Michael Dake

2/21/2022

# Deep Learning Challenge

Overview

The goal of this project is to use machine learning and neural networks to predict whether applicants will be successful if funded by the fictional company Alphabet Soup.

## Process

I read an excel file into pandas containing more than 34,000 organizations which had received funding from Alphabet Soup with several columns of data about each organization. I processed the data with the following steps:

- dropping non-beneficial columns,
- finding the number of data points for each unique value for each of the columns that had more than 10 unique values - APPLICATION_TYPE and CLASSIFICATION,
- choosing a cutoff point of 600 and 300, respectively, to bin rare categorical values together into a new value called "Other",
- using `pd.get_dummies()` to convert categorical data to numeric,
- dividing the data into a target array (IS_SUCCESSFUL) and features arrays,
- applying the `train_test_split` to create a testing and a training dataset,
- and finally, using `StandardScaler` to scale the training and testing sets

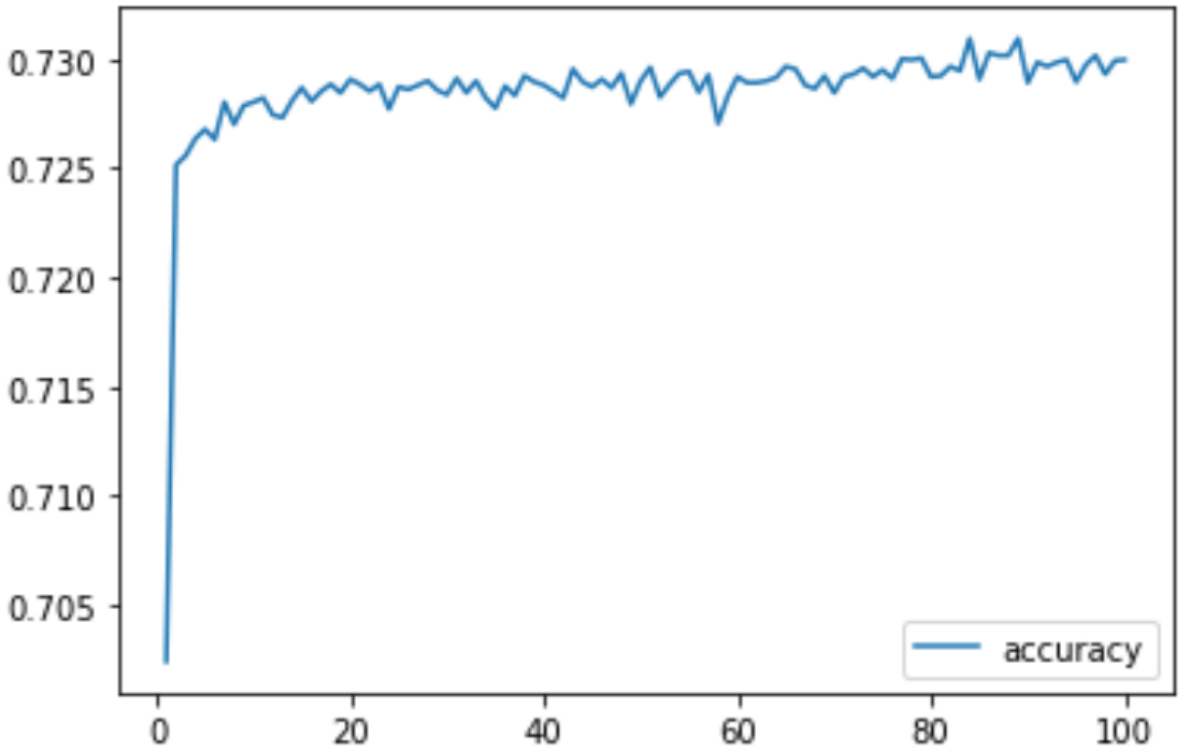
I attempted to achieve a target accuracy of higher than 75%, however after three attempts I was not able to get it higher than an average of 72%.

## Test 1

This was the first prime test and achieved an accuracy of 72%.

The hyperparameters used were:

- layers = 2
    - layer1 = 9 neurons and ‘relu’ activation function
    - layer2 = 18 neurons and ‘relu’ activation function
- epochs = 100

