CS 557: PATTERN RECOGNITION AND LEARNING
QUIZ 5
FALL 2016

PROBLEM

Given the following parameters of an HMM
Transition probability matrix:

0	1/3	2/3	0
1	0	0	0
0	0	0	1
0	0	0	1

The emission probability matrix for symbols H (first row) and T (second row)

1/2	1/3	1/4	1/2
1/2	2/3	3/4	1/2

The initial probability distribution for the four states is: $[1/4\ 1/4\ 1/4\ 1/4]^T$
Find the most likely sequence that generates HTH

SOLUTION

We apply the Viterbi algorithm here. The following table shows the $\delta_t(i)$ values

	S_1	S_2	S_3	S_4
t=1	1/8	1/12	1/16	1/8
t=2	1/24	1/36	1/16	1/16
t=3	1/72	1/9/24	1/24/12	1/32

The best state $\psi_t(i)$ is stored in the following table:

	S_1	S_2	S_3	S_4
t=1	0	0	0	0
t=2	2	1	1	4
t=3	2	1	1	3

The optimal state sequence is: $S_4\ S_3\ S_4$
(Note: for t=2 there is a tie for state 4 so the above table can also have a 4 as its entry instead of 3)