

Artificial Intelligence: Lab 5

Supervised Machine Learning : Perceptron, MLP & SVM

1 Perceptron and MLP

Artificial neural networks are inspired by the human neural network architecture. The simplest neural network consists of only one neuron and is called a perceptron. A perceptron has one input layer and one neuron.

A single layer perceptron can solve simple problems where data is linearly separable. However, in case of non-linearly separable data, the accuracy of single layer perceptron decreases significantly. Multilayer perceptrons, on the other hand, can work efficiently with non-linearly separable data.

For this lab, we will use iris dataset. It is part of the datasets available within sklearn.

1. Import the necessary python modules : `numpy` and `pandas`.
2. Load the dataset. For this, execute the following instructions :

```
from sklearn.datasets import load_iris
iris = load_iris()
```

3. You can use print the description (using the `DESCR` property) of the dataset.
4. The dataset iris is well formatted. It comes with two properties : `data` which contains the data and `target` which corresponds to the classe. Extract the data into a variable `X` and the target into a variable `y`.
5. Neural networks work well with scaled data. As we have seen in the first lab (about data preprocessing), use `StandardScaler` to scale well our data.
6. Split the dataset into two subsets : one for training and the other for testing. Save 30% of the dataset for test.
7. Using the python module `sklearn.neural_network`, train a model using `MLPClassifier`.
8. Give the confusion matrix and evaluate the model.

2 SVM

The dataset we will consider in this example es described in the following web site :

https://www.kaggle.com/raghupalem/bill_authentication

1. Load the dataset
2. We use `Class` column as class and the other columns as features. Write the corresponding code.
3. Split the dataset as usual.
4. Using the python module `sklearn.svm`, train a model using `SVC`.
5. Train and evaluate your model.

3 To Do

Compare the accuracy of the SVM classifier with the other classifiers we have seen till now.