Homework #2

Neural Network Theory and Applications
Homework Assignment 2

March 21, 2019
Due at April 4, 2019

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In this assignment, the support vector machine (SVM) and the Min-Max-Module strategy will be used to deal with multi-class classification problems. SVMs usually handle binary classification tasks. If there are several classes to recognize, some strategies are needed. The most common methods are one-vs-one strategy, one-vs-rest strategy, and part-vs-part strategy.

Two problems are given below. The dataset used in this homework is the SJTU Emotion EEG Dataset (SEED), which is a three-class classification problem. Four files are included in the .zip file: train_data.npy, train_label.npy, test_data.npy, and test_label.npy, and 37367 samples are included in the training data, and 13588 samples in the test data.

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Problem 1:

Solving the three-class classification problem in the given dataset using SVM classifiers and the **one-vs-rest** strategy. SVM classifiers are provided in LibSVM package and other machine learning libraries (sklearn). You can use these libraries to solve this problem.

Notice: the SVM provided in these third-party modules can handle multi-class classification. However, you are required to write the one-vs-rest strategy by yourself in this assignment

Problem 2:

    Solving the three-class classification problem using Min-Max-Module SVM and **part-vs-part** task decomposition method. You should divide the three-class problem into three two-class problems using one-vs-rest method and then decompose these imbalance two-class problems into balance two-class problems following random task decomposition and task decomposition with prior knowledge strategies. Please compare the performance of SVMs obtained in Problem one and the Min-Max-Module SVMs here.