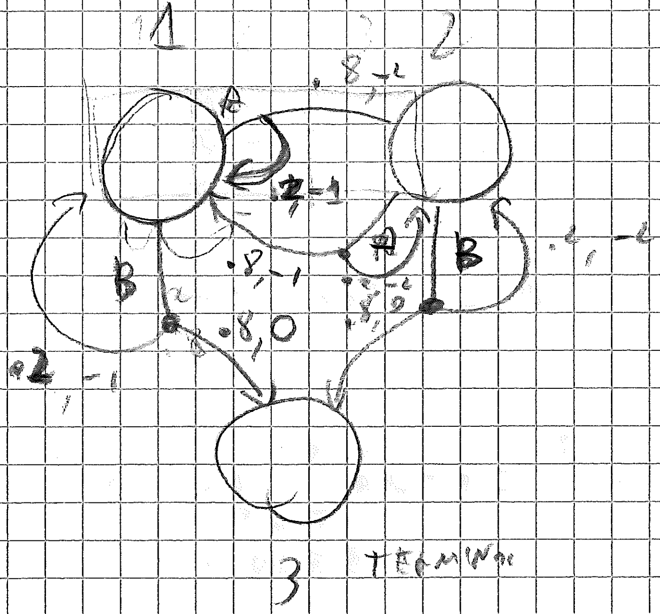
(ISOS) SECOND PARTIAL WRITTEN TEST

04/06/2018

Ex 1

Q 1)



$\gamma = 1$

Q2) QUALITATIVELY DETERMINE BEST POLICY

$\pi(1) = b \qquad \pi(2) = b$ BECAUSE WE WANT TO REACH STATE 3 AS SOON AS POSSIBLE

Q3) BUILD ITERATIONS OF VALUE ITERATIONS FOR STATE 1 WHERE $V(s) = 0 \quad \forall s$

$$V^{t+1} = \max_a \sum_{s'} T(s,a,s')\left(R(s,a,s') + \gamma V^t(s')\right)$$

$$V^1(1) = \max_{a \in (A,B)} \sum_{s'} T(1,a,s')\left(R(1,a,s') + V^0(s')\right)$$

$$V^1(1) = \max_{A,B} \begin{cases} A \to .2 \times (-1+0) + .8 \times (-2+0) = -1.8 \\ B \to .2 \times (-1+0) + .8 \times (0+0) = -0.2 \end{cases}$$

$$V^1(1) = -0.2 \qquad V^1(2) = \begin{bmatrix} A \to .8(-1) + .2(-2) \\ B \to .8(0) + .2(-2) \end{bmatrix} = -0.4$$

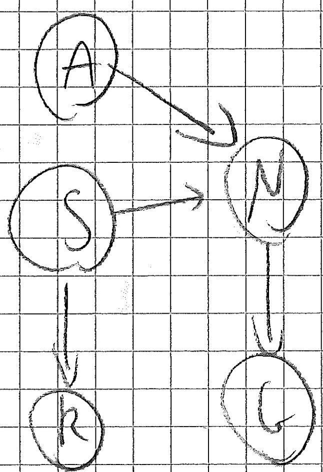
$$V^2(1) = \begin{cases} A \to .2 \times (-1 + (-0.2)) + .8(-2 + (-0.4)) = -2.16 \\ B \to .2 \times (-1 + (-0.2)) + .8(0 + 0) = -0.24 \end{cases}$$

$V^2(1) = -0.24$ $\qquad$ $V^2(2) = -0.48$

Q4) IS THE VALUE $V(2)$ IMPORTANT FOR THIS COMPUTATION?

NO, BECAUSE THE OPTIMAL ACTION FOR STATE $\underline{1}$ IS ALWAYS B BECAUSE WE WANT TO QUIT THE GAME ASAP. THIS COMP. IS INDEPENDENT OF $V(2)$

EXERCISE 2



Q1) CAN WE GUARANTEE THAT N IS COND. INDEP. FROM R GIVEN S, A ($P(N|S,A) = P(N|S,A,R)$)?

