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**Report on the Performance of Deep Learning Model for Alphabet Soup**

**Overview of the Analysis:**

The purpose of this analysis is to develop a deep learning model using TensorFlow and Keras to predict whether applicants for Alphabet Soup's funding will be successful in their ventures. The goal is to build a classification model that can accurately identify potential successful applicants, enabling Alphabet Soup to optimize their resources and increase the impact of their funding initiatives.

**Results:**

**Data Preprocessing:**

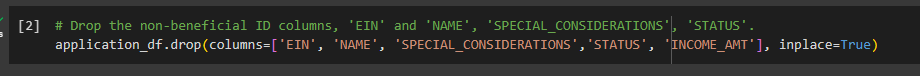
1. Target Variable: The target variable for our model is the "IS\_SUCCESSFUL" column, which indicates whether an applicant was successful (1) or not (0) in receiving funding from Alphabet Soup. A screen shot of a computer

   Description automatically generated
2. Feature Variables: The feature variables for our model include various columns such as 'AFFILIATION', 'USE\_CASE', 'ORGANIZATION', 'STATUS', 'INCOME\_AMT', and others. These features provide information about the applicants and their characteristics that can help predict their chances of success.

A screenshot of a computer

Description automatically generated

1. Removed Variables: We removed 'EIN' and 'NAME', 'SPECIAL\_CONSIDERATIONS', 'STATUS' columns from the input data because they are neither targets nor features and do not provide relevant information for our prediction task.



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

1. Neural Network Architecture: We designed a deep neural network with two hidden layers. The first hidden layer consists of 48 neurons with the ReLU activation function, and the second hidden layer has 24 neurons with the ReLU activation function. The output layer has 1 neuron with the sigmoid activation function since we are dealing with a binary classification problem.

The number of neurons is not exactly science, and we used some trial and error to determine the best fit. One of the main concerns is overfitting by using too many neurons if the data is not sufficiently large or complex based on the number of input features or intricate patterns, may require many neurons to capture and learn those patterns effectively.

A computer screen with text on it

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1. Model Performance: The model was trained using the training data and evaluated using the testing data. However, the model did not achieve the desired target performance of over 75% accuracy. Further optimization was required to improve the model's accuracy.

A screenshot of a computer program

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1. Steps to Improve Performance: To enhance the model performance, we attempted various strategies, such as adjusting the number of neurons, layers, and activation functions. Despite our efforts, the model performance did not meet the target accuracy.

**Summary:**

The deep learning model we created for Alphabet Soup's funding prediction showed some promise, but it did not achieve the desired target performance. It was able to capture some patterns in the data but struggled to generalize effectively to new, unseen data.

In our attempts to improve the model performance, we experimented with different neural network architectures and optimization techniques. However, further improvements are necessary to achieve the target accuracy.

**Recommendation:**

Considering the challenges faced in achieving the target model performance, it is recommended to explore alternative machine learning models that may better suit the classification problem that was not either in scope or lack of time to explore further.

Furthermore, feature engineering and selection may also play a crucial role in improving model performance. Carefully selecting relevant features and creating new informative features based on domain knowledge could lead to better predictive power.

In conclusion, while the deep learning model has shown potential, experimenting with different models and fine-tuning feature engineering could lead to better results and more accurate predictions for Alphabet Soup's funding applicants.