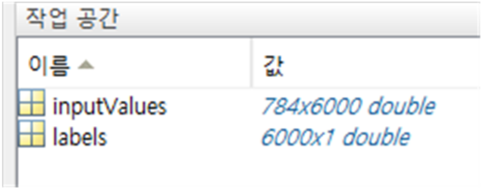
실습 - Machine Learning 코드 설명

Seoul National University of Science and Technology

코드 설명

- **훈련(학습) 데이터를 로드한다**

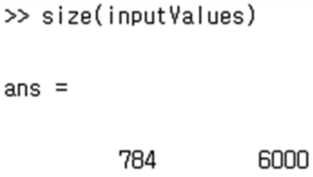
```
close all; clear all; clc

% Load MNIST dataset.
load('training_data.mat')
```



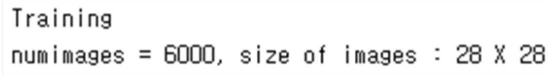
작업 공간

이름 ▲	값
inputValues	784x6000 double
labels	6000x1 double

```
fprintf('Training\nnumimages = %d, size of images : %d X %d\n',...
    size(inputValues,2),sqrt(size(inputValues,1)),sqrt(size(inputValues,1)))
```



```
>> size(inputValues)

ans =

         784        6000
```

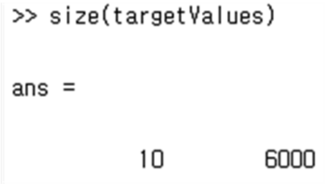


```
Training
numimages = 6000, size of images : 28 X 28
```

코드 설명

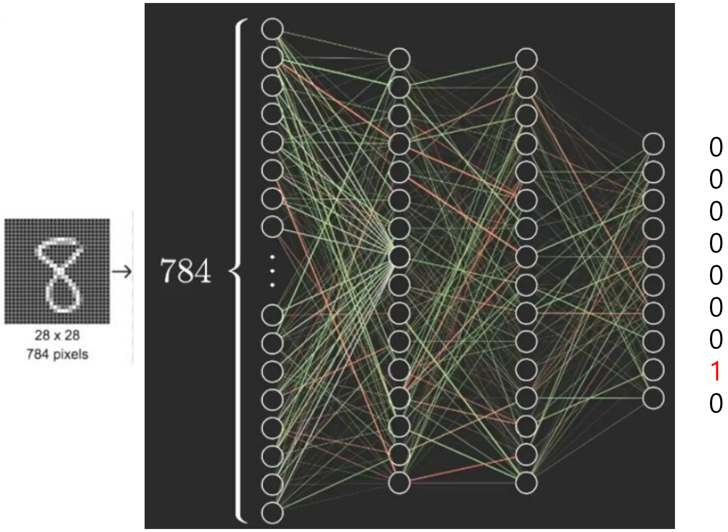
- 인공신경망 학습을 위해 각 이미지의 label을 출력 노드에 적용한다

```
% Transform the labels to correct target values.
targetValues = 0.*ones(10, size(labels, 1));
```



```
>> size(targetValues)

ans =

          10        6000
```

```
for n = 1: size(labels, 1)
    targetValues(labels(n) + 1, n) = 1;
end
```



