[PO]MDP in practice

The tiger problem

The tiger problem

The tiger problem

The tiger problem

The tiger problem

The tiger problem

The tiger problem

The tiger problem

The tiger problem

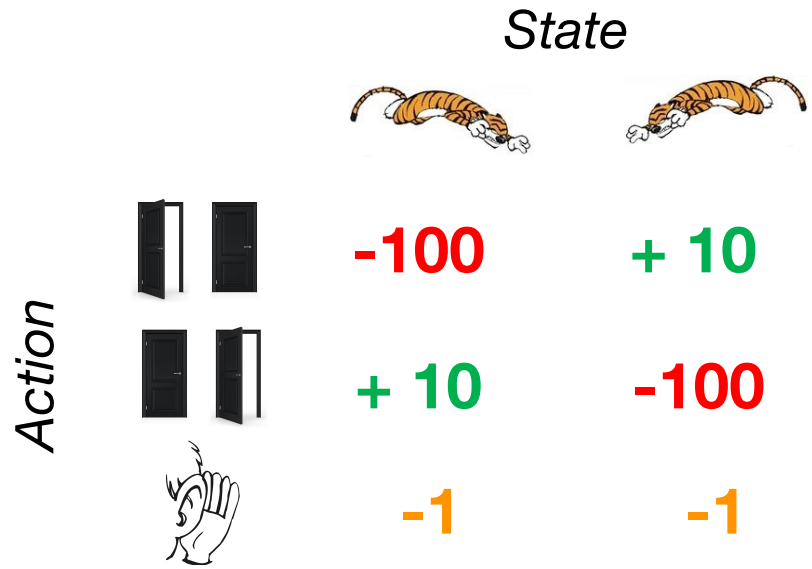
Outcomes

State

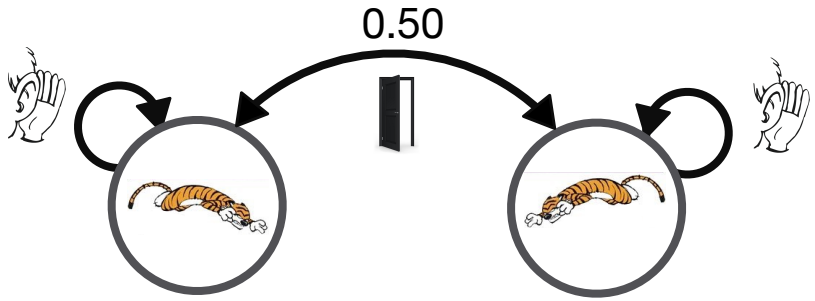
Action

	-100	+ 10
	+ 10	-100
	-1	-1

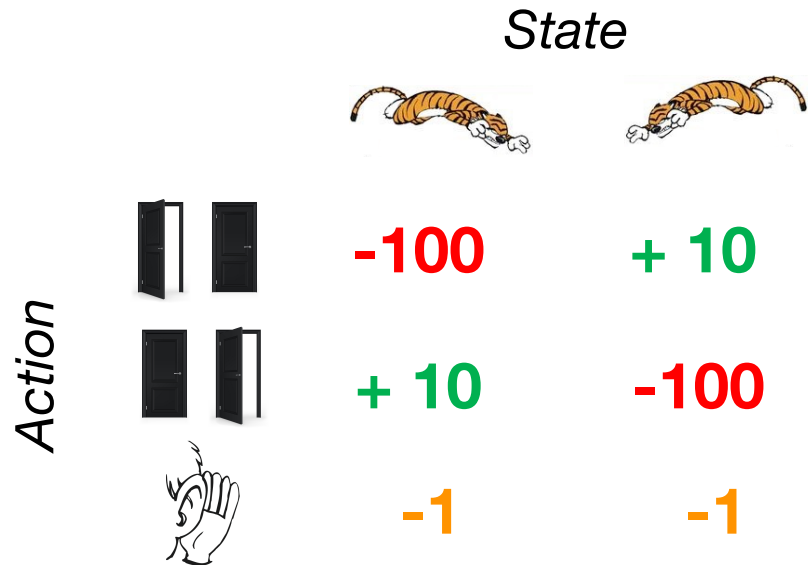
Outcomes



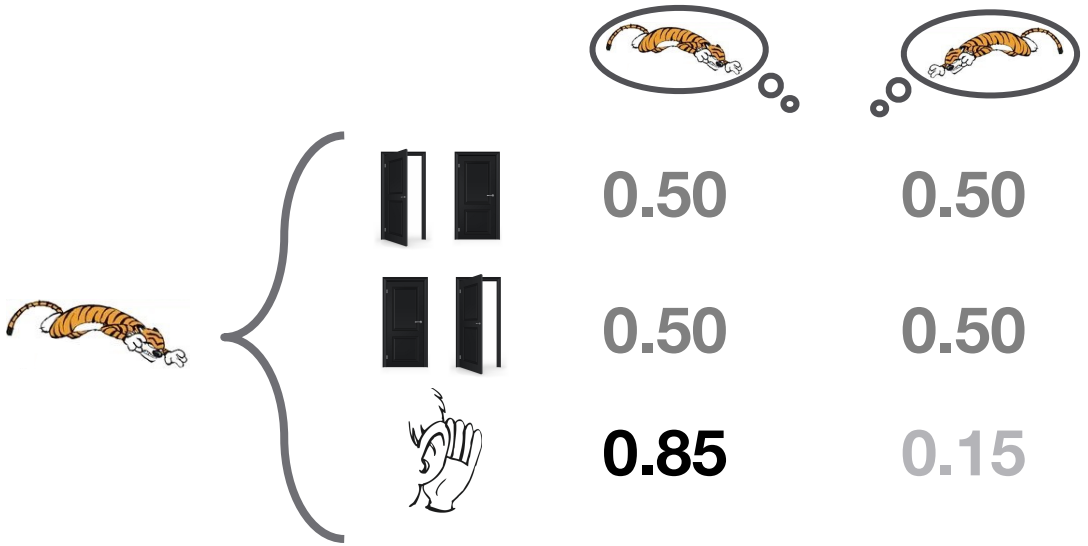
