Deep Learning Challenge: Charity Funding Predictor

Overview:

Alphabet Soup, a non-profit organization, aims to create an algorithm to predict the likelihood of an applicant successfully receiving funding. Leveraging machine learning and neural networks, the objective is to utilize the provided dataset's features to develop a binary classifier capable of predicting whether an applicant will be successful when funded by Alphabet Soup.

Results:

To prepare the data, unnecessary features were removed. After eliminating the EIN and NAME columns, the remaining features were considered for model training. The NAME column was reintroduced for binning purposes during subsequent tests. The dataset was then split into training and testing sets. The target variable (IS_SUCCESSFUL) indicates whether the funding was successful (1 for yes, 0 for no). Both APPLICATION and CLASSIFICATION features were analyzed, with the latter being binned into categories to group rare variables under the “Other” category. Categorical features were one-hot encoded using get_dummies(), followed by checks to confirm successful binning.

Compiling, Training, and Evaluating the Model:

A neural network with three layers was used. The number of hidden nodes was dictated by the number of input features. Each hidden layer used the ReLU activation function, and the output layer utilized the sigmoid activation function for binary classification.

Model Summary:

- Layer 1: 7 input features, 350 parameters
- Layer 2: 14 hidden nodes, 112 parameters
- Output Layer: 1 node, 15 parameters

The model created 477 trainable parameters in total. In the first training iteration, the model achieved an accuracy of 73.2%, just below the target of 75%. Despite being slightly under the desired performance, this result was promising for a first attempt.

Optimization:

In the second attempt, the NAME feature was included to test its impact. This time, the model architecture involved a higher number of trainable parameters (3,298 in total). The optimized model achieved a significant improvement, reaching an accuracy of 78.9%, surpassing the target of 75% by 4%.

Model Summary (Second Attempt):

- Layer 1: 7 input features, 3,171 parameters
- Layer 2: 14 hidden nodes, 112 parameters
- Output Layer: 1 node, 15 parameters

The inclusion of the NAME feature and the adjustment of layers resulted in a stronger performance, making the model a reliable predictor for the desired binary classification task.

Conclusion:

The neural network demonstrated significant improvement during optimization, achieving an accuracy of 79%. This performance indicates that the model effectively captures the underlying patterns in the data. Utilizing multiple layers in deep learning is crucial, as the model learns to identify and classify input data through multiple filtering layers, ensuring more accurate predictions. The model is suitable for deployment, especially after further fine-tuning to handle any remaining edge cases.