

Report: charity-funding-success-predictor

Deep Learning Project by Christopher Denq

Abstract

The non-profit foundation Alphabet Soup is interested in predicting which charity fundings end up being successful. Data containing more than 34,000 organizations previously funded by Alphabet Soup and their metadata is preprocessing and fitted into a deep learning neural network.

This process utilizes two different strategies:

- a baseline, “manual” attempt in which the hyperparameters of the neural network are predefined and fitted onto the data (73% accuracy) and
- an optimized, “automatic” attempt in which the hyperparameters were systematically tested used keras tuner (74% accuracy)

Results

Data Preprocessing

What variable(s) are neither targets nor features, and should be removed from the input data?

- Removed the EIN and NAME features, as these are metadata

What variable(s) are considered the target(s) for your model?

- Since this is a classification model, the IS_SUCCESSFUL feature is the target

What variable(s) are considered to be the features for your model?

- After one-hot encoding all of the remaining features were the multi-variate features passed in

Compiling, Training, and Evaluating the Model

How many neurons, layers, and activation functions did you select for your neural network model, and why?

```
# Get best model hyperparameters
best_hyper = tuner.get_best_hyperparameters(1)[0]
best_hyper.values

{'activation': 'sigmoid',
 'first_units': 3,
 'num_layers': 3,
 'tuner/bracket': 2,
 'tuner/epochs': 20,
 'tuner/initial_epoch': 7,
 'tuner/round': 2,
 'tuner/trial_id': 'cab05230889b2ed301ceffadbd3eff74',
 'units_0': 7,
 'units_1': 5,
 'units_2': 5,
 'units_3': 7,
 'units_4': 3}
```

- Ultimately the sigmoid activation function, 3 neurons per, and 3 layers were used. These provided the highest model accuracy during a loop search.

Were you able to achieve the target model performance?

```
268/268 - 1s - loss: 0.5637 - accuracy: 0.7420 - 550ms/epoch - 2ms/step
Loss: 0.5637046694755554, Accuracy: 0.7419769167900085
```

- Unfortunately, even with a hyperparameter optimization, the model could not perform above 75%.

What steps did you take to try and increase model performance?

- Using the keras tuner, the model was tested against every combination of relu, tanh, and sigmoid activate functions at 1-10 neurons in the first layer, 1-6 hidden layers (each between 1-10 neurons), and an output layer.

Summary

In this initial testing, the neural model demonstrated a decent capacity for predicting charity success, which provides Alphabet Soup with additional information on which charities to fund moving forward. Further optimizations can be performed in the future (different preprocessing, additional data, etc); further testing (testing model's variance to check for overfitting) to verify the model's potency.

One specific way to adjust the model would be to apply a PCA and/or tSNE model during the preprocessing step to reduce the number of features (and therefore, the amount of noise).