

# Neural Network Model Report

## Overview of the Analysis

The purpose of this analysis is to develop and evaluate a deep learning model for Alphabet Soup's charity funding prediction. The goal is to determine whether a given funding application will be successful based on historical data.

## Results

### Data Preprocessing

- **Target Variable:** The target variable for the model is the funding success indicator.
- **Feature Variables:** The input features include various attributes of the funding application, such as categorical and numerical data.
- **Removed Variables:** Non-beneficial columns such as 'EIN' and 'NAME' were removed, as they do not contribute to the predictive capability of the model.

### Compiling, Training, and Evaluating the Model

- **Neural Network Structure:**
  - Input layer with a number of input features (number\_input\_features)
  - First hidden layer: hidden\_nodes\_layer1 neurons, ReLU activation
  - Second hidden layer: hidden\_nodes\_layer2 neurons, ReLU activation
  - Output layer: 1 neuron, sigmoid activation
- **Compilation and Training:**
  - Loss function: Binary Cross-Entropy
  - Optimizer: Adam
  - Training epochs: 100
- **Performance:**
  - The model was evaluated using accuracy.
  - Final evaluation results: Loss: model\_loss, Accuracy: model\_accuracy
- **Performance Improvements:**
  - Various attempts were made to improve model performance, including adjusting the number of hidden layers and neurons, modifying activation functions, and tuning hyperparameters.

## Summary

The deep learning model successfully classified funding applications with a certain level of accuracy. However, further improvements may be necessary to achieve optimal performance. A potential alternative model for this classification problem could be a **Random Forest classifier** or **XGBoost**, as these models are robust with categorical and numerical data and often perform well on structured datasets. These methods could be explored to compare performance with the neural network approach.

