CS161: FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

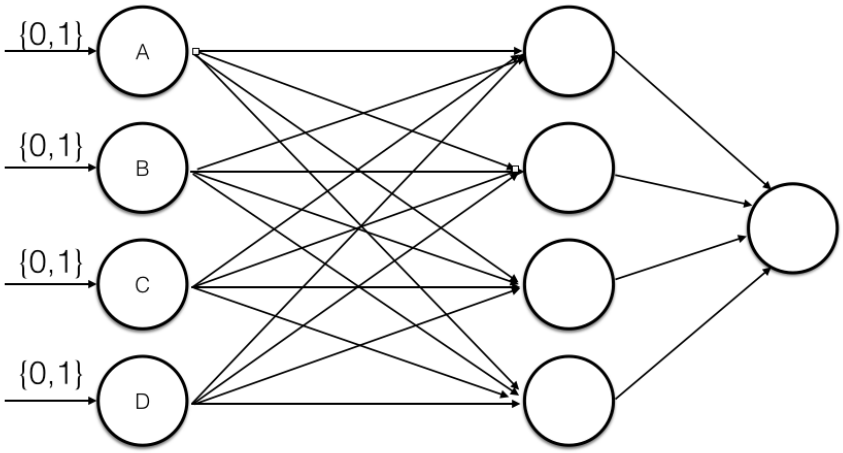
Spring 2020
Assignment 9. Due Friday, Jun 5, 2020, 11:55pm

Please submit your solutions on Gradescope in a well-formatted PDF file named hw9.pdf. You may also submit a scanned PDF of a handwritten solution, but please ensure that the scanned file is clearly legible. Note: You might start looking at Problem 1 first. Problem 2 will be introduced next week.

1. Consider the table below which represents a dataset by listing each unique example with the number of times it appears in the dataset. Construct the decision tree learned from this data by finding the most discriminating attribute at each step. Show precisely how you decided on the most discriminating attribute at each step by computing the expected entropies of the remaining attributes.

Example	Input Attributes			Class	#
	A	B	C	D	
$\mathbf{x}_1$	T	T	T	Yes	1
$\mathbf{x}_2$	T	T	F	Yes	6
$\mathbf{x}_3$	T	F	T	No	3
$\mathbf{x}_4$	T	F	F	No	1
$\mathbf{x}_5$	F	T	T	Yes	1
$\mathbf{x}_6$	F	T	F	No	6
$\mathbf{x}_7$	F	F	T	Yes	2
$\mathbf{x}_8$	F	F	F	No	3

2. Create a two layer neural network that uses the step function to implement $(A \vee \neg B) \oplus (\neg C \vee D)$, where $\oplus$ is the XOR function. You can either use the network structure provided below or another structure you construct. After drawing your network, clearly show the weights and activation function for each node. Assume inputs of $\{0, 1\}$ for each input variable. Note that solutions with more than two layers will still receive partial credit.


{0,1}
A
{0,1}
B
{0,1}
C
{0,1}
D