# Deep Learning HW Report

## Overview:

The non-profit foundation Alphabet Soup wants to create an algorithm to predict whether applicants for funding will be successful. The CSV containing the over 34,000 applications was sent over and was processed to use with a neural network model to predict the success of future applications.

## Results:

### Data Processing:

* The variable that I wanted to target was whether the applicant was successful or not. So, the Boolean variable IS\_SUCCESSFUL was the target.
* Initially the variables with the largest set of values to train to where application type and classification. Both had more than 15 unique values that could be used, while the rest had 10 or fewer.
* The variables EIN, STATUS and SPECIAL CONSIDERATIONS were considered unnecessary. EIN was a unique identifier for each application and could not be used to create any pattern. Status had only 5 values that differed from the other 34,000 and would not contribute to much. Special consideration had a similar number of differing values, 27.

### Compiling, Training, and Evaluating the Model:

* Three layers were used, first with 100 neurons, the second with 30 neurons, and the third with 10. The ReLu and sigmoid activation functions were used. ReLu is used on the larger layer for faster learning and the sigmoids are used on the smaller layers because we are trying to determine a probability of success.
* I was able to achieve an accuracy of 79%, which is very close to the target model.
* Attempted additional epochs with original setup, no discernible change in accuracy. Attempted larger layers with two ReLu layers and two sigmoid. Achieved marginally better accuracy. Attempted an additional sigmoid layer, made the model perform worse.

## Summary:

The neural network was able to predict whether an application would be successful about 80% of the time. A random forest classifier was able to achieve an accuracy of about 78%. The network is worth exploring much further in how to modify it to achieve a greater than 85% accuracy.