

# 1 Procedure

1. Load the Wisconsin Breast Cancer dataset and preprocess the data.
2. Split the dataset into a training set (80%) and a test set (20%), ensuring a balanced distribution of class labels in both sets.
3. Standardize the feature values in the dataset.
4. Implement a Multi-Layer Perceptron (MLP) with one hidden layer, using squared-loss or cross-entropy error function and the backpropagation algorithm.
5. Train the MLP with various hidden layer sizes,  $k \in \{5, 10, 15, 20, 25, 30\}$ , and learning rates,  $\eta \in \{1.0, 0.5, 0.1, 0.01\}$ .
6. Evaluate the performance of the MLP classifier by plotting the train and test accuracy for each combination of hidden layer sizes and learning rates.
7. Analyze the plot to determine the ideal number of iterations to terminate the training, the impact of the learning rate on the performance, and any trends in performance with different numbers of nodes in the hidden layer.
8. Train the best-performing model according to the previous analysis.
9. Create and plot a confusion matrix for the best-performing model to visualize the classifier's performance.