

ML-Lab- Experiment-7

Question:

You are tasked with implementing Single and Multilayer Perceptron neural networks to classify a publicly available dataset. You are provided with the Wine dataset, which contains information about different types of wine. Your goal is to predict the class of wine based on its attributes.

Task:

1. Implement a Single-layer Perceptron (SLP) and a Multilayer Perceptron (MLP) neural network for classification.
2. Train both models on the provided Wine dataset and evaluate their performance.
3. Compare the performance of SLP and MLP using different architectures.

Requirements:

1. Implement both SLP and MLP using Python and any suitable library (e.g., TensorFlow, Keras, PyTorch).
2. Split the dataset into training and testing sets (e.g., 70-30 or 80-20).
3. Train the models using appropriate training algorithms (e.g., gradient descent, backpropagation).
4. Evaluate the models using the following performance metrics:
 - Accuracy: The proportion of correctly classified instances.
 - Precision: The proportion of true positive predictions out of all positive predictions.
 - Recall: The proportion of true positive predictions out of all actual positives.
 - F1 Score: The harmonic mean of precision and recall.
5. Experiment with different architectures for the MLP, varying the number of hidden layers and neurons per layer.
6. Provide a detailed comparison between SLP and MLP in terms of their performance metrics and computational complexity.

Note:

1. Use proper data preprocessing techniques (e.g., normalization, scaling) if necessary.
2. Document your code properly, including comments explaining the implementation and the choice of hyper parameters.
3. Present your findings in a clear and organized manner, including tables and plots where applicable.