**Deep Learning for AlphabetSoup Funding Success Prediction**

**Overview**:

The goal of this analysis is to develop and refine a deep learning model to predict whether funding applicants for the nonprofit Alphabet Soup will successfully utilize their financial support. Using a dataset of over 34,000 previous funding recipients, we aim to build a binary classification model to forecast the likelihood of future applicants effectively using the funds, as indicated by the target variable, \*\*IS\_SUCCESSFUL\*\*.

**Data Preprocessing:**

* **Target Variable**

-IS\_SUCCESSFUL: Indicates whether the recipient used the funds effectively.

* **Feature Variables**

- APPLICATION\_TYPE: Type of application submitted to Alphabet Soup.

- AFFILIATION: The sector of industry the organization is associated with.

- CLASSIFICATION: Government classification of the organization.

- USE\_CASE: The purpose for which the funding is requested.

- ORGANIZATION: The type of organization applying for funding.

- STATUS: Whether the organization is currently active.

- INCOME\_AMT: The income category of the organization.

- SPECIAL\_CONSIDERATIONS: Any special considerations for the application.

- ASK\_AMT: The requested funding amount.

**Excluded Data:**

- NAME and EIN: These identification columns were removed during preprocessing.

**Model Development:**

The initial model consisted of a single hidden layer with 5 neurons and was trained over 250 epochs. As this was a simple network with only one hidden layer, I employed a single activation function.

**Performance:**

Unfortunately, the initial model did not meet the target performance. To improve accuracy, I experimented with adding more layers and neurons, testing different activation functions, and increasing the number of training epochs. Despite these efforts, neither the original model nor the optimized version yielded satisfactory results.

- The initial model was biased towards predicting positive outcomes.

- The optimized model, conversely, predicted negative outcomes almost exclusively.

**Potential Improvements:**

The poor performance of these deep learning models suggests that further preprocessing adjustments could significantly improve results. For example, feature engineering—such as binning and leveraging the NAME column—might enhance the model’s predictive power. Additionally, alternative machine learning algorithms, such as linear regression or XGBoost, may perform better, especially given XGBoost's effectiveness with structured/tabular data.

**Conclusion:**

Both the initial and optimized models failed to accurately predict the success of AlphabetSoup’s funding applicants. Future work should focus on refining data preprocessing and exploring alternative modeling approaches that are better suited to the nature of the dataset.

A graph of a curve

Description automatically generated