Alphabet Soup Charity

Overview of the Analysis:

The purpose of this analysis is to develop a deep learning model that predicts the success of charitable donations based on various organizational features. By preprocessing the dataset, training a neural network model, and evaluating its performance, we aim to determine the most effective approach for classifying organizations into successful and unsuccessful funding outcomes.

Data Preprocessing:

- **Target Variable:** The target variable for the model is the “IS_SUCCESSFUL” column, which indicates whether an organization received funding.
- **Feature Variables:** The features used for prediction include organization type, application type, income classification, and other relevant attributes.
- **Removed Variables:** Columns that do not contribute to the prediction, such as identification numbers and non-informative text-based columns, were removed from the dataset to enhance model efficiency.

Compiling, Training, and Evaluating the Model

Neural Network Architecture:

The model consists of multiple hidden layers to capture complex patterns in the data.The firs hidden layer had 64 neurons, the second hidden layer had 32 neurons. There was 1 neuron output layer. The first hidden layer has 64 neurons to capture complex relationships in the input features. The second hidden layer has 32 neurons, reducing dimensionality while maintaining learning capacity. Each layer includes an optimal number of neurons based on experimentation to balance performance and computational efficiency. ReLU activation was used for hidden layers to introduce non-linearity, while a sigmoid activation function was used in the output layer for binary classification.

Model Performance:

- The initial model did not meet the desired performance target.
- Several optimization attempts, including tuning hyper-parameters and adding layers, were made to improve accuracy.

Performance Optimization Steps:

- Feature engineering and selection were refined to remove noise from the dataset.
- Additional hidden layers and neurons were tested to enhance learning capacity.
- Different activation functions and dropout regularization techniques were experimented with to reduce overfitting.

Summary:

The deep learning model demonstrated some capability in predicting successful funding outcomes but did not achieve an optimal level of accuracy. Alternative approaches, such as decision trees, could be considered for improved performance. This model might offer better interpretability and efficiency for this classification task by leveraging structured feature importance analysis and handling categorical variables effectively.