코드 설명

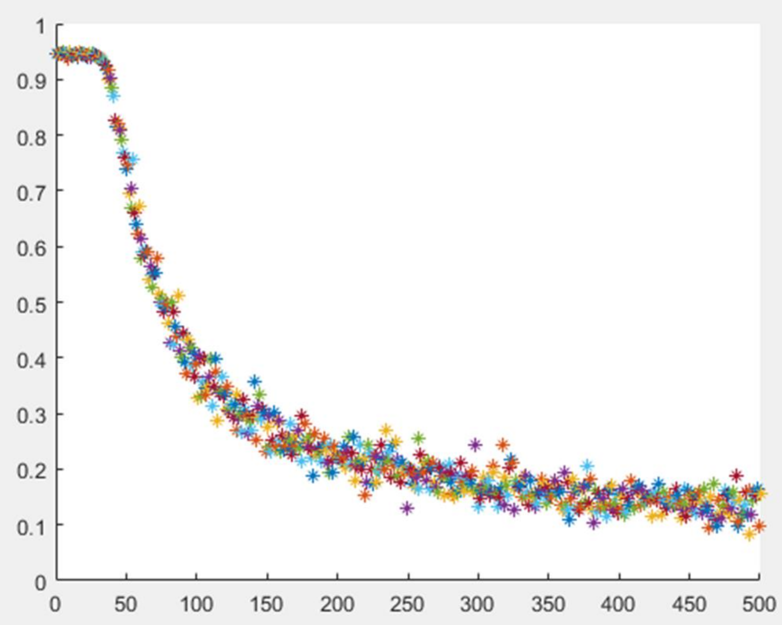
- 인공신경망 학습을 위한 파라미터들을 설정한다

```
% Choose form of MLP:
numberOfHiddenUnits = 150;

% Choose appropriate parameters.
learningRate = 0.3;

% Choose activation function.
activationFunction = @logisticSigmoid;
dActivationFunction = @dLogisticSigmoid;

% Choose batch size and epochs.
batchSize = 200;
epochs = 400;

fprintf('Train two layer perceptron with %d hidden units.\n', numberOfHiddenUnits);
fprintf('Learning rate: %d.\n', learningRate);
```

코드 설명

- 인공신경망 학습을 수행한다

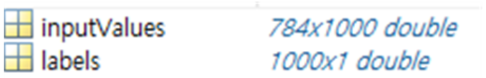
```
[hiddenWeights, outputWeights, error] = ...
    trainStochasticSquaredErrorTwoLayerPerceptron(...
    activationFunction, dActivationFunction, numberOfHiddenUnits, inputValues, ...
    targetValues, epochs, batchSize, learningRate);
```



코드 설명

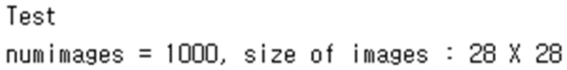
- 검증(validation)을 위해 테스트 데이터를 로드한다

```
% Load validation set.
load('test_data.mat')
```



```
inputValues    784x1000 double
labels         1000x1 double
```

```
fprintf('Test\nnumimages = %d, size of images : %d X %d\n', ...
    size(inputValues,2),sqrt(size(inputValues,1)),sqrt(size(inputValues,1)))
```

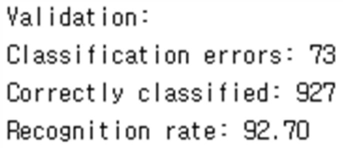


```
Test
numimages = 1000, size of images : 28 X 28
```

코드 설명

- 검증(validation)을 수행한다

```
fprintf('Validation:\n');

[correctlyClassified, classificationErrors] = ...
    validateTwoLayerPerceptron(activationFunction, hiddenWeights, ...
    outputWeights, inputValues, labels);

fprintf('Classification errors: %d\n', classificationErrors);
fprintf('Correctly classified: %d\n', correctlyClassified);
recognition_rate = 100*correctlyClassified/size(inputValues,2);
fprintf('Recognition rate: %.2f\n', recognition_rate);
```

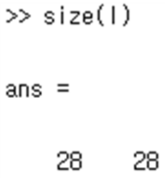


```
Validation:
Classification errors: 73
Correctly classified: 927
Recognition rate: 92.70
```

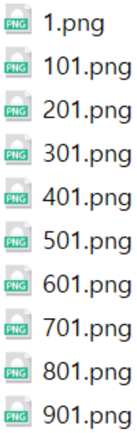
코드 설명

- 이미지들을 쓰고 읽고 그려본다

```
% save and show some images
figure
for i=0:9
    I = reshape(inputValues(:,i*100+1), 28, 28);
    imwrite(I, strcat(num2str(i*100+1), '.png'));
    img=imread(strcat(num2str(i*100+1), '.png'));
    subplot(2,5,i+1);
    imshow(img);
end
```



```
>> size(I)

ans =

    28    28
```



```
1.png
101.png
201.png
301.png
401.png
501.png
601.png
701.png
801.png
901.png
```