracy: 0.7291

Target model performance was not achieved with only slight improvements to loss and accuracy.

* + Steps taken to improve model performance:

Optimization #1 – ‘STATUS’ column was removed

Optimization #2 – number of neurons were increased in the input and hidden layers

Optimization #3 – additional hidden layer was added

**Summary**

The model ended up with the accuracy score of 72.91% after optimization. The initial neural network had an accuracy score of 72.89%. Further optimization to the neural network can be done by removing more features or adding more data to the dataset to increase accuracy. Logistic regression can be used as an alternative model for the same reason why the sigmoid activation function is used as the output layer. Since the target is a binary outcome, logistic regression is used to find the probability of success or failure.