**Neural Network Model Report**

**Overview:**

The purpose of this analysis is to use neural network machine learning techniques to create a model. The model is requested by Alphabet Soup (a nonprofit foundation) to predict if applicants who are requesting for funding are successful in meeting all the required criteria.

**Results:**

Data Preprocessing:

Please refer to the CSV file to view the different variables that were used in the analysis.

* Target Variable: IS\_SUCCESSFUL
* Feature Variables: STATUS, ASK\_AMT, APPLICATION\_TYPE, AFFILIATION, CLASSIFICATION, USE\_CASE, ORGANIZATION, INCOME\_AMT, SPECIAL\_CONSIDERATIONS
* Variables that were removed during the optimization process:
  + EIN
  + NAME
  + STATUS
  + SPECIAL\_CONSIDERATIONS
  + ASK\_AMT
  + I felt that these variables had no direct effect on whether a company is a successful candidate in obtaining funding.

Compiling, Training, Evaluating the Model:

* In the initial attempt, a total of two hidden layers were used and both having the “relu” activation function. The first layer contained 8 nodes and the second layer contained 5. The output lawyer contained 1 node and the “sigmoid” function.
* After testing this model, we achieved a loss rate of 0.5562 and an accuracy rate of 0.7210.
* During the optimization process, a total of 4 additional attempts were made. The following images show the nodes, layers and activation functions that were used.

A screenshot of a computer program

Description automatically generatedA screenshot of a computer code

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A screenshot of a computer program

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A screenshot of a computer program

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As shown above, more and more units, layers and activation functions were added to the model to enhance optimization. This was done in hopes to achieve an accuracy rate of above 75%.

**Summary:**

In summary, the fifth attempt contained the best results with a loss rate of 0.5555 and accuracy rate of 0.7268. However, it was difficult to build a model to achieve the desired result of above 75%.

As such, it is recommended that an unsupervised learning model be used for this analysis using the PCA method. This will ensure that we can group the results in two clusters. After all, there are only two outcomes anyways: whether the funding was successful or not successful, and the clusters will help us determine these outcomes.