Nguyễn Minh Đức - ITITIU21045

Lab 8&9: Perceptron

Objective

The assignment aims to create and compile a perceptron from scratch to learn how this simple but powerful linear binary classifier works. In the following sections you can find a summary of what a perceptron is and how it works, and finally the text of the assignment.

Methodology

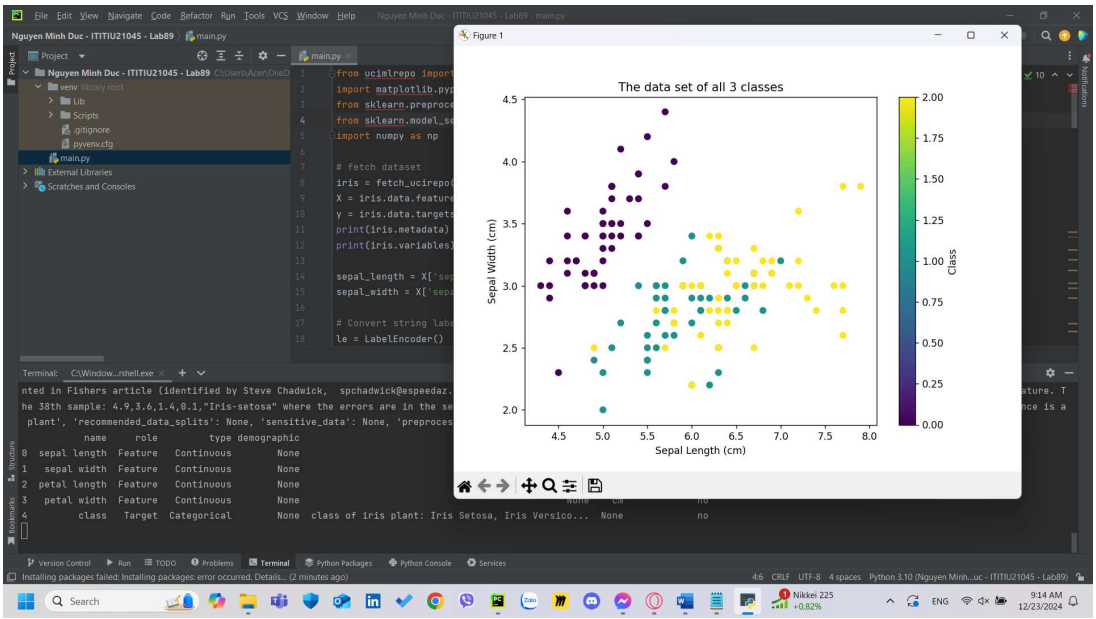
Iris Dataset Analysis

- Utilized ucimlrepo library for binary classification task.
- Focused on Iris-setosa and Iris-versicolor classes.
- Dataset split into training (80%) and testing (20%) sets.
- Implemented perceptron algorithm from scratch.
- Initialized weights and bias, iteratively updated using learning rule.
- Tuned learning rate and number of iterations.
- Used bipolar activation function for weight updates.
- Perceptron trained on training dataset and used to predict test dataset classes.
- Model performance evaluated by calculating accuracy on both sets.

Results

The perceptron model achieved 100% accuracy on the training set and 95% accuracy on the testing set.

a) Data set of all 3 classes



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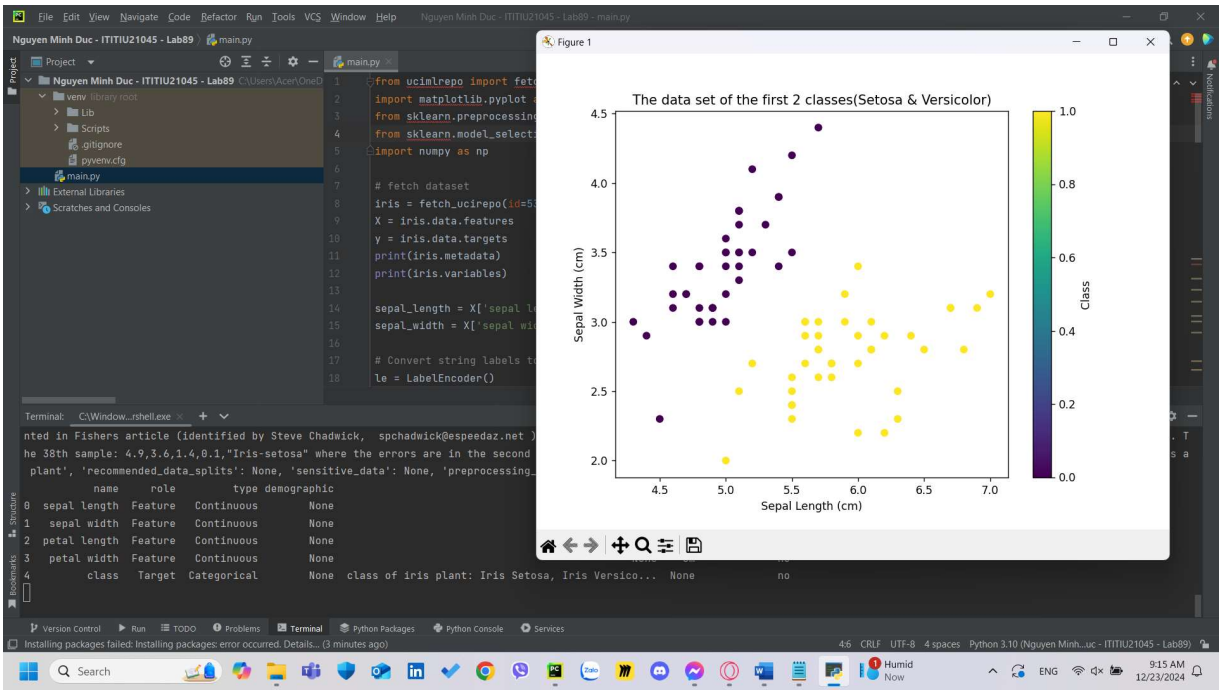
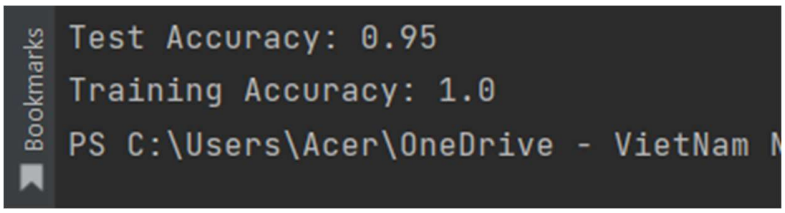
b) Data set of first 2 classes



Test and Training Accuracy



Discussion:

After training we can clearly see that there are still errors which are some purple and yellow dots disappeared. Although the training accuracy gives 1.0 point in theory, but in practical training, the test gives 0.95 point. That will be easily recognized if the number of factors is small.