CST3990 Undergraduate Individual Project

Pistachio Classification Using a Multilayer Perceptron

Contents

Overview

- The aim of this project is to classify Kirmizi and Siirt pistachio samples using a MLP.
- The resulting best accuracy observed was 92.79%.
- Below I will discuss the dataset, the MLP and the results.

Dataset

- The dataset consists of 2148 samples, 1232 of Kirmizi and 916 of Siirt pistachios.
- Each sample consists of 28 features extracted from pistachio images.
- The data is normalized to values between 0 and 1.
- The classes are mapped to target prediction values 0 and 1.
- The dataset is shuffled randomly and split 80/20 for training and testing.

MLP

- The MLP uses a 2-unit hidden layer and single unit output layer.
- The logistic function is used as the transfer function for all layers of the network.
- The weights are initialized randomly and learned using gradient descent and backpropagation.
- The loss function used is $\frac{1}{2}\sum_{i=1}^{n}(o_i - t_i)^2$

Parameters

I've tried to keep the program general to help in hyperparameter tuning. Some of the parameters are:

- The number of hidden layers.
- The size of each hidden layer.
- The number of iterations to train for.

Biases are not implemented in this MLP.

Results

- With a large enough number of training iterations, the performance fluctuated around 90%.
- The best performance observed was 92.79% after 10000 iterations.
- There may be a lot of room for improvement by tuning the hyperparameters.