Project 3:  
Neural Networks and Classification

### Andy Varner 12153597 Fall 2022

Experiments

Talk about this in general:

The purpose of this project is to gain a meaningful introductory understanding of Neural Networks. We approach this through the classification of four two-dimensional data sets with increasing levels of difficulty:

* two linearly separable classes
* two nonlinearly separable classes
* two *highly* nonlinearly separable classes
* ten nonlinearly separable classes

# Design

What to choose as train, validation and test data?

The datasets are generated using the numpy library.

# Evaluation

Resub and cross-validation

Build and report confusion metrics

Report various metrics (e.g. acc, recall, precision, f1 score)

# Network

Architecture: experiment with width vs. depth, nonlinearities, error functions, and other architectural parameters

Optimization: experiment with SGD, momentum, Adam

Experiemnt with variations in optimization parameters

RESULTS SECTION

Talk about interestin gstuff for each class

--recall, accurarcy, precision, f1, confusion matrix, accuracy/loss graphs, color coded image for each task (different intuition for what the network is doing. Show decision boundaries being created)

Conclusions and Future Work

This project serves as an introduction to

# References

[1] J. M. Keller, D. Liu, and D. B. Fogel, *Fundamentals of Computational Intelligence*. John Wiley & Sons, 2016.

[2] A. P. Engelbrecht, *Computational Intelligence*. John Wiley & Sons, 2002.

[3]