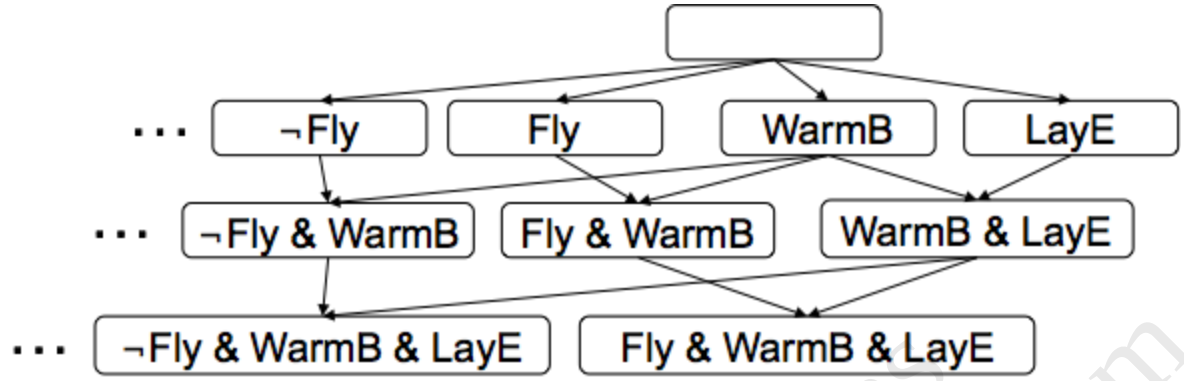
Given this generality partial order for the bird concept hypotheses answer the questions below:



Write the set of bird hypotheses that are consistent with all the training data after each of the following examples is added to the set **T**, which is initially empty.

1) (2pts) Add to training set **T**: f(Robin: WarmB & LayE & Fly)=Bird/+

All consistent bird hypotheses: Any, Fly, WarmB, LayE, Fly&WarmB, Warmb&LayE, Fly&WarmB&LayE,

2) (2pts) Add to training set **T**: f(Pteranodon: ColdB & LayE & Fly)=Reptile/-

All consistent bird hypotheses: WarmB, Fly&WarmB, Warmb&LayE, Fly&WarmB&LayE

3) (2pts)Add to training set **T**: f(Bat: WarmB & ¬LayE & Fly)=Mammal/-

All consistent bird hypotheses: Warmb&LayE, Fly&WarmB&LayE

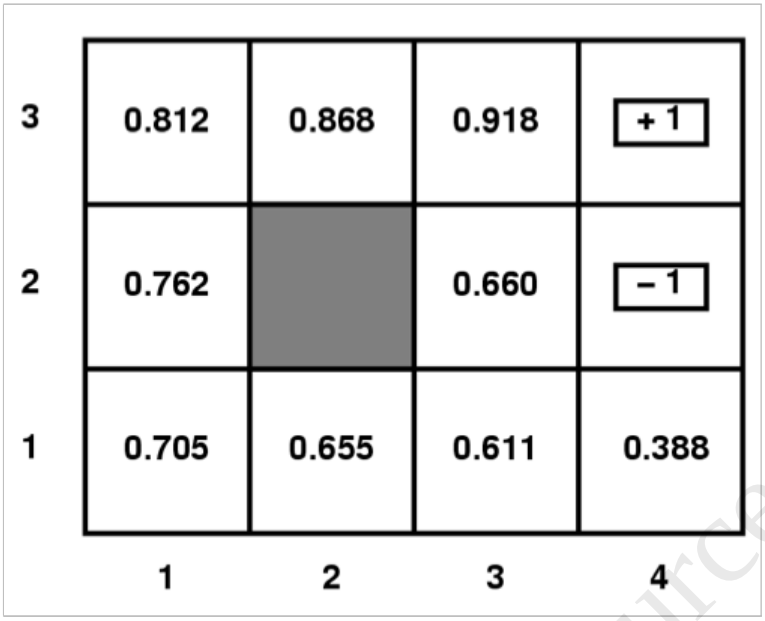
4) (2pts) Add to training set **T**: *f(Ostrich: WarmB & LayE & ¬Fly)=Bird/+*

All consistent bird hypotheses: Warmb&LayE

5) (2pts) Add to training set **T**: *f(Platypus: WarmB & LayE & ¬Fly)=Mammal/-*

None

Given the grid below answer the questions below:



1) (5pts) What would be the optimal policy for the grid?

