**Module 21 Challenge Assignment Report – charity\_data.csv**

**Ryan MacFarlane**

I ran a neural network analysis of the data within the ‘charity\_data.csv’ file provided. The preprocessing portion of my analysis can be summarized with the following:

* The target variable is the ‘IS\_SUCCESSFUL’ column, which is a binary field – 0 for unsuccessful, and 1 for successful.
* The features for this data are ‘APPLICATION\_TYPE’, ‘AFFILIATION’, ‘CLASSIFICATION’, ‘USE\_CASE’, ‘ORGANIZATION’, ‘STATUS’, ‘INCOME\_AMT’, ‘SPECIAL\_CONSIDERATIONS’, and ‘ASK\_AMT’.
* The ‘EIN’, and ‘NAME’ columns were dropped, as they would give no helpful information to the model.

On my initial model run, I selected a neural network with three total layers (two hidden and one output layer). I felt that these were a good first choice, because I have found that it is good to start a bit simpler and more straightforward and then make the model more complex as needed. Unfortunately, I was not able to meet the goal of 75% accuracy. Here is a list of the number of layers and neurons I used during each optimization attempt :

* First attempt – 3 total layers – 10 neurons in first, 6 in the second.
* Second attempt – 4 total layers – 14 in first, 8 in second, 4 in third.
* Third attempt – 5 total layers – 18 in first, 12 in second, 8 in third, 4 in fourth.
* Fourth attempt – 5 total layers – 12 in first, 20 in second, 24 in third, 18 in fourth.

In addition to these varied neural network setups, I also tried different cutoffs for the ‘OTHER’ category for the ‘APPLICATION\_TYPE’, and ‘CLASSIFICATION’ features, but to no avail. I also tried switching my original ReLU activation function to a Leaky ReLU, but that did not seem to help either. As far as other choices for models, I might suggest a Convolutional Neural Network as another candidate for this exercise, as I am using one for my Project 4 and getting much better results – although the problem is very different. It could be effective in breaking that elusive 75% accuracy mark.

In summary – the results of my model and optimization were not successful, my accuracy and F1 score were near 50 – which fell well short of the 75% accuracy mark suggested by the exercise.

Thank you!

Ryan