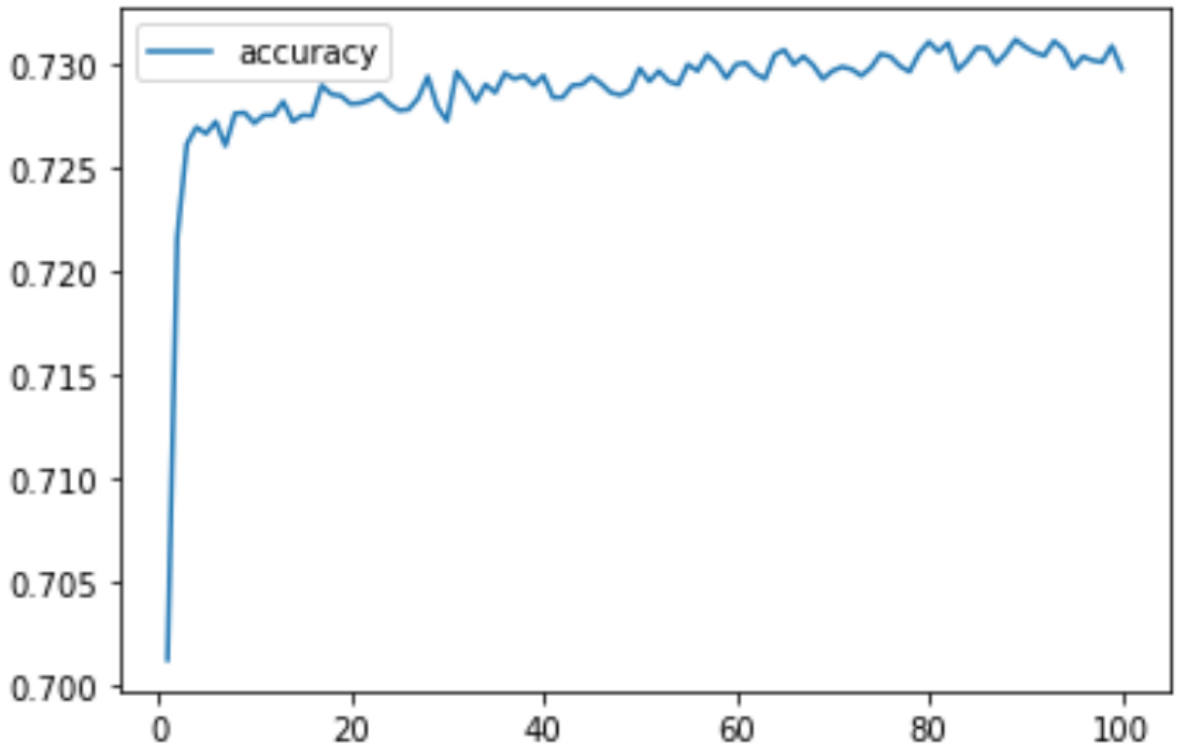


## Test 2 – Hidden Layers

For the second test I added another layer which resulted in an accuracy score of 72.1%.

The hyperparameters used were:

- layers = 3
    - o layer1 = 9 neurons : activation function = ‘relu’
    - o layer2 = 18 neurons : activation function = ‘relu’
    - o layer3 = 27 neurons : activation function = ‘relu’
- epochs = 100

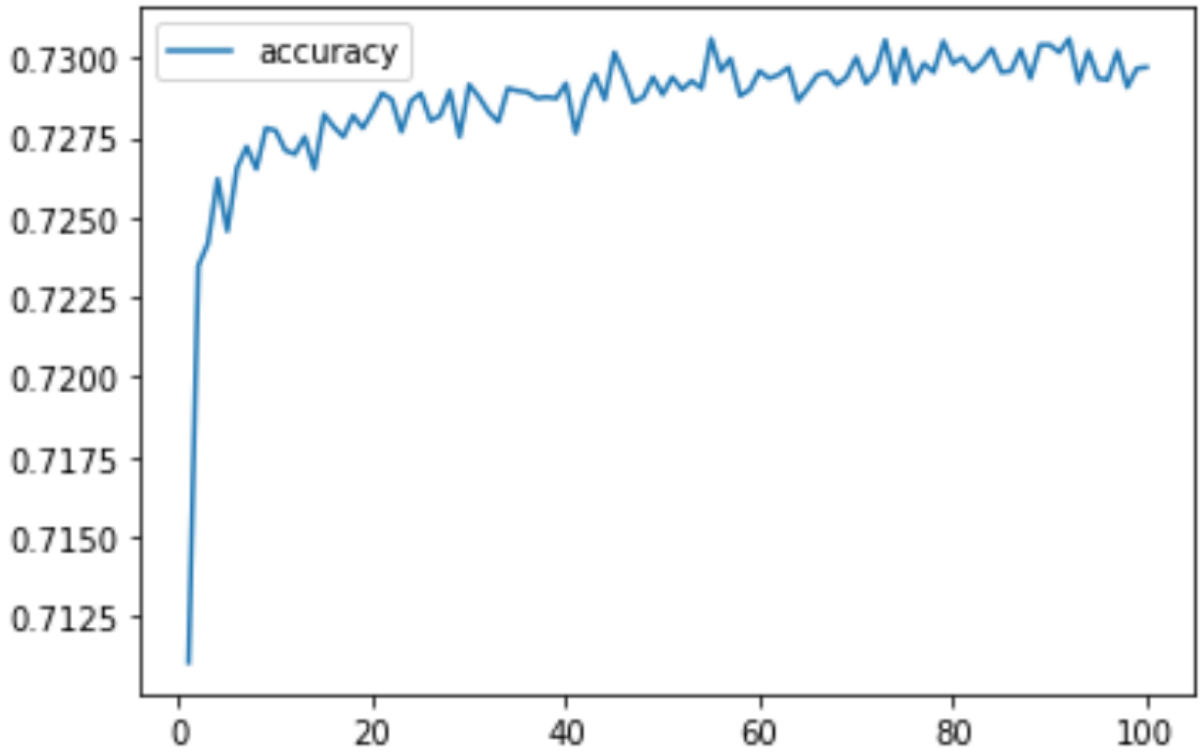


## Test 3 – Activation Functions

For the third test I changed the activation functions for layers 2 and 3 which resulted in an accuracy of 72%.

The hyperparameters used were:

- layers = 3
    - o layer1 = 9 neurons : activation function = ‘relu’
    - o layer2 = 18 neurons : activation function = ‘tanh’
    - o layer3 = 27 neurons : activation function = ‘tanh’
- epochs = 100




Summary

Hypertuning made almost no impact on the accuracy rating as the highest score was from my second attempt at 72.1%. Perhaps a different classification model would be better at predicting the success rate of applicants funded by Alphabet Soup.