Transitions

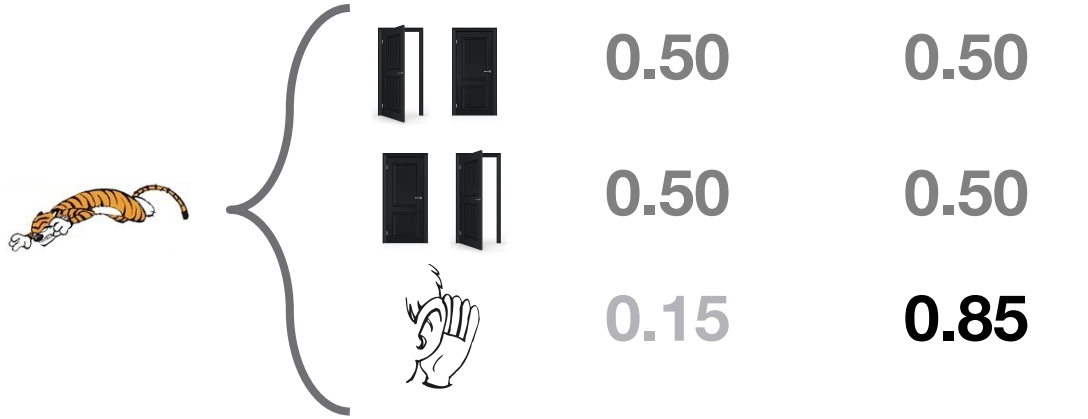


Outcomes

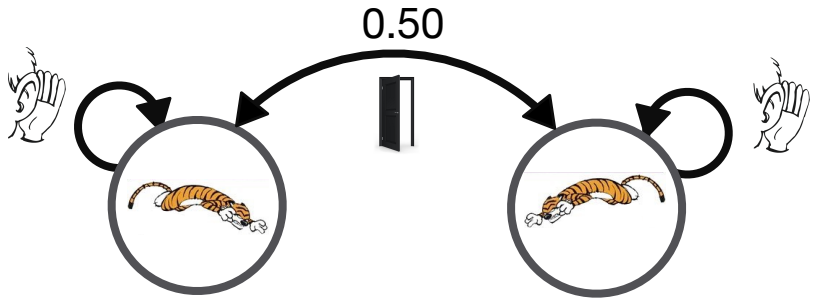


Observations





Transitions



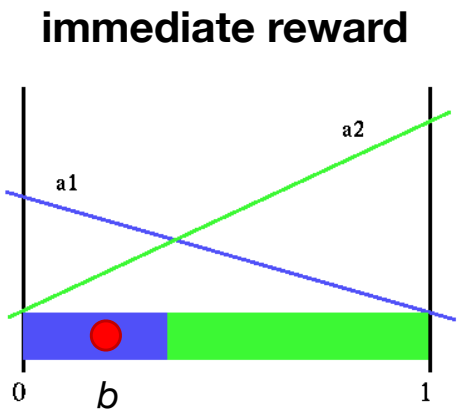
POMDP toolbox

- Download from
  - Official www.pomp.org http://cs.brown.edu/research/ai/pomdp/
  - Github https://github.com/lionel-rigoux/CPC-pomdp
- Compile the C code
- Edit the POMDP description file
- Run the executable or the the helper script

