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Deep Learning Challenge - Non Profit Foundation Alphabet Soup

**Predicting Success for Alphabet Soup Funding Applications Using Deep Learning**

**Objective:** The primary objective of this analysis was to assist Alphabet Soup, a nonprofit organization, in predicting which applicants for funding are likely to be successful in their ventures. By leveraging data from over 34,000 previously funded organizations, we aimed to develop a model capable of making accurate predictions. This would enable Alphabet Soup to allocate its resources more effectively by funding projects with a higher likelihood of success.

**Results:**

**Data Preprocessing:**

1. **Target Variable:** The model's target variable was IS\_SUCCESSFUL, indicating whether the funds provided to an organization were used effectively.
2. **Feature Variables:** The features included application type, affiliation, classification, use case, organization type, status, income amount, special considerations, and the requested amount.
3. **Removed Variables:** We excluded EIN and NAME as they are identification details that do not impact the success of funding applications.

**Model Compilation, Training, and Evaluation:**

A. **Model Design:** A neural network model with two hidden layers was designed. The first hidden layer had 80 neurons, and the second had 30 neurons, both utilizing the ReLU activation function. The output layer used the sigmoid activation function to predict the success of an application. B. **Initial Performance:** The model initially achieved an accuracy of approximately 72%, falling short of the 75% accuracy target. C. **Optimization Attempts:** To improve performance and achieve the 75% accuracy goal, several adjustments were made:

* Increased the number of neurons.
* Added more hidden layers.
* Adjusted activation functions.
* Experimented with the number of epochs and batch sizes.
* Implemented early stopping and model checkpoints.

**Summary:**

In conclusion, although the developed deep learning model was close to achieving the target accuracy, it did not reach the perfect score. Identifying the optimal architecture and parameters is challenging, despite the power of neural networks for classification problems. Considering the robustness and lower sensitivity of Random Forest Classifiers, they might be a better choice for this task. Random Forest Classifiers perform well with both categorical and numerical data, potentially providing better accuracy with less fine-tuning.