Project Overview:

Deep Learning - Charity Funding Predictor

The goal of this project is to create an algorithm using machine learning and neural networks to predict whether applicants will be successful if funded by the fictional non-profit foundation, Alphabet Soup.

# Data Preprocessing:

* Dropped non-beneficial columns.
* Examined the number of data points for each unique value for the columns APPLICATION\_TYPE and CLASSIFICATION, which had more than 10 unique values.
* Binned rare categorical values together into a new value called "Other" using cutoff points of 600 and 300, respectively.
* Converted categorical data to numeric using **pd.get\_dummies()**.
* Divided the data into a target array (IS\_SUCCESSFUL) and features arrays.
* Created testing and training datasets using **train\_test\_split**.
* Scaled the training and testing sets using **StandardScaler**.

# Model Compilation, Training, and Evaluation:

* Attempted three models using machine learning and neural networks.
* Target predictive accuracy was set higher than 75%.
* All three models achieved an accuracy rate around 72%, slightly below the required target accuracy.

## Model Details - Attempt #1:

* Accuracy Score: 72.8%
* Hyperparameters:
  + Layers: 2
    - Layer 1: 9 neurons and 'relu' activation function
    - Layer 2: 18 neurons and 'relu' activation function
  + Epochs: 100

A graph with blue lines

Description automatically generated

## Model Details - Attempt #2:

* Accuracy Score: 72.6%
* Hyperparameters:
  + Layers: 3
    - Layer 1: 9 neurons with 'relu' activation function
    - Layer 2: 18 neurons with 'relu' activation function
    - Layer 3: 27 neurons with 'relu' activation function
  + Epochs: 100

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## Model Details - Attempt #3:

* Accuracy Score: 72.7%
* Hyperparameters:
  + Layers: 3
    - Layer 1: 9 neurons with 'relu' activation function
    - Layer 2: 18 neurons with 'tanh' activation function
    - Layer 3: 2 neurons

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# Summary of Model Attempts

In the three attempts, the model achieved an accuracy score ranging from 72.6% to 72.8%. Despite hyperparameter tuning, there was minimal improvement. Considering the limited success in achieving a higher predictive accuracy, it might be worthwhile to explore alternative classification models to determine if they can better predict whether applicants will be successful if funded by Alphabet Soup.