YES FOR LOCAL SEMANTICS: R IS NON DESCENDENT OF N AND A AND S ARE THE PARENTS OF N

Q2) CAN WE GUARANTEE THAT A IS COND INDEP FROM G GIVEN S $P(A \mid G,S) = P(A \mid S)$

<u>**NO**</u> CAN NOT APPLY LOCAL SEM BECAUSE G IS A DESCENDANT OF A

CAN NOT APPLY M.B. BECAUSE MB FOR A IS (S,N) <u>BUT</u> N IS NOT PART OF EVIDENCE!

$$MB(A) = \underset{\emptyset}{\text{PARENTS}} \cup \underset{N}{\text{CHILDRENS}} \cup \underset{S}{\text{CHILDRENS' PARENTS}} = (S,N)$$

Q3) N° OF PARAM TO COMPUTE JOINT PROB IF S,N TERNARY WHILE A,R,G ARE BINARY

$$P(A,S,N,R,G) = P(A)\,P(S)\,P(N \mid A,S)\,P(R \mid S)\,P(G \mid N)$$

$$\underbrace{(|A|-1)}_{P(A)} + \underbrace{(|S|-1)}_{P(S)} + \underbrace{(|N|-1)(|A|)(|S|)}_{P(N \mid A,S)} + \underbrace{(|R|-1)(|S|)}_{P(R \mid S)} + \underbrace{(|G|-1)|N|}_{R \mid G \mid N}$$

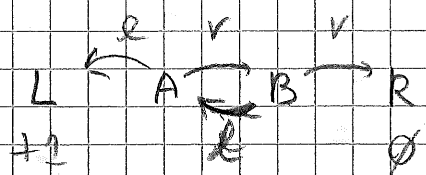
$$1 + 2 + 2 \cdot 2 \cdot 3 + 1 \cdot 3 + 1 \cdot 3$$

$$1 + 2 + 12 + 3 + 3 = 21$$

EXERCISE 3

E_1 (A, v, B, ∅) (B, v, R, +1)
E_2 (A, v, B, ∅) (B, l, A, ∅)
E_3 (A, v, B, ∅) (B, l, R, +1)

THIS IS THE INPUT



THIS IS NOT REQUIRED FOR SOLUTION, ADDED JUST FOR CLARITY

Q1) SHOW THE ESTIMATION OF T() AND R()

$$\frac{\text{COUNT}(A, v, B)}{\text{COUNT}(A, v)}$$

	T	R
A, v, B	= 1.0 = 3/3	∅
A, v, A	= 0 = 0/3	∅
B, v, A	= 0 = 0/1	∅
B, v, R	= 1.0 = 1/1	1
B, l, A	= 1/2 = 1/2	∅
B, l, R	= 1/2 = 1/2	1

Q2) SHOW DIRECT EVALUATION FOR V(S)
(NOT USING BELLMAN UPDATE)

STATES	V: E_1	E_2	E_3	AVG
A	+1	∅	1	2/3
B	+1	∅	1	2/3

SAMPLE BASED POLICY EVAL

STATES	V^0 (init)	V^1	V^2	V^3	V^4
A	$\emptyset$	$\emptyset$	.25	.3125	
B	$\emptyset$	.5	.375	.6875	

$\alpha = .5$

$\gamma = 1$

$$V^\pi(s) = (1-\alpha)\, V^\pi(s) + \alpha \overbrace{\left(R(s,a,s') + \gamma V^\pi(s')\right)}^{\text{SAMPLE}}$$

$(A, V, B, \emptyset)$ $\quad V^1(A) = (1-.5)\times\emptyset + .5(\emptyset + 0) = \emptyset$

$(B, K, R, 1)$ $\quad V^1(B) = .5\times\emptyset + .5(1+0) = .5$

$(A, V, B, \emptyset)$ $\quad V^2(A) = .5\times\emptyset + .5(\emptyset + .5) = .25$

$(B, \ell, A, \emptyset)$ $\quad V^2(B) = .5\times.5 + .5(\emptyset + .25) = .375$

$(A, V, B, \emptyset)$ $\quad V^3(A) = .5\times.25 + .5(0 + .375) = .3125$

$(B, \ell, R, 1)$ $\quad V^3(B) = .5\times.375 + .5(1 + 0) = .6875$