CS457 - Computational Intelligence
Project 1

Implement a classifier for characters L and I using the discrete perceptron learning algorithm (Section 3.3.3 in textbook). You may use any implementation, including the one in Ch. 3 (textbook).

What to do:

1. Use a 3 x 3 binary matrix representation of the characters.
2. Create a training set (vectors representing versions of characters L and I). Start with two vectors, one for L and one for I. Then experiment by adding to the training set more vectors representing graphical variations of the two characters.
3. Your neural network should have one neuron.
4. Create a test set using vectors not used for training, and test your classifier. Compute the accuracy: accuracy = (# correctly predicted characters / # test characters) × 100%.
5. Repeat Steps 1-4 using a 5 x 5 binary representation.

Hint: Do not forget that perceptron learning requires fixing of one component of the input vector, usually at the -1 level. If you plan to use your own implementation, the following link may be useful: https://machinelearningmastery.com/implement-perceptron-algorithm-scratch-python/

At the end, answer the following questions:

Q1. Does your training always converge? If not, explain why.

Q2. When you increase the resolution of the matrix representation, will this improve the classification accuracy? Explain why.

What to upload in a compressed folder (Canvas):

- The numerical results of your experiments and your conclusions.
- Describe which implementation you used.
- If it is your code, attach it.