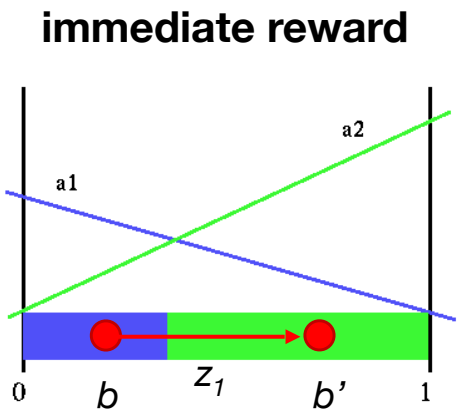
Resolution

Resolution

Resolution

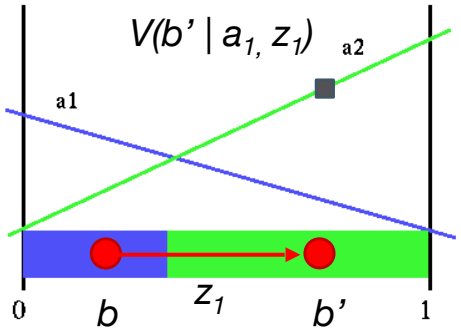


Resolution



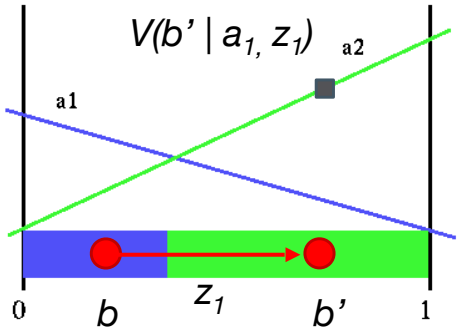
Resolution

immediate reward

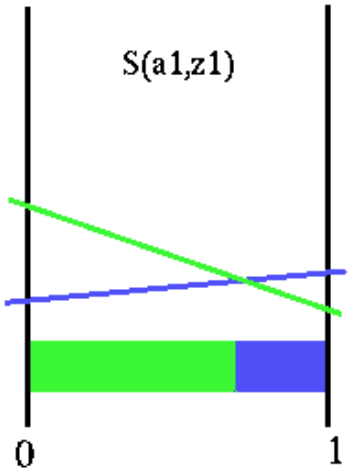


