**Neural Network Model Performance Report**

Overview of the Analysis

The purpose of this analysis is to develop a deep learning neural network model for Alphabet Soup, a philanthropic organization, to predict the success or failure of charitable projects. Alphabet Soup seeks to optimize its funding allocation by identifying which charitable organizations and projects are more likely to be successful. The model is trained on historical data to make these predictions based on various features related to the organizations and their funding applications.

Data Preprocessing

The dataset used for this analysis was sourced from "charity\_data.csv" and contained information about charitable organizations, including features like application type, affiliation, classification, use case, organization type, income amount, special considerations, and funding amount. Non-beneficial columns 'EIN' and 'NAME' were dropped from the dataset as they did not contribute to the analysis.

Feature Engineering

The 'APPLICATION\_TYPE' column contained 17 unique values. To reduce dimensionality and handle low-frequency values, application types with less than 500 occurrences were grouped into an 'Other' category.

The 'CLASSIFICATION' column contained 71 unique values. To manage dimensionality and handle low-frequency values, classifications with less than 1,000 occurrences were grouped into an 'Other' category.

Model Architecture

The neural network model consisted of three layers: two hidden layers and one output layer.

The first hidden layer had 80 units with a ReLU activation function. The second hidden layer had 30 units with a ReLU activation function. The output layer had one unit with a sigmoid activation function, suitable for binary classification.

Model Compilation and Training

The model was compiled with the binary cross-entropy loss function and the Adam optimizer. The training data was scaled using StandardScaler to ensure consistent and meaningful input values. The model was trained with 80% of the data and validated on 20% of the data using the train\_test\_split method.

Model Evaluation

The trained neural network model achieved an accuracy of approximately 72.64% on the test dataset. The model's performance metrics indicate that it is reasonably effective at predicting whether a charitable project will be successful or not based on the provided features.

Summary

The deep learning model developed in this analysis provides a reasonable level of accuracy in predicting the success of charitable projects funded by Alphabet Soup. However, the model's performance did not fully meet the target model performance. Further optimization and exploration can be considered:

In conclusion, while the deep learning model showed promise in predicting project success, further exploration and experimentation with alternative models and feature engineering techniques are recommended to potentially achieve better results and enhance Alphabet Soup's ability to make informed funding decisions.