

Project Title: **Deep Learning for Charity Funding Prediction**

Project Overview:

- I embarked on a data-driven journey to create a predictive model for Alphabet Soup, a charitable organization that has historically supported over 34,000 organizations.

Data Preprocessing:

1. **Data Collection:** The project began with the collection of data from the 'charity_data.csv' file, which was loaded into a Pandas DataFrame.
2. **Target and Features:** I identified the target variable(s) for the model, which represent funding approval. The relevant features for model building were also determined.
3. **Data Cleaning:** I dropped the 'EIN' and 'NAME' columns, as they were not contributing to the prediction task.
4. **Data Exploration:** A comprehensive analysis of the dataset was conducted, including an assessment of the unique values in each column.
5. **Binning Strategy:** For columns with more than ten unique values, I developed a strategy to group rare categorical variables into a single 'Other' category, optimizing data quality.
6. **Categorical Encoding:** The categorical variables were encoded using the `pd.get_dummies()` method, preparing the data for model training.
7. **Data Split:** I split the preprocessed data into two arrays: one for features (X) and the other for the target variable (y). The dataset was further divided into training and testing subsets using the `train_test_split` function.
8. **Feature Scaling:** To ensure consistency and improve model performance, I scaled the features using the `StandardScaler`.

- **Deep Learning Model:**

I implemented a three-layer neural network model

- **Model Performance:**

The initial model achieved an accuracy of approximately 72%, which was slightly below the desired target accuracy of 75%.

- **Optimization**

In a subsequent model iteration, I reintroduced the 'NAME' feature into the dataset. This enhancement led to a significant performance boost, with the model achieving an accuracy of 78%, exceeding the target by 3%.

- **Conclusion:**

This project represents a significant step in utilizing deep learning to streamline the charity funding approval process. By achieving a predictive accuracy of 78%, the project has the potential to enhance the efficiency and impact of Alphabet Soup's funding allocation.