Alphabet Soup

Neural Network Deep Learning

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Overview

The nonprofit foundation Alphabet Soup wants a tool that can help it select the applicants for funding with the best chance of success in their ventures. The dataset is a CSV which contains more than 34,000 organizations that have received funding from Alphabet Soup over the years. Within this dataset are a number of columns that capture metadata about each organization. Using this data, we have created machine learning models to create a binary classifier that can predict whether applicants will be successful if funded by Alphabet Soup.

Results

1. **Pre-Processing the Data:**
    a. The 'EIN' and 'NAME' columns were removed because they were not targets or features for the model
    b. Outliers were removed from the 'APPLICATION TYPE' and 'CLASSIFICATION' columns in order to achieve more accurate results in the machine learning model.
    c. The "IS SUCCESSFUL" column served as the target while the remaining columns in the dataset served as the model features. With this cleaned data, we used StandardScaler and train_test_split to create the base for the machine learning model.
2. **Compiling, Training, and Evaluating the Model**

a. In the initial neural network model, we applied the features and two layers of hidden nodes; the first layer with 4 neurons and the second layer with 2. We used ReLu activation for the hidden layers to avoid returning negative inputs, and the Sigmoid activation as the output for logistic regression since there are only 2 possible outcomes. This initial model had an accuracy rate of 73.13%.
b. In the second model, we tweaked the number of neurons in the hidden node layers to 6 and 4, respectively. This adjustment yielded a 73.35% accuracy.
c. In the third model, we used the kerastuner search model in order to attempt to find the best hyperparameters. Despite letting the search find the best parameters, we saw a decline in accuracy as this model yielded a 73.31% accuracy rate.
d. In the final rendition, we changed the layer activation from ReLu to tanh (Hyperbolic Tangent Activation) which is a bit more aligned with the output activation Sigmoid. However, this model regressed down to 72.59%, which may have to do with the 'tanh' activation being more centered around input values near '0.'

Conclusion

In summary, we were not able to achieve the target accuracy of 75% at this point in time. It seems that the kerastuner search model performed the best among the models implemented. Perhaps with more training and testing on this model, along with adjusting the number of layers and the types of layer activation, the machine would surpass the 75% threshold requested from Alphabet Soup.