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.

ANSWER

The purpose of this analysis is to develop and evaluate machine learning models for a classification task. Specifically, the goal is to train models that can accurately classify data instances into predefined categories or classes based on input features.

1. 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?

ANSWER

Target variable is : 'IS\_SUCCESSFUL’

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

ANSWER

The feature variable is all other columns except 'IS\_SUCCESSFUL’

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

ANSWER

'EIN' and 'NAME'

Apart from this there are two more columns removed to optimize performance.

STATUS', 'SPECIAL\_CONSIDERATIONS

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

ANSWER: In first attempt

1. Neurons (Hidden Layers):
   * First Hidden Layer: 11 neurons
   * Second Hidden Layer: 4 neurons
2. Activation Functions:
   * ReLU (Rectified Linear Unit) is used as the activation function for both hidden layers.
   * Sigmoid activation function is used for the output layer.
3. Layers:
   * Two hidden layers and one output layer.

Reason: The number of neurons in each hidden layer (8 and 5) is arbitrary

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

ANSWER

No target not achieved.

Since the accuracy is 72

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

ANSWER

I removed more columns to achieve accuracy.

Removed column’s: STATUS', 'SPECIAL\_CONSIDERATIONS

Also, did two more trials as below:

2nd trial:

Two hidden layers were used with 10 neurons in the first hidden layer and 8 neurons in the second hidden layer. ReLU activation function was used for both hidden layers, and the output layer used the sigmoid activation function.

* Results:
  + Loss: 0.5535
  + Accuracy: 72.58%
* Observation:
  + The model achieved an accuracy of approximately 72.58%, indicating that it correctly classified around 72.58% of the data instances in the test set.

Trial 3:

* + Similar to trial 2, two hidden layers were used with 20 neurons in the first hidden layer and 20 neurons in the second hidden layer. ReLU activation function was used for both hidden layers, and the output layer used the sigmoid activation function.
* Results:
  + Loss: 0.5646
  + Accuracy: 72.48%
* Observation:
  + The model achieved an accuracy of approximately 72.48%, slightly lower than the accuracy obtained in trial 2.

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.

ANSWER

The overall results of the deep learning model indicate that the neural network architectures experimented with achieved accuracies in the range of approximately 72-73%. Here's a summary of the key points:

Trial 2: Achieved an accuracy of approximately 72.58% with a loss of 0.5535.

Trial 3: Obtained an accuracy of approximately 72.48% with a loss of 0.5646.

These results suggest that the models were able to learn from the data to some extent, but there is room for improvement.

Recommendation for a Different Model:

Given the moderate performance of the deep learning models, an alternative approach to solve this classification problem could involve using an ensemble learning technique such as Random Forest