Звіт

до лабораторної роботи №6

з предмету Комп'ютерне бачення та аналіз зображень

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MNIST digit classification using neural networks:

```
In [6]: from sklearn.datasets import fetch_openml
        from sklearn.neural_network import MLPClassifier
        from sklearn.preprocessing import normalize
        from sklearn.model_selection import train_test_split
        #Get MNIST Dataset
        print('Getting MNIST Data...')
        mnist = fetch_openml('mnist_784')
        print('MNIST Data downloaded!')
        images = mnist.data
        labels = mnist.target
        #Preprocess the images
        images = normalize(images, norm='l2') #You can use l1 norm too
        #Split the data into training set and test set
        images_train, images_test, labels_train, labels_test = train_test_split(images, labels, test_size=0.25, random_state=17)
        #Setup the neural network that we want to train on
        nn = MLPClassifier(hidden_layer_sizes=(100), max_iter=20, solver='sgd', learning_rate_init=0.001, verbose=True)
        #Start training the network
        print('NN Training started...')
        nn.fit(images_train, labels_train)
        print('NN Training completed!')
        #Evaluate the performance of the neural network on test data
        print('Network Performance: %f' % nn.score(images_test, labels_test))
```

```
Getting MNIST Data...
MNIST Data downloaded!
NN Training started...
Iteration 1, loss = 2.30038204
Iteration 2, loss = 2.26290749
Iteration 3, loss = 2.22659572
Iteration 4, loss = 2.18568407
Iteration 5, loss = 2.13773494
Iteration 6, loss = 2.08200647
Iteration 7, loss = 2.01808287
Iteration 8, loss = 1.94612131
Iteration 9, loss = 1.86723324
Iteration 10, loss = 1.78310386
Iteration 11, loss = 1.69581950
Iteration 12, loss = 1.60766568
Iteration 13, loss = 1.52053457
Iteration 14, loss = 1.43603774
Iteration 15, loss = 1.35546881
Iteration 16, loss = 1.27957259
Iteration 17, loss = 1.20892993
Iteration 18, loss = 1.14376808
Iteration 19, loss = 1.08417539
Iteration 20, loss = 1.02998682
NN Training completed!

Network Performance: 0.803486
```