CSCI3320

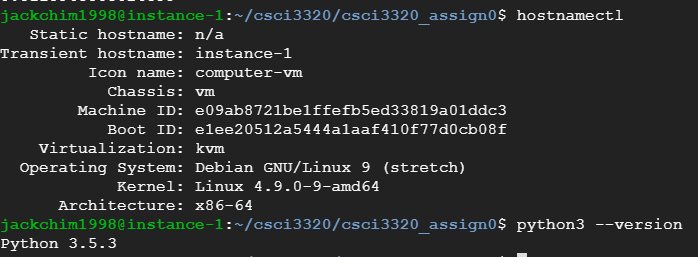
Assignment 0

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Environment:

Debian Linux 9

Python 3.5.3



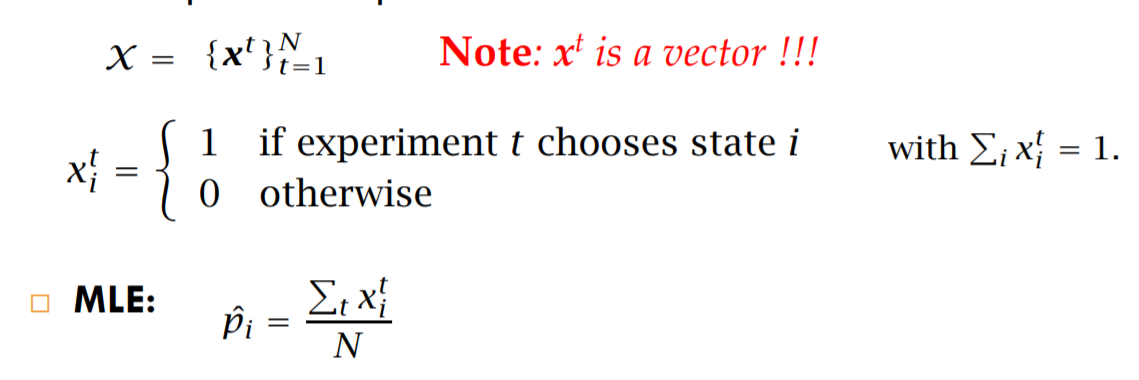
**Problem 1:**

Process:

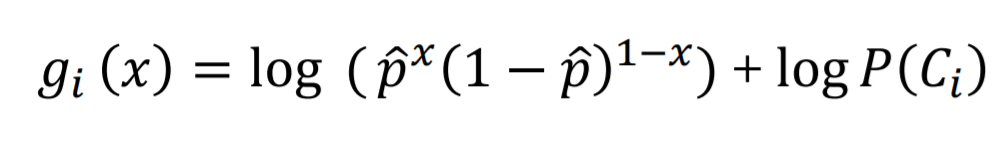
Before processing, I check there are total 3 classes. Then I split the 3000 training points into train set (2400) and test set (600) without shuffle.

The prior value is calculated as n\_i/N, where n\_i is the number of points belong to class i and N is total number of points.

The estimated\_p is calculated as the following MLE formula, be noticed that X contains training point belong to class i only.



The discriminant function is defined as the following equation.

