Alphabet Soup Challenge

1. **Overview** of the analysis:
2. Alphabet Soup, a non-profit organization, aims to develop a tool for selecting funding applicants with the highest likelihood of success in their endeavours. Leveraging machine learning and neural network techniques, our objective is to build a binary classifier using the dataset's features. This classifier will predict the potential success of applicants if they receive funding from Alphabet Soup.
3. **Results**:

* Data Preprocessing
  + What variable(s) are the target(s) for your model?
  + For our model, the primary target variable chosen is "IS\_SUCCESSFUL." This variable serves as the key indicator to determine the effectiveness of utilizing funds after implementing our model.
  + What variable(s) are the features for your model? All data fields except “**EIN**” and “**NAME**” will serve as features for our model:
    - **APPLICATION\_TYPE**—Type of application submitted to Alphabet Soup.
    - **AFFILIATION**—Affiliated or sector of industry associated with applicant.
    - **CLASSIFICATION**—Classification of the organization based on government standards.
    - **USE\_CASE**—Intended use case for funding.
    - **ORGANIZATION**—Type of organization applying for funding.
    - **STATUS**—Current active status of organization.
    - **INCOME\_AMT**—Classification of the organization’s income level.
    - **SPECIAL\_CONSIDERATIONS**—Any special considerations mentioned in application.
    - **ASK\_AMT**—Amount of funding requested by the applicant.
  + What variable(s) should be removed from the input data because they are neither targets nor features?
    - The columns labeled “**EIN**” and “**NAME**” will be excluded from our analysis since they sever as identification column.
* Compiling, Training, and Evaluating the Model
  + How many neurons, layers, and activation functions did you select for your neural network model, and why?
    - For the initial model, I opted for a configuration comprising two hidden layers, with 88 and 132 neurons, respectively. This choice was guided by a commonly used rule of thumb, which suggests setting the number of neurons to be around 2 or 3 times the number of input features. In this case, with 44 input features, I selected 88 and 132 neurons accordingly. I chose ReLU as the activation function
* Were you able to achieve the target model performance?
  + - The initial model is achieving approximately 72% accuracy, which is in the desired target of 75%
  + What steps did you take in your attempts to increase model performance?
    - Added more neurons to a hidden layer.
    - Added more hidden layers.
    - Used different activation functions for the hidden layers.
    - Added or reduce the number of epochs to the training regimen.
    - Dropped columns ['EIN', 'NAME', 'SPECIAL\_CONSIDERATIONS', 'ASK\_AMT']. Which then gave us 41 input features.

1. **Summary**:

* The analysis involves building a neural network model to predict the success of funding applicants for Alphabet Soup. While the initial model shows promising results, efforts are made to further optimize the model's performance by adjusting various parameters and refining the input data. Further iterations and fine-tuning may be necessary to achieve the desired target accuracy of 75%.