Resolution

immediate reward

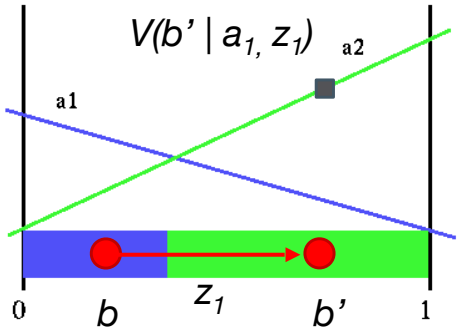


future value

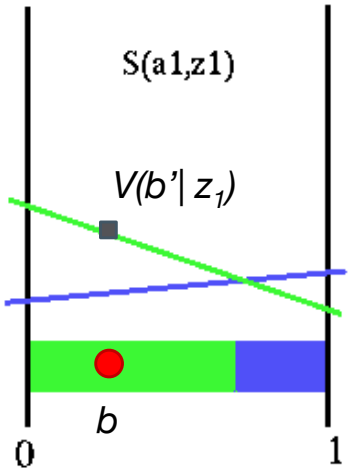


Resolution

immediate reward

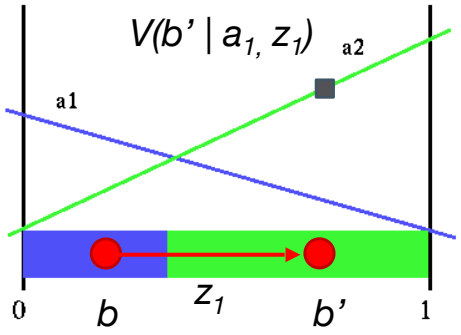


future value

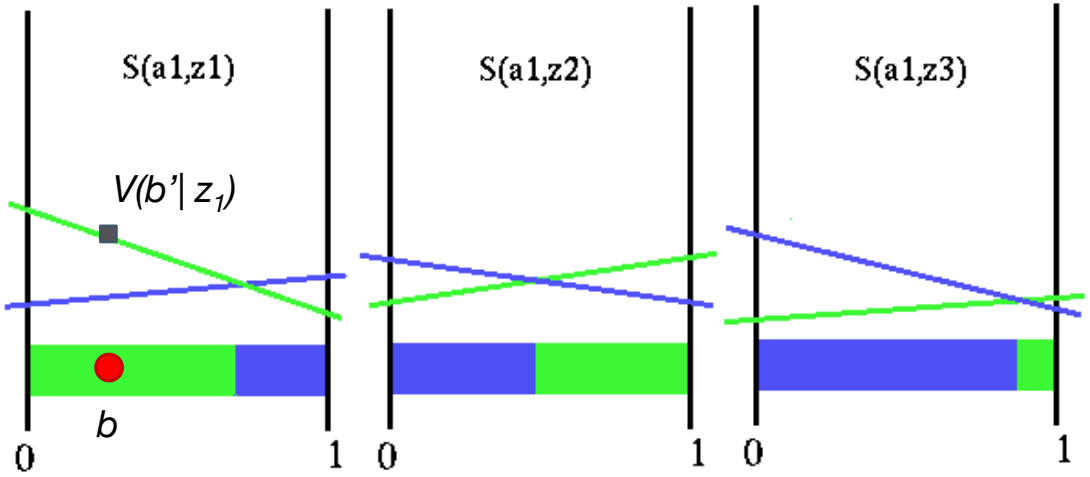


