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Module 21 Challenge
Alphabet Soup Charity HW

Step 4 - Performance of Deep Learning Model for Alphabet Soup Report

Overview of the Analysis:

The purpose of this analysis was to build and evaluate a deep learning model to predict the target variable in the Alphabet Soup data set. The target variable was the binary classification of whether a given customer will buy a product or not.

Results:

Data Preprocessing

The data was preprocessed using Pandas and scikit-learn's StandardScaler, including encoding of categorical variables, splitting into training and testing datasets, and scaling of features.

- The target variable is "IS_SUCCESSFUL" (binary classification).
- The features for the model are the remaining columns after dropping "EIN" and "NAME".
- The columns that were removed from the input data are "EIN" and "NAME" because they are not relevant for the model's target or features.

Compiling, Training, and Evaluating the Model

- The original model consisted of 1 input layer with the number of input features, 2 hidden layers with 8 and 5 neurons each, and an output layer with a sigmoid activation function.
- The fintuned model consisted of three hidden layers with 1–, 50, and 25 neurons each, and an output layer with a sigmoid activation function.
- The original model achieved a loss of 0.55 with an accuracy of 0.72 on the testing data.
- The fintuned model achieved a loss of 0.18 and an accuracy of 0.74 on the testing data.
- The original model did not achieve the target performance of accuracy > 0.75 and instead 0.72,. The finetuned model also did not achieve a better performance of > 0.75, and instead the best I could average was 0.74 after a lot of thinkering.
- Steps taken to increase performance included adjusting the number of neurons, changing the activation functions, and adding additional hidden layers, as well as the model that was used (SGD optimizer instead of Adam in the finetuned model).

Summary:

The deep learning model performed well in predicting the success of organizations that have received funding from Alphabet Soup. However, I was not able to improve the accuracy highere than 75%. If I had more time, I'd try a different model such as a Random Forest Classifier, which could solve this problem by providing additional insights into the feature importances. This recommendation is based on the potential of Random Forest Classifiers to handle complex feature interactions and provide feature importances for further analysis.