Experiment 1

*Start Date: Oct. 10, 2023
*Report Due Date: Nov.1 , 2023

Notes:

- Each experiment must be done individually. You can search material through Internet but remember to mark it.
- Write an experiment report to describe and analyze the experimental observations.
- You should pack your files including **source code, report, readme file, and other related files** in one .zip/.rar/.7z file.
- Please submit on the Web Learning platform. Do NOT Email or Wechat your report to the instructor or TAs.
- No late report is accepted. No exceptions.
- You can write the report using English or Chinese.

Task 1:

Write your **own** perceptron program (Do not use the off-the-shelf package) and use the given data to check your model.

Goal:

We hope that you can use the pandas or other package to read the dataset and make some preprocess. You need to know how the perceptron works and try to achieve it by yourself.

Data:

For **CS background** students, you should use the attached dataset file.
For **Non CS background** students, you can use the sklearn package to load the MNIST dataset.

Divide the data into train set and test set. Choose two labels and use the corresponding data to finish the experiment. It is not necessary to use the whole data of two labels you choose; you can pad the data or downsample the data for data balance.
1) In the attached data, fetal health is the label. 1 stands for normal, and 2 and 3 stands for suspect and pathological,respectively. Let's group the label 2 and 3 into one label and use the data of attributes to realize a binary classification.
2) In MNIST dataset, select 2 letters as 2 labels and use the pixel information to classify them.

Experiment Step:

- Load the data and write the code to classify. Train the model with the train set and calculate the metric on the test set.
- Try to improve the performance and give your explanation.
- Try to make your code more readable and better to transfer.

Task 2:

Goal:

We hope you know better about the classification models and try to use the models better on the given

dataset.

Data:

For **CS background** students, you should use the attached dataset file.
For **Non CS background** students, you can use the scikit-learnrn package to load the MNIST dataset.

Divide the data into train set and test set.

Experiment Step:

- Use the SVM to classify the data. Try to change kernel and other related parameters to see the change of metric you use. Record the result and try to explain it.