CS 302 AI
Quiz 4

Solution key

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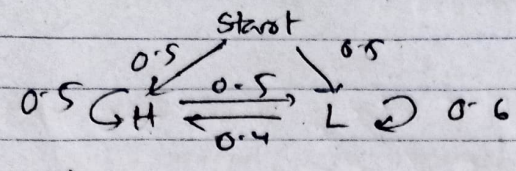
22/02/2024

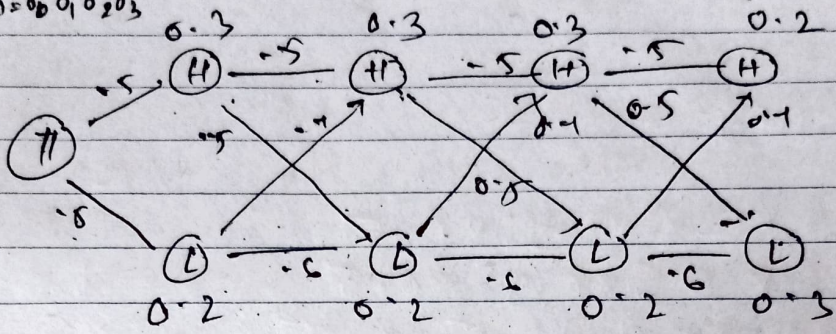
Soln

(a)



GGCA
$O = o_0 o_1 o_2 o_3$

(i)



$\alpha_0(L) = 0.5 \times 0.2 = 0.1$ | $\alpha_0(H) = 0.5 \times 0.3 = 0.15$

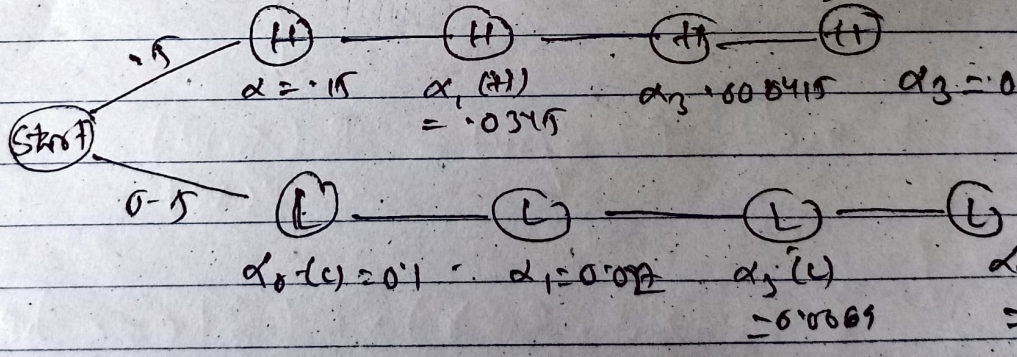
For T=0 { $\alpha_1(H) = .15 \times .5 \times .3 + .1 \times .4 \times .3 = .0345$
$\alpha_1(L) = 0.1 \times .6 \times .2 + .15 \times .5 \times .2 = .027$ } -1

For T=2 { $\alpha_2(H) = 0.0345 \times .5 \times .3 + .027 \times .4 \times .3 = .008415$
$\alpha_2(L) = .027 \times .6 \times .2 + .0345 \times .5 \times .2 = .00669$ } -1

For T=3 { $\alpha_3(H) = .008415 \times .5 \times .8 + .00669 \times .4 \times .2 = .0013767$
$\alpha_3(L) = .00669 \times 0.5 \times 0.3 + .008415 \times 0.5 \times 0.3 = 0.0002657$ } -1

$P(O/\lambda) = \sum_{i=0}^{3} \alpha_{T-1}(i) = 0.0036$ -1 marks

(ii)



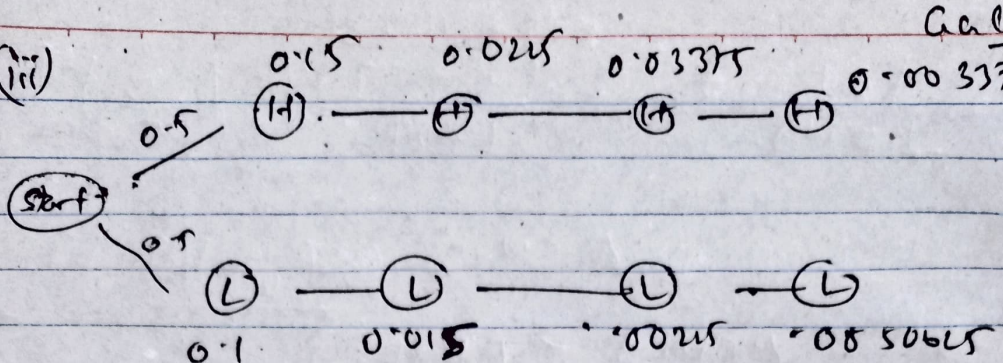
→ 1 marks

For most likely state seq. we backtrack from higher α_i value of every state.

For T3, => max = L
T2 => max = H
T1 => max = H
T0 => max = H
= 1 marks

state seq = HHHL → 1 marks

(iii)



Calculation

– 1 marks

$V_0(H) = 0.5 \times 0.3 = 0.15$ | $V_0(L) = 0.5 \times 0.2 = 0.1$

for V_1,

H → H	$0.15 \times 0.5 \times 0.3 = 0.0225$
H → L	$0.15 \times 0.05 \times 0.2 = 0.015$
L → H	$0.1 \times 0.4 \times 0.3 = 0.012$
L → L	$0.1 \times 0.6 \times 0.2 = 0.012$

for V_2

H → H	$0.0225 \times 0.5 \times 0.3 = 0.03375$
H → L	$0.0225 \times 0.5 \times 0.2 = 0.00225$
L → H	$0.015 \times 0.4 \times 0.3 = 0.0018$
L → L	$0.015 \times 0.6 \times 0.2 = 0.00108$

– 1 marks

for V_3,

H → H	$0.03375 \times 0.5 \times 0.2 = 0.003375$
H → L	$0.03375 \times 0.05 \times 0.3 = 0.0050625$
L → H	$0.00225 \times 0.4 \times 0.2 = 0.00018$
L → L	$0.00225 \times 0.6 \times 0.3 = 0.000405$

Optimal path = HHHL – 1 marks