KECE470: Pattern Recognition

School of Electrical Engineering, KOREA UNIVERSITY

(Homework #3) Artificial Neural Networks

Report containing the code, results, discussions

In this homework, we will use MNIST dataset which can be downloaded from http://yann.lecun.com/exdb/mnist/. You will write a program to construct and train a Multi-Layer Perceptron (MLP), then use it to predict class label of the test data. **Please submit a report file and codes, respectively.**

Please answer the following questions.

1. **(Download MNIST dataset)** The data has been divided into several sets for training and test. You will randomly take 10% of the training set as validation set.

2. **(Explain Activation Function)** Describe the role of the activation function, and give examples such as sigmoid and ReLU.

3. **(Explain MLP)** Describe MLP formula (e.g. 2 layers) with respect to weight and bias, and explain training process (backpropagation)

4. **(Training and Evaluation)**
   a. Build a three-layer perceptron. At this time, make the hidden node 1024 dimensions and use ReLU.
   b. After the last layer, use softmax and cross-entropy as the loss function.
   c. Graph validation accuracy and test accuracy for each epoch, and check when convergence occurs.
   d. Consider ways to increase the performance of the designed MLP.

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