**Neural Network Model Analysis**

In this challenge we wanted to identify which organizations would be useful for Alphabet Soup funding over the years and to identify successful and unsuccessful spends provided by this charity. From the data source provided by the team, there were more than 34,000 organizations that have received funding over the years. Using Neural Network Analysis, we identified which organizations would provide the most successful turnaround by capturing the ‘Successful’ column to identify if funds provided were used effectively. Other variables of consideration were EIN, Name, Application Type, Affiliation, Classification, Use Case, Organization, Status, Income Amount, Special Considerations, and Ask AMT. From parsing through the data source, the EIN column was removed in the analysis as this volume did not capture any categorical data to use for binning or success as this served as a unique identifier to the charity name.

In the pre-processing stages, data was cleaned with columns of 10 unique values grouped together, categorical variables encoded with one-hot encoding, and split to training and testing datasets then standardized to provide testing through 100 epochs for accuracy and loss. The model used was a tensor flow keras model with 4 layers (initial, hidden, and output) using an initial relu activation, sigmoid for the 2 hidden layers, and lastly a sigmoid activation for the output layer.

In summary, the target of accuracy 75% or higher was achieved as shown on Figure 1, with 78.06% over 100 epochs. There was a significant amount of loss of 45.89%. To achieve higher target model performance, additional hidden layers and neurons and were introduced which didn’t make a difference and was removed from the model. After reviewing different Machine Learning models, Random Forest may be a good choice for next step iterations as this model type is used for modeling predictions and behavior analysis representing direct uses through classification problems and stories.

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**Figure 1:**

Table

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**Figure 2**