# **Overview of the Analysis**

The purpose of this analysis is to develop a deep learning model that can accurately predict whether a funding request will be successful or not for Alphabet Soup. By analyzing various features related to the funding applications, such as the type of request, organization details, and financial information, the model will learn patterns and relationships that influence the success of funding requests. This will assist Alphabet Soup in making informed decisions about where to allocate their resources effectively.

# **Results**

## **Data Preprocessing:**

* **Target Variable(s):** The target variable for the model is "IS\_SUCCESSFUL", which represents whether a funding request was successful or not.
* **Feature Variables**: The feature variables used to predict the target variable include the "APPLICATION\_TYPE", "CLASSIFICATION", and other relevant columns present in the dataset after dropping the "IS\_SUCCESSFUL" column.

A graph of a number of blue squares

Description automatically generated

* **Variables to be Removed:** The "EIN" and "NAME" columns are dropped from the input data as they are considered non-beneficial ID columns that do not contribute to the prediction task.

A graph of a number of blue squares

Description automatically generated

A graph with blue squares

Description automatically generated

A chart with different colored numbers

Description automatically generated with medium confidence

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

* **Neurons, Layers, and Activation Functions:** The neural network model consists of two hidden layers with 10 and 5 neurons, respectively, and a single output layer. The activation function used for the hidden layers is the ReLU (Rectified Linear Unit) function, while the output layer uses the sigmoid activation function, which is suitable for binary classification problems.
* **Target Model Performance:** The code doesn't explicitly mention a target model performance metric. However, the model's loss and accuracy are evaluated on the test data, and the results are printed, allowing for an assessment of its performance.

A graph with a bar

Description automatically generated

* **Steps to Increase Model Performance**: The provided code doesn't include any specific steps to increase model performance beyond the initial model architecture and training. However, potential steps could involve techniques such as hyperparameter tuning (e.g., adjusting the number of layers, neurons, or epochs), trying different optimizers or loss functions, or incorporating additional preprocessing techniques like feature scaling or encoding.

# **Summary**

The deep learning model developed in this analysis appears to achieve a reasonable level of performance in predicting the success of funding requests for Alphabet Soup, based on the evaluation metrics printed. However, without specific target performance criteria, it's difficult to assess whether the model meets the desired level of accuracy.

As an alternative approach, a different model such as a gradient boosting machine or a random forest classifier could be explored to solve this classification problem. These ensemble methods are known for their robustness and ability to handle various types of data, including categorical and numerical features. They can also provide insights into feature importance, which could be valuable for Alphabet Soup in understanding the key factors influencing funding success.

Compared to deep learning models, which can be computationally expensive and require careful hyperparameter tuning, ensemble methods like gradient boosting or random forests often offer good out-of-the-box performance and are relatively easier to interpret and explain. However, it's important to note that the optimal model choice depends on the specific characteristics of the data and the problem at hand, and multiple models should be evaluated and compared to determine the most suitable solution.