Resolution

immediate reward

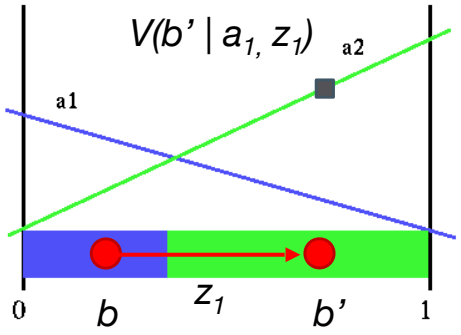


future value

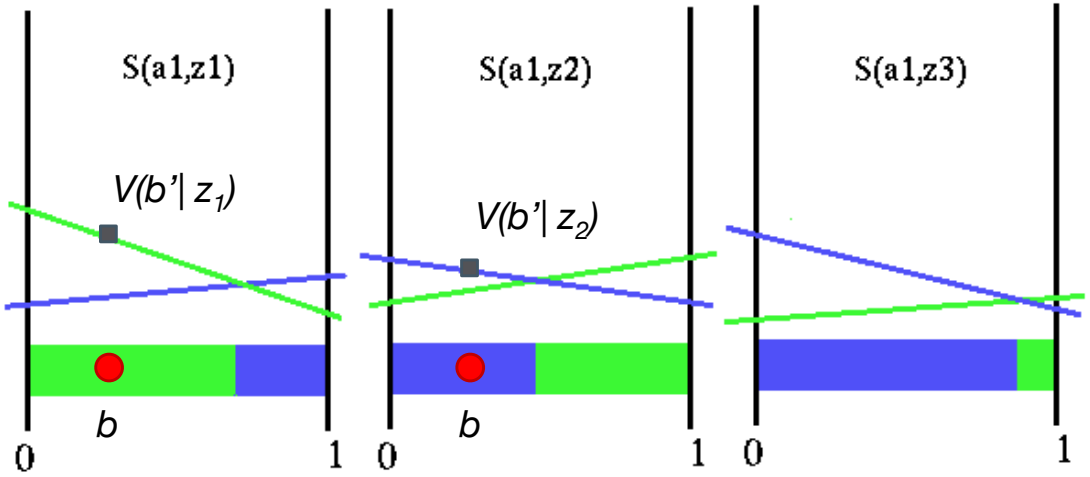


Resolution

immediate reward

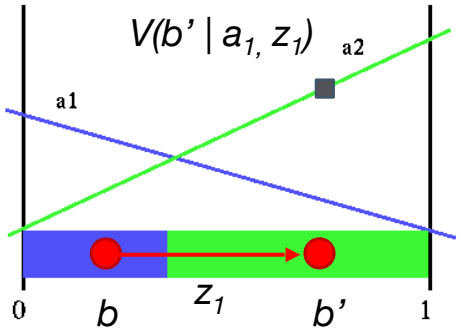


future value

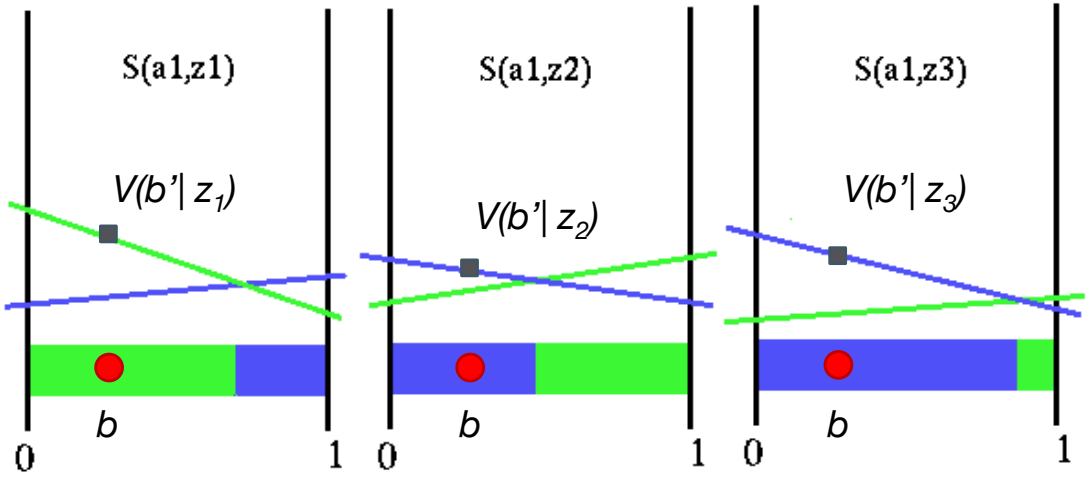


