CSE 421 – Embedded Machine Learning
Homework 4 – Bonus (Listing 10.4)

Can Sarp Aridogan
Ahmet Renda Sendag

1. Objective

The objective of the bonus task is to implement Listing 10.4 for handwritten digit recognition and evaluate its performance using a lightweight model suitable for embedded systems.

2. Dataset and Feature Extraction

The MNIST handwritten digit dataset is used in this experiment. Each image is a 28×28 grayscale digit. Hu invariant moments are extracted from each image to represent global shape characteristics. Seven Hu moments are computed per image and normalized using statistics obtained from the training set.

3. Model

A lightweight linear model is trained using least squares regression. A sigmoid threshold is applied to perform binary classification between the digit zero and all other digits.

4. Results

The implemented system achieved an accuracy of 0.902 on the MNIST test set. The number of false negatives is 980.

5. Conclusion

The results demonstrate that the approach presented in Listing 10.4 is effective for handwritten digit recognition while remaining computationally efficient. The method is well suited for deployment on embedded platforms.