Assignment 2: Basic Models for Classification

Purposes

We are going to evaluate the performance of different classification models.

Implementation Tasks

1. (12 points) Write a Python class for each of the following classification methods:

   - (4 points) Widrow-Hoff Learning;
   - (4 points) Linear Support Vector Machine (SVM);
   - (4 points) Logistic Regression.

   Each class should have a *constructor* which initializes the weights and bias, a function `forward` which computes the output of the ML model based on a given input, a function `fit` which trains the ML model based on the given set of training samples.

2. (5 points) Read the data set library from scikit-learn [1]. Choose at least two sets of data for binary classification and test the performance of the above 3 ML models. You need to use the same training and testing samples.

   - You may choose a large number for the training and testing data, and compare the prediction accuracies of the models.
   - You may also choose the same learning rate, to see which model spends the least time cost.

3. (5 points) Write a Python class for the Weston-Watkins SVM.

4. (3 points) Test the Weston-Watkins SVM using a scikit-learn data set for multiclass classification.

[1] `https://scikit-learn.org/stable/api/sklearn.datasets.html`