Resolution

immediate reward

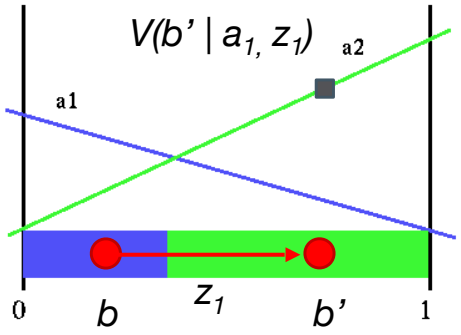


future value

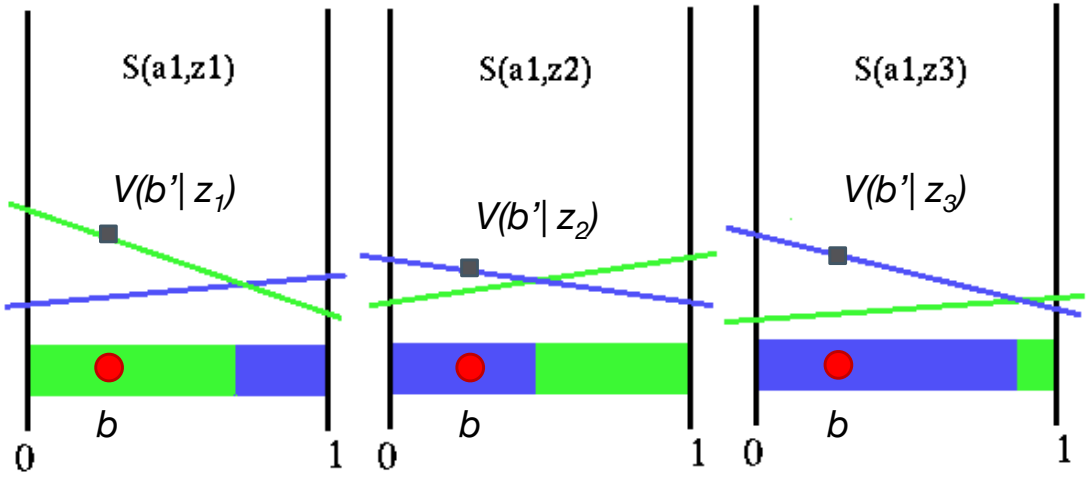


Resolution

immediate reward

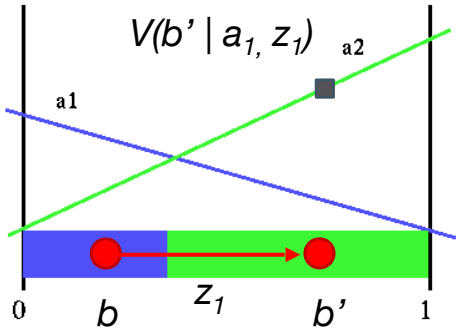


future value $V(b') = \sum V(b'|o)p(o|b)$

