Alphabet Soup Charity: Deep Learning Report  
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Overview:

To predict the likelihood of applicants achieving success upon receiving funding from the fictional non-profit organization, Alphabet Soup, our objective is to devise a machine learning algorithm and employ neural networks.

Results:

* Deep Learning Attempt

**APPLICATION\_TYPE cutoff = 275  
CLASSIFICATION cutoff = 1500**  
  
layer1 = 80 : activation function = relu  
layer2 = 30 : activation function = relu

*Epochs: 100*  
*Loss: 0.5542781949043274, Accuracy: 0.7243148684501648*  
  
With an accuracy rate indicating that 72.4% of the model's predictions align with the original dataset's actual values, there is room for further optimization in the model, as evidenced by a loss value of 55.4%. To reach the desired accuracy target of 75%, specific adjustments are required.

* Optimization Attempt #1

**APPLICATION\_TYPE cutoff = 10  
CLASSIFICATION cutoff = 100**  
  
layer1 = 50 : activation function = relu  
layer2 = 12 : activation function = relu

*Epochs: 100  
Loss: 0.5522711277008057, Accuracy: 0.7255976796150208*

Following adjustments to both cutoffs and neurons, a loss value of 55.2% indicates the potential for further model optimization. The accuracy rate, standing at 72.5% and reflecting agreement between 72.5% of the model's predictions and the actual dataset values, signifies that specific refinements are required to attain the 75% accuracy target.

* Optimization Attempt #2

**APPLICATION\_TYPE cutoff = 50  
CLASSIFICATION cutoff = 10**  
  
layer1 = 100 : activation function = sigmoid  
layer2 = 42 : activation function = sigmoid

*Epochs: 75  
Loss: 0.5742185711860657, Accuracy: 0.724781334400177*

Following adjustments to the activation function, neurons, epochs, cutoffs, and the removal of the ORGANIZATION column, the model still presents room for further optimization, as evidenced by a loss value of 57.4%. The accuracy rate, currently at 72%, reveals alignment between 72% of the model's predictions and the original dataset values, indicating the need for specific refinements to reach the 75% accuracy target.

* Optimization Attempt #3

**APPLICATION\_TYPE cutoff = 100  
CLASSIFICATION cutoff = 100**

layer1 = 99 : activation function = tanh  
layer1 = 33 : activation function = relu  
layer2 = 11 : activation function = sigmoid

*Epochs: 125  
Loss: 0.5551036596298218, Accuracy: 0.7269970774650574*

Having made modifications to the activation function, neurons, epochs, cutoffs, and introducing an additional layer, the model's current loss value of 55.5% signifies potential for further optimization. While the accuracy rate stands at 72.7%, aligning with 72.7% of the model's predictions and the original dataset values, specific adjustments are required to reach the desired 75% accuracy target.

Summary:

In each of my three attempts, I couldn't achieve a predictive accuracy surpassing 72.7%. Despite applying hyperparameter tuning, there was only a marginal improvement. It might be worth exploring an alternative classification model to enhance the prediction of applicants' success with Alphabet Soup funding. If you're seeking to boost predictive accuracy for the same problem, you might want to consider using a Random Forest classifier as an alternative to the neural network model. This classifier combines multiple decision trees to mitigate overfitting and enhance generalization.