The report should contain the following:

1. **Overview** of the analysis: Explain the purpose of this analysis.

This analysis seeks to predict the likelihood of an organization’s success, for purposes of determining which to support with funding.

1. **Results**: Using bulleted lists and images to support your answers, address the following questions:

* Data Preprocessing[[1]](#footnote-1),[[2]](#footnote-2)
  + What variable(s) are the target(s) for your model?

The target is the IS\_SUCCESSFUL column. The model is seeking to determine the likelihood of predicting the successful outcome of the model.

A close up of a text

Description automatically generated

* + What variable(s) are the features for your model?

The features include the status, ask amount, application type, income amount, and special considerations. These values originated in the raw data, which was stripped of the names, and EIN, and normalized with the get\_dummies function.



* + What variable(s) should be removed from the input data because they are neither targets nor features?

Names and EIN

* Compiling, Training, and Evaluating the Model
  + How many neurons, layers, and activation functions did you select for your neural network model, and why?

I ran 14 permutations of this model. The highlighted model below, with 3 hidden layers of 10, 5, and 5 neurons, with activation functions of relu, sigmoid, sigmoid, and sigmoid, respectively, achieved the highest accuracy of 73.26%. Upon rerunning this function, it achieved a lower accuracy of 72.91%. Given the inconsistency and relatively low neuron count, I recommend using 3 hidden layers: 50 neurons/relu, 25 neurons/sigmoid, 5 neurons/sigmoid, output layer sigmoid, which achieved an accuracy of 72.98%.

A screenshot of a computer

Description automatically generated

* + Were you able to achieve the target model performance?

No

* + What steps did you take in your attempts to increase model performance?

I added a third layer, experimented with different activation functions, and changed the number of neurons, as shown in the image above.

1. **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.

The machine learning model has an accuracy of 72.98%, and a loss of 0.556. This loss indicates the difference between the actual target values and what the model predicts. It is a “summation of errors in our model” (<https://www.baeldung.com/cs/ml-loss-accuracy>). Accuracy is simply the ratio of accurate predictions to inaccurate predictions. Having an accuracy of 73% means that out of 100 funding decisions, 73 of those will be accurate, meaning funding went to a successful venture, or funding was withheld from an unsuccessful venture.

In the future, this model should be built with the kerastuner hyperparameter approach, which will optimize the neurons, layers, and activation models to achieve the best possible accuracy.

1. R, R. (2023, September 6). Decoding features and targets in Machine Learning: The Keys to model Success. *Marketcalls*. https://www.marketcalls.in/machine-learning/decoding-features-and-targets-in-machine-learning-the-keys-to-model-success.html#:~:text=In%20machine%20learning%2C%20features%20represent,based%20on%20the%20input%20features. [↑](#footnote-ref-1)
2. https://www.baeldung.com/cs/ml-loss-accuracy [↑](#footnote-ref-2)