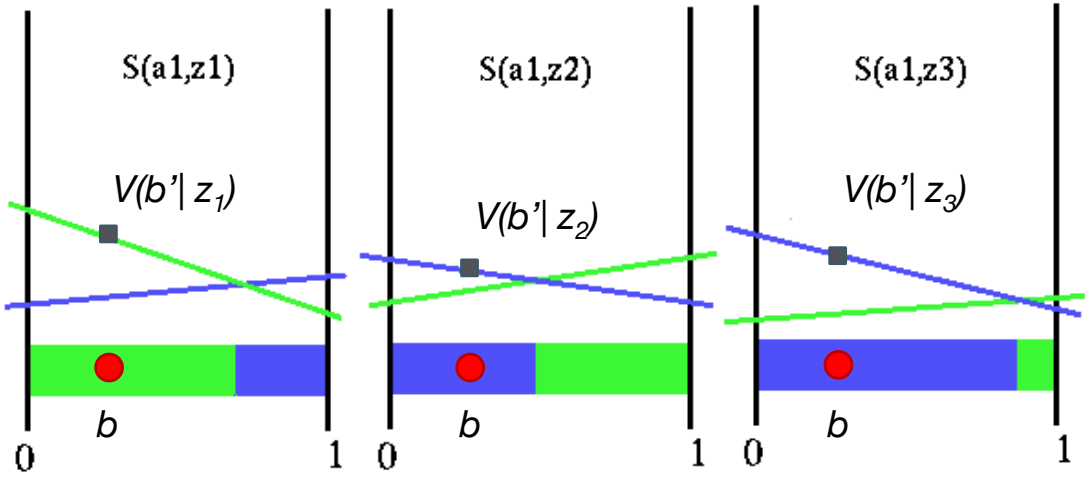


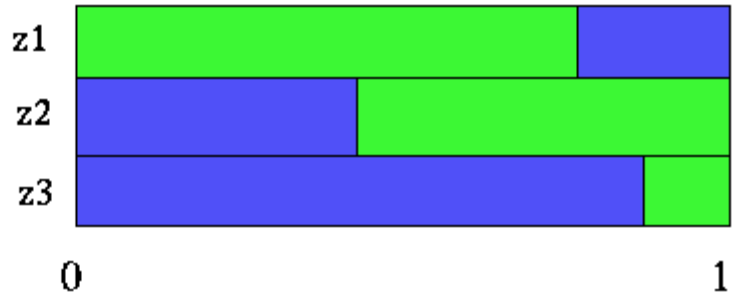
Resolution

immediate reward



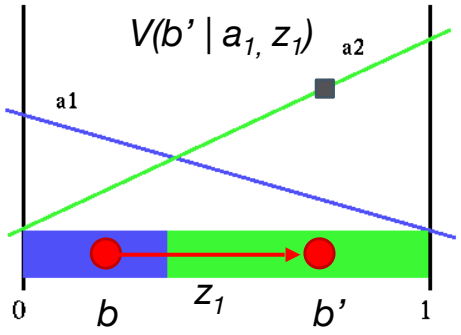
future value $V(b') = \sum V(b'|o)p(o|b)$



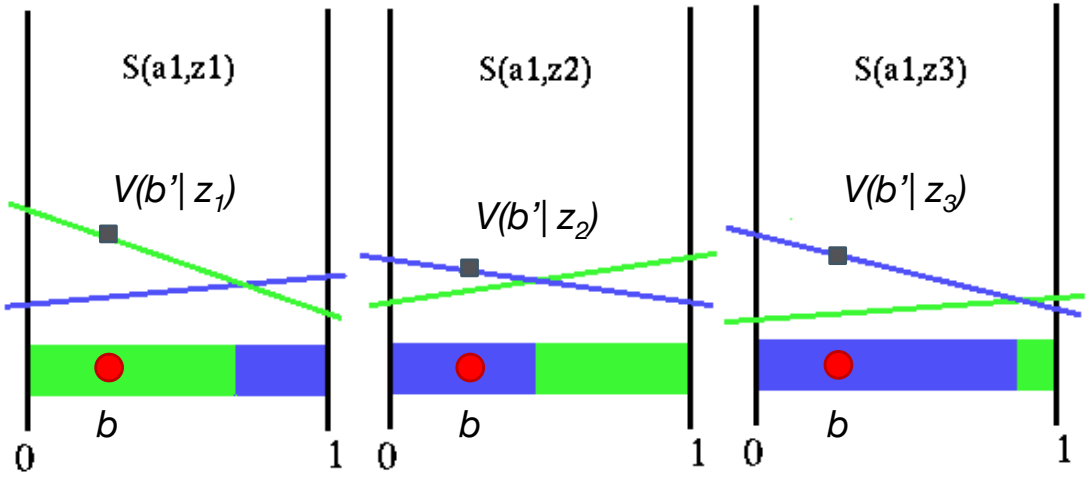


