

Exercise 4: Part 5

Neural Networks

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Description

Using either FNN from scratch or Scikit learn:

1. Try training the FNN model with two selected classification datasets (Abalone and any other dataset of your choice) from the UCI machine learning repository. Process the Abalone dataset so that you have 4 classes (ring size).
2. Evaluate the effect of number of hidden neurons, and learning rate [0.1, 0.2 ...1] using AUC and Classification Accuracy.
3. Try 10 experiments with different random state in data split (60/40 train/test) or different initial weights for each run.
4. Report the mean and standard deviation for each experiment.
5. Show convergence plot, ROC-AUC curve, F1-Score, Confusion Matrix for the best run.

Advanced exercise: use FNN from Scratch code and extend it further.

1. Try to add another hidden layer and update the forward and backward pass.
2. Can you generalise to any user-selected number of hidden layers? Discuss how you will do this and implement it if possible.
3. Add AdaGrad and Adam optimisers
4. Add Dropouts
5. Compare the effect of AdaGrad, Adam and Dropouts for the above datasets (use Keras or Scikit-learn to do this in case you can't code from scratch).