1,1 N 2,1 W 3,1 N 4,1 W

1,2 N 3,2 N

1,3 E 2,3 E 3,3 E

2) (5pts) What are the Q-values for the square (3,2) given that the agent is deterministic, i.e. $Pr(s,a,s') = 1$, R(3,2)=0 and $\gamma = .5$
Recall that $Q(a,s) = \Sigma\, Pr(s,a,s')[R(s) + \gamma max\ Q(a',s')]$ *and* $Q(a,s) = 0$ *at Terminal states* $(4,2),\ (4,3)$

Q(N, (3,2)) = 1 *[0+.5 (Q(E,(3,3))] = .25

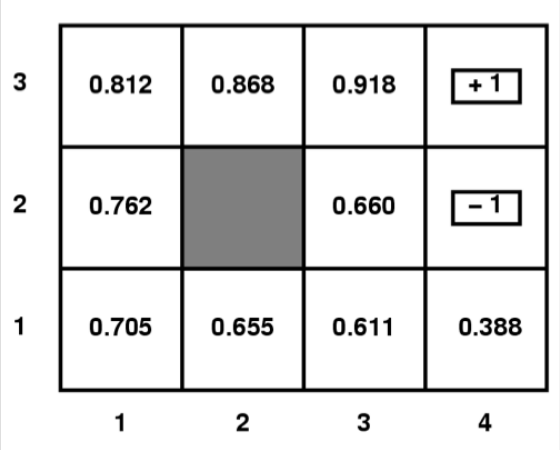
Q(E, (3,2)) = 1 *[-1+.5 (0)] = -1

Q(S, (3,2)) = 1 *[0+.5 (Q(N,(3,1))] = .0625

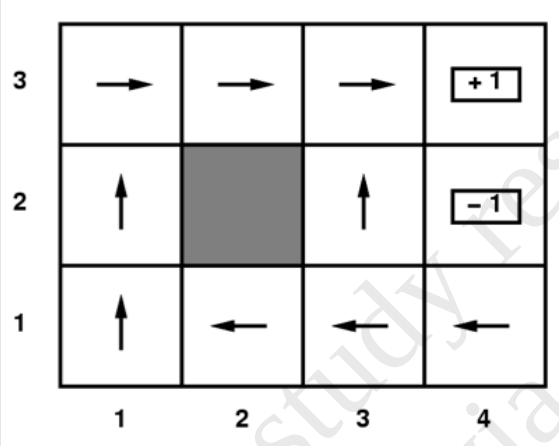
Q(E,(3,3) = 1 *[0+ .5(1*[1+0])] =.5

Q(N,(3,1)) = 1*[0+ .5(Q(N,3,2)) = .125

Given the grid below answer the following questions:



1) (5pts) Is this an optimal policy for the grid? Why or why not?



No, at state 3,1 the optimal action is to go N not W, because state (3,2) has a higher utility value than state (2,2)

2) (5pts) What are the Q-values for the square (3,3) given that the agent is deterministic, i.e. $Pr(s,a,s') = 1$, R(3,2)=0 and $\gamma = .5$

Recall that $Q(a,s) = \Sigma\, Pr(s,a,s')[R(s) + \gamma max\ Q(a',s')]$ *and* $Q(a,s) = 0$ *at Terminal states* $(4,2),\ (4,3)$

Q(E,(3,3) = 1 *[0+ .5(1*[1+0])] =.5

Q(W, (3,3)) = 1 *[0+.5 (Q(E,(3,3))] = .25

Q(S, (3,3)) = 1 *[0+.5 (Q(N,(3,2))] = .125

Q(N,(3,2)) = 1*[0+ .5(Q(E,3,3)) = .25