

Neural Network Model Written Report

1. Overview:

- a. The purpose of this neural network model is to create a tool to help the nonprofit foundation Alphabet Soup to be able to help select which applicants should be given funding that have the best chance of success in their venture. The data given contained over 34,000 organizations that have received funding from Alphabet Soup over the years.

2. Results:

a. Data Processing

- i. What variables are the targets for your model?
 1. The target variable is the 'IS_SUCCESSFUL' column from the application_df.
- ii. What variables are the features for your model?
 1. All of the rest of the columns in the data frame are the features for the model except the 'IS SUCCESSFUL' column. This is from dropping the 'IS SUCCESSFUL' on the X.
- iii. What variables should be removed from the input data because they are neither targets nor features for the dataset?
 1. 'EIN' and 'NAME' columns were dropped from the input because they were neither targets nor features.

b. Compiling, Training, and Evaluating the Model

- i. How many neurons, layers, and activation functions did you select for your neural network model, and why?
 1. I started with 3 hidden layers. The first hidden layer had 80 nodes, the second layer had 30 nodes and the third layer had 1 node. These were the quantities used in the startup code.
- ii. Were you able to achieve the target model performance?
 1. I was never able to achieve the target model performance of 75 accuracy. The closest that I achieved was 73.2 accuracy.

- iii. What steps did you take in your attempts to increase model performance?
 - 1. I then tried changing the number of nodes and adding a layer to try getting closer to the target model performance. I tried 8 nodes for the first layer, 16 for the second layer and 32 for the third layer and 1 for the fourth layer. I started with 100 epochs and tried increasing to 125 in an effort to improve the accuracy of the model. Increasing the epoch decreased the accuracy slightly.
- c. Summary: Summarize the overall results of the deep learning model. Include a recommendation for how a different model could solve this classification problem, and then explain your recommendation.
 - i. This deep learning model was around 73% accurate of correctly classified instances out of the total in the test set. Random Forest is a learning method that builds multiple decision trees and combines predictions to improve accuracy and reduce overfitting.