

Description

This script is designed to train and evaluate a neural network on the MNIST dataset, a well-established benchmark for image classification tasks involving handwritten digits.

The process begins with loading the MNIST dataset, which consists of grayscale images of handwritten numbers. The script extracts the features and labels from this dataset, normalizing the pixel values to a range between zero and one. The data is then split into two subsets: one for training the model and one for evaluating its performance.

A neural network is then configured with a specific architecture, including input features that correspond to the dimensions of the images, a hidden layer with a defined number of units, and an output layer that represents the digit categories. The network's weights are initialized randomly to start the training process.

To train the neural network, the script employs an optimization algorithm to adjust the weights. This involves minimizing a cost function that measures how well the network's predictions match the actual labels. The optimization process iteratively refines the network's parameters to improve its accuracy.

Once training is complete, the neural network's performance is assessed using both the training and testing datasets. The script calculates the accuracy of the network's predictions to evaluate how well it generalizes to new, unseen data. Additionally, precision is computed to provide insight into the reliability of the network's positive predictions.

Finally, the trained weights of the neural network are saved to text files. This step allows for the reuse of the trained model or further analysis of the learned parameters.

Overall, the script provides a complete pipeline for training a neural network on the MNIST dataset, evaluating its performance, and saving the model for future use. It leverages libraries for data handling, numerical computations, optimization, and performance evaluation to achieve these tasks.