

Note: the codes of question 1 and 2 are implemented in question 3, please check '3_a.py' and '3_e.py' to find the pure version of the codes for question 1 and 2.

3. Testing Algorithms on Data

a) Please run **'python 3_a.py'**.

At the top of this file, the user is able to setting up the number of neurons and activation functions for different layers, learning rate, regularization parameter and training iterations. At last, it will print out all the learned weights and biasses of all layers as well as the activations of the last layer.

b) Please run **'python 3_b.py'**

The user can set up the parameters for SMO algorithm in line 119.

c) Please run **'python 3_c.py'**

The user can set up the value of learning rate, regularization parameter and iterations in line 46-48.

d)

i) Please run **'python 3_d_i.py'**,

The user is also allowed to set up the parameters for the neural network at the top of the file.

ii) Please run **'python 3_d_ii.py'**

The user can set up the parameters for SMO algorithm in line 138.

iii) Please run **'python 3_d_iii.py'**

The user can set up the value of learning rate, regularization parameter and iterations for training 1 vs all logistic regression classifier in line 64-66.

e)

i) Please run **'python 3_e_i.py'**,

The user is also allowed to set up the activation functions, learning rate, regularization parameter and training iterations for the auto-encoder at the top of the file.

The user is also allowed to set up all the necessary parameters for the neural network.

The code will first train an auto-encoder to reduce the dimension of the training dataset, and then apply the learned parameters to testing dataset to do dimensional reduction.

Second, it will start to train a neural network using the 100 dimensional training data, and then test it on the 100 dimensional testing dataset to print out classification error at last.

ii) Please run '**python 3_e_ii.py**'

The user is allowed to set up all the necessary parameters for the auto-encoder as I mentioned above, and also can set up the parameters for SMO algorithm in line 247.

iii) Please run '**python 3_e_iii.py**'

The user is allowed to set up all the necessary parameters for the auto-encoder as well as the parameters for training 1 vs all logistic regression classifier in line 171-172.

f) Please run '**python 3_f.py**'

g) Please run '**python 3_g.py**'

h) Please run '**python 3_h.py**'

The user is allowed to set the value of K and σ in line 104.