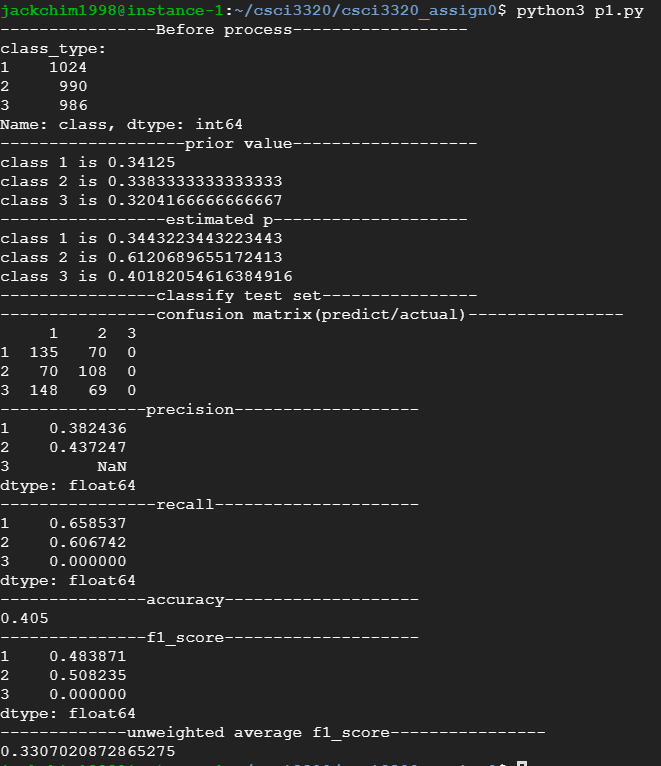


Be noticed that we have only two input value 0 or 1. For each value, we will create 3 discriminant functions and choose the highest one. As a result, our prediction results only have 2 possibility class 1 or 2. Therefore the precision of class 3 will be undefined which is the result of dividing 0.

The f1\_score function in sklearn treat the undefined precision as 0 by default and the f1\_score of class 3 become 0. The disadvantage of this setting is that we can’t know there is undefined value by only observing f1\_score. The advantage is we can still get average f1\_score by treating f1\_score of class as 0.

Be noticed that the columns of confusion matrix is predication and the rows are truth.

Result:

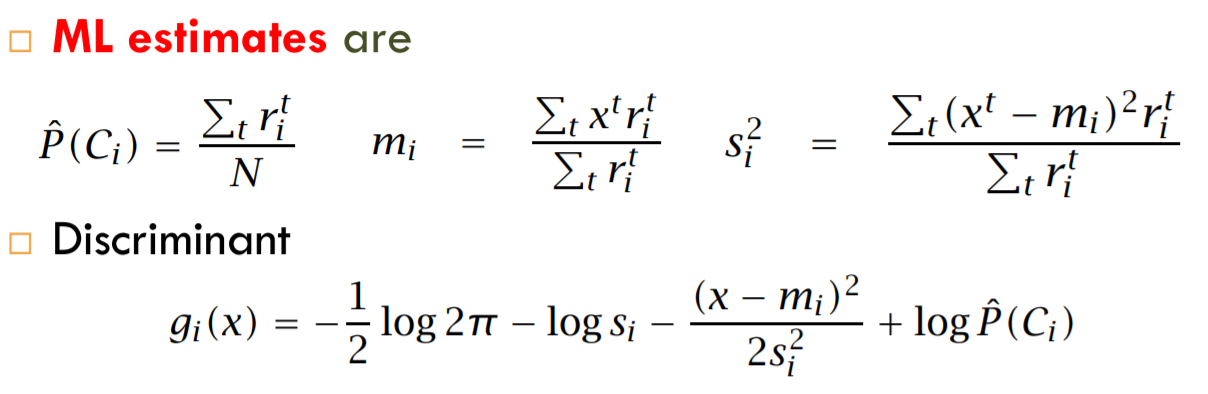


**Problem 2:**

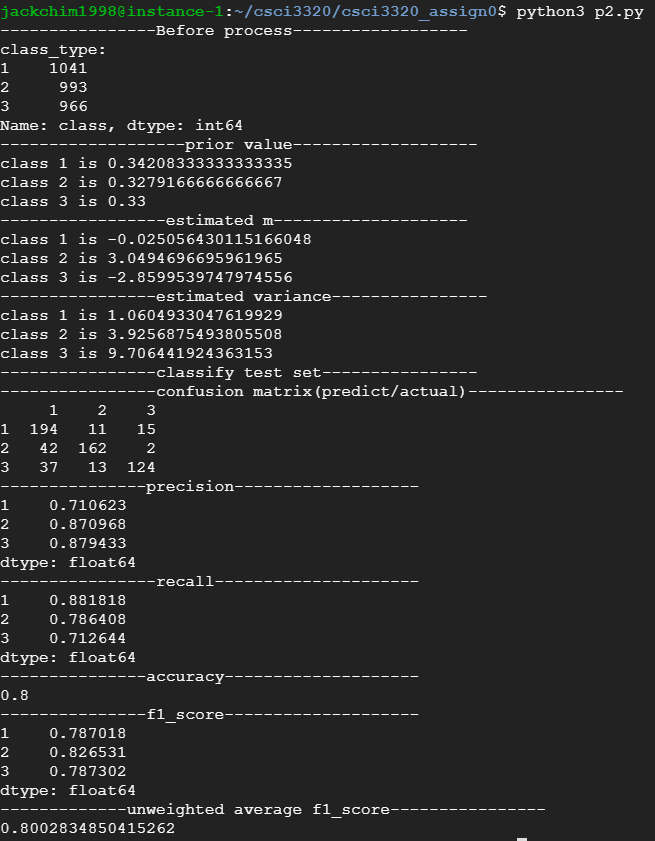
Process:

The estimate parameters are following these equations

The whole process is similar as Problem 1.



Result:

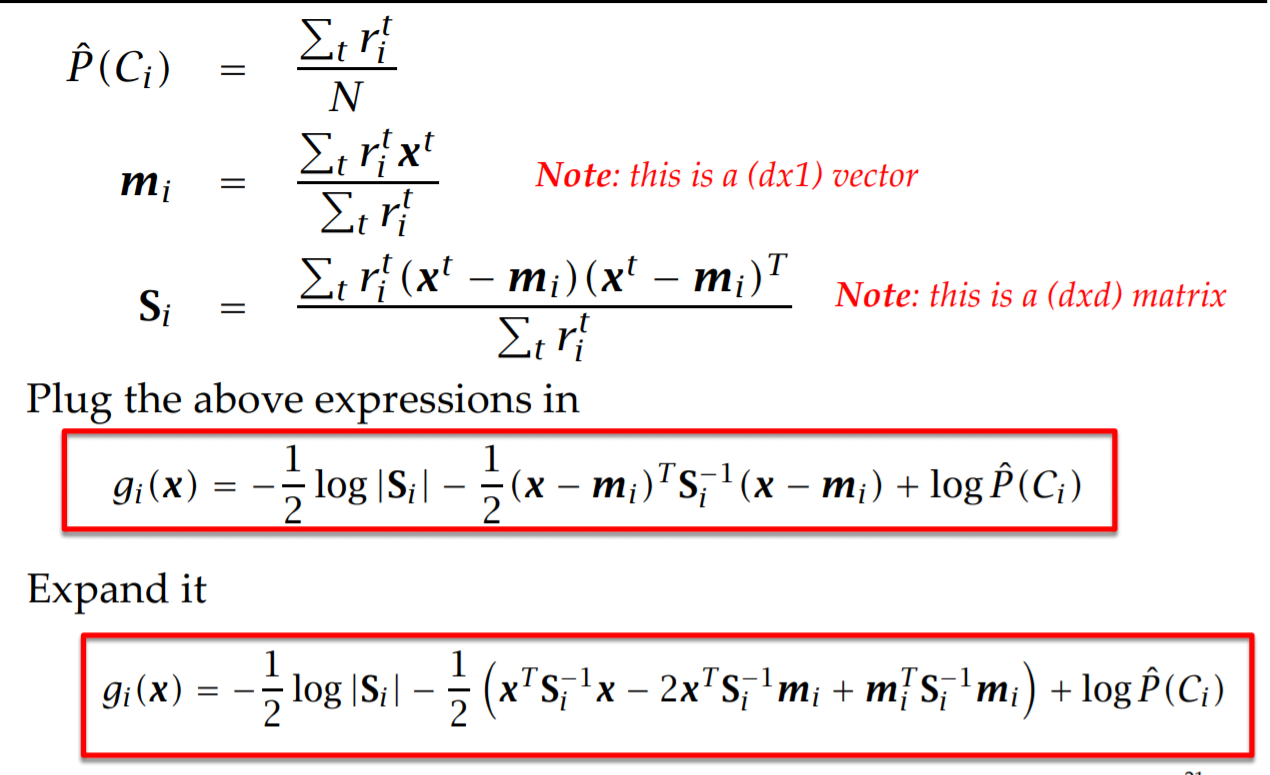


**Problem 3:**

The estimate parameters are following these equations

The whole process is similar as Problem 2.

The data type of estimated values are stored as Numpy array, since it is convenient to use Numpy to implement matrix calculation



Result:

