## **Module 2**

## **Decision Tree Learning**

1	Explain Decision Tree Learning and also explain the problem characteristics for which decision tree learning is suitable.												
2	Explain the concepts of entropy and information gain.												
3	Explain ID3 algorithm for decision tree learning with an illustrative example.												
4	Explain which attribute is chosen as the best classifier in ID3 algorithm.												
5		Explain the construction of decision tree for the below given dataset using ID3 algorithm:											
	outlook		temperature		humidity wind		answer						
	Sunny		hot		high weak		no						
	sunny		hot		high stron		g no						
		overcast hot		hot	high		weak yes						
		Rain mild		high		weak yes							
		Rain		cool		normal wea		yes					
		Rain		cool		normal stror		•					
		over		cool		normal	strong yes						
		Sunn	•	mild		high	weak						
		Sunn	У	cool		normal	weak	•					
		Rain		mild		normal	weak	•					
		Sunny mild overcast mild			normal	strong yes strong yes							
	overcast overcast		hot		high stro		<u> </u>						
	Rain mild			high		yes g no							
6	Consi	Consider the following dataset:		high strong no			8 Marks						
	No.	Student	First	last year?	Male	? Works I	nard?	Drinks?	First this year?				
	1	Richard	yes		yes	No		yes	yes				
	2	Alan	yes		yes	Yes		no	yes				
	3	Alison	no		no	Yes		no	yes				
	4	Jeff	no		yes	No		yes	no				
	5	5 Gail yes no		no	Yes		yes	yes					
	6	Simon	no		yes	Yes		yes	no				

<ol> <li>What is the entropy of this collection of training examples with respect to the target function classification?</li> <li>Construct a minimal decision tree for this dataset. Show your work.</li> </ol>									
1. Use your decision tree from the previous part to classify the following instances:									
	No	Student	First last year?	Male ?	Works hard?	Drinks ?	First this year?		
	7	Matthew	no	yes	No	yes	??		
	8	Mary	no	no	Yes	yes	??		
Give decision trees to represent the following Boolean function:									
$d.  (A \land B) \lor (C \land D)$									
	Give decidents a. A. b. A. c. A.	2. Conswork  1. Use y follo  No  7  8  Give decision a. A A ~ b. A V (Constant)	respect to the  2. Construct a m work.  1. Use your dec following ins  No Student  7 Matthew  8 Mary  Give decision trees to rea. A A ~B  b. A V (B A C)  c. A XOR B	respect to the target function  2. Construct a minimal decision work.  1. Use your decision tree from following instances:  No Student First last year?  7 Matthew no  8 Mary no  Give decision trees to represent the follona. A A ~B  b. A V (B A C)  c. A XOR B	respect to the target function class  2. Construct a minimal decision tree work.  1. Use your decision tree from the problem of the following instances:  No Student First last year? Male?  7 Matthew no yes  8 Mary no no  Give decision trees to represent the following Both a. A A ~B  b. A V (B A C)  c. A XOR B	respect to the target function classification?  2. Construct a minimal decision tree for this dat work.  1. Use your decision tree from the previous part following instances:    No	respect to the target function classification?  2. Construct a minimal decision tree for this dataset. Showork.  1. Use your decision tree from the previous part to class following instances:    No	respect to the target function classification?  2. Construct a minimal decision tree for this dataset. Show your work.  1. Use your decision tree from the previous part to classify the following instances:    No	