**Step 4: Write a Report on the Neural Network Model**

For this part of the assignment, you’ll write a report on the performance of the deep learning model you created for Alphabet Soup.

The report should contain the following:

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

We are creating models to find a optimal fit based on accuracy.

Steps:

1. Eliminated columns that’s data was not trainable.
2. Binned data so that samples with low frequency were bundled under other.
3. Scaled the data.
4. Set up test environments.
5. Targeted variable “Is\_sucessful”
6. Fit model
7. Elevated the model
8. Saved Model
9. Created optimized model.
10. Attempt 1: Dropped more columns to changed thresholds for binned data to concise data.
11. Attempt 2: Added 1 hidden layers and more nodes to all layers.
12. Attempt 3: Changed the activation function to sigmoid from relu and doubled the epoch.
13. **Results**: Using bulleted lists and images to support your answers, address the following questions:

* Data Preprocessing
  + What variable(s) are the target(s) for your model?

“is\_sucessful”

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

All other columns were the features.

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

We determined that “Ein” , “name” , and “status” were columns that could be eliminated to add functionality to our data.

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

**Attempt 1:**

Neurons: 80 L1, 30L2. 1L3

Layers: 3

Activation functions: “relu”

**Attempt 2:**

Neurons: 100L1, 30L2, 10L3, 1L4

Layers: 4

Activation functions: “relu”

**Attempt 3:**

Neurons: 100L1, 30L2, 10L3, 1L4

Layers: 4

Activation functions: “Sigmund”

Ephochs changed: 100 -> 200

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

No I was not, unfortunately the closest attempt was 72.25%

* + What steps did you take in your attempts to increase model performance?
* Dropped more columns “status”. Increased thresholds to 2000 & 1.
* Increasing or decreasing the number of values for each bin

Increased thresholds to 2000 & 1.

* Add more neurons to a hidden layer

Attempts had neuron as follows:

Layer 1: 100

Layer 2: 30

Layer 3: 10

Layer 4: 1

* Add more hidden layers.

Added another hidden layer.

* Use different activation functions for the hidden layers.

Used sigmod instead of “relu”

* Add or reduce the number of epochs to the training regimen.

Changed the number of ephochs to 200.

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 results of our deep learning model were not efficient in being accurate to the allotted accuracy threshold. I constricted the information modeled within the dataset, organized the data into bins so it was more correlated. I ran three models on the dataset.

* + 1. The initial model had the 2 hidden layers and a limited amount of neurons on each layer. I used the relu modeling language.
    2. On my next attempt I restricted the data more by eliminating the status column in my dataset, I also set more constriction on my bins within the model.
    3. Next, I added a hidden layer and increased the amount on neurons on each level.
    4. Third I changed the relu method to sigmoid and ran an additional 100 epochs to try to get a better response.

This was conclusively not efficient to get a model that was 75% accurate. Given another test I would include 6 layers. Run one model on relu and the other on sigmoid. With a small, medium and significant number of neurons on each hidden layer. I would additionally look over the columns and try to eliminate anymore that would be unneeded variables / columns for choosing optimal charities.