BIN2023R01 – INTRODUCTION TO DATAMINING & MACHINE LEARNING FOR BIOINFORMATICS

Lab Exercise 10 - Classification with Neural Network

Aim: To construct an MLP-based neural network model that can classify and predict the digit dataset.

Procedure:

1. Load the digit dataset from the scikit-learn library.
2. Import necessary packages for constructing and evaluating a multi-layer perceptron (MLP) neural network model.
3. Visualize the data distribution to gain insights into its properties and characteristics.
4. Construct an MLP classifier-based neural network model for the digit dataset.
5. Evaluate the model's performance using appropriate performance metrics.
6. Apply the trained model to make predictions on user-defined data.

Questions:

1. What is an MLP and how does it differ from a single-layer perceptron? Explain the architecture of an MLP.
2. What are activation functions in the context of MLPs? Why are they necessary?
3. How are weights initialized in an MLP? What is the purpose of the bias term in an MLP?
4. Describe the process of forward propagation in an MLP. What is backpropagation and how is it used to train an MLP?
5. What is the role of optimization algorithms (e.g., gradient descent) in training an MLP? What are some common hyperparameters that need to be tuned in an MLP?
6. What is overfitting in the context of MLPs and how can it be addressed?
7. Can MLPs handle non-linear data? Explain.
8. Can an MLP be used for regression tasks as well as classification tasks? If so, how?
9. What are some limitations of MLPs compared to other neural network architectures?

Soft copy deadline: April 15th, 11:59PM
Hard copy deadline: April 16th, 3:15PM