Assignment 1

IMPLEMENTATION: PYTHON

Problem1:

epoch = 50
learning_rate = 0.4

1) Single sample perceptron without margin

PRECISION :- 99.91%
RECALL:- 99.91%

Algorithm:- For simple perceptron , I have to divide classes into two seperate group. I have taken the weight vector w and for each training data find the value w(i)*X(i) and if it is greater than zero and equals to 0 then updating the w(i) as w(i) - n*x(i) where n is a learning rate and if it is less than zero and value is equal to one then updating the w(i) as w(i) + n*x(i).

2) Single sample perceptron with margin

PRECISION :- 99.91%
RECALL:- 99.91%
margin (b = 1) :- 1

Algorithm:- For simple perceptron , I have to divide classes into two seperate group. I have taken the weight vector w and for each training data find the value w(i)*X(i) and if it is less and equal to b and equals to 1 then updating the w(i) as w(i) + n*x(i) where n is a learning rate and if it is greater than -1*b and value is equal to zero then updating the w(i) as w(i) - n*x(i).

3) Batch perceptron with and without margin

PRECISION :- 100%
RECALL:- 99.91%

Algorithm :- in batch perceptron, the value of w vector should be changed after every epoch is done and should not be done for each wrong classification and the implementation will remain same as the single sample perceptron.

Algorithm	Precision	Recall	Epoch
Simple Sample Perceptron	0.999165674321	0.998237885463	15
	0.999174442344	0.999118942731	20
	0.999118942731	0.999118942731	60
Simple Sample Perceptron with Margin	0.999165674321	0.998237885463	15
	0.999165674321	0.999118942731	20
	0.999118942731	0.999118942731	60
Batch Perceptron	1.0	0.994713656388	15
	1.0	0.995594713656	20
	1.0	0.996475770925	60

PROBLEM:-2

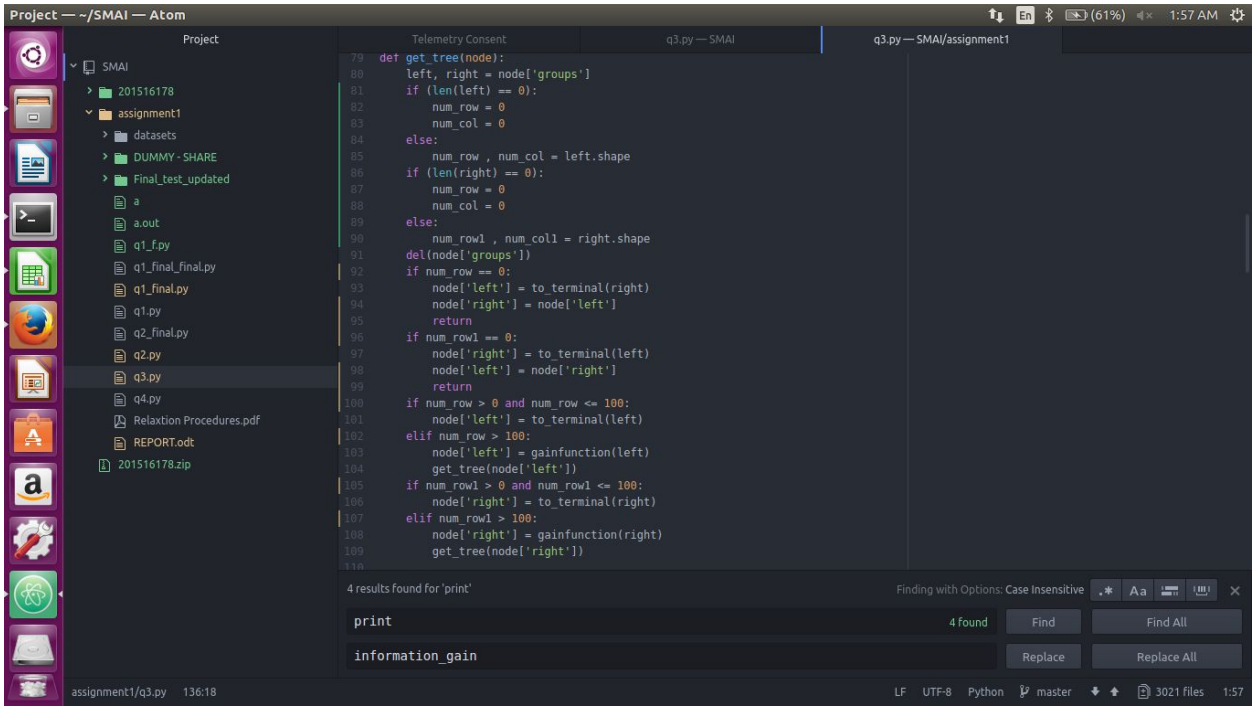
1) PRECISION :- 100%
RECALL:- 95.7%
Here I have used the relaxation algorithm

2)PRECISION :- 100%
RECALL:- 96%
1.000000 0.957143
For modified perceptron algorithm, as we have to give more accurate answer I have used Voted Perceptron and the output value is predicted on the basis of all the changed weights and vector and their frequency, here frequency is the number till that they are updated**.**

Algorithm	Precision	Recall	Epoch
Relaxation Algorithm	1	0.958237885463	50
	1	0.966666666667	30

	0.983050847458	0.966666666667	20
Modified Perceptron Algorithm	1	0.972237885463	50
	1	0.999118942731	30
	0.989118942731	0.999118942731	20

Problem 3



PRECISION:- 0.98277398635
RECALL:- 0.911105636432

Implementation:-
-Finding out Information Gain and choosing the attribute that maximises the Information Gain.
-Information Gain is subtracting weighted entropy of the subparts from the entropy of sample
-Constructed binary tree