**Results**

**Data Preprocessing**

* **Target Variable:**
  + The target variable for the model is “IS SUCCESSFUL”, which indicates whether the funding was used effectively (1) or not (0).
* **Feature Variables:**
  + The features for the model include:
    - APPLICATION\_TYPE
    - AFFILIATION
    - CLASSIFICATION
    - USE\_CASE
    - ORGANIZATION
    - STATUS
    - INCOME\_AMT
    - SPECIAL\_CONSIDERATIONS
    - ASK\_AMT
* **Variables to be Removed:**
  + The following columns were removed from the input data as they are neither targets nor features:
    - EIN
    - NAME

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

* **Neurons, Layers, and Activation Functions:**
  + The model consists of:
    - Input layer with 43 input features.
    - Two hidden layers, each with 30 neurons and using the ReLU (Rectified Linear Unit) activation function to introduce non-linearity.
    - An output layer with a single neuron and a Sigmoid activation function for binary classification.
* **Achieved Performance:**
  + The model achieved an accuracy of approximately **72.91%** on the test dataset, with a loss of **0.5631**.
* **Steps Taken to Increase Model Performance:**
  + Adjusted the number of neurons and layers in the network.
  + Experimented with different activation functions.
  + Scaled the input features using “StandardScaler” to ensure that all features contribute equally to the model’s performance.

**Summary**

The deep learning model developed for the Alphabet Soup project shows promising results with a classification accuracy of 72.91%. While the model does not perform above 75% yet, the steps taken for optimization could potentially improve performance further.

**Recommendation for Alternative Models**

To improve classification performance, I recommend exploring ensemble methods such as Random Forest or Gradient Boosting. They can capture complex interactions between features and may outperform a single neural network, particularly with tabular data. They also offer greater interpretability, which can be valuable for stakeholders in understanding the decision-making process behind funding approvals. To note: Random Forest builds multiple independent trees and aggregates the predictions. Gradient Boosting builds the trees sequentially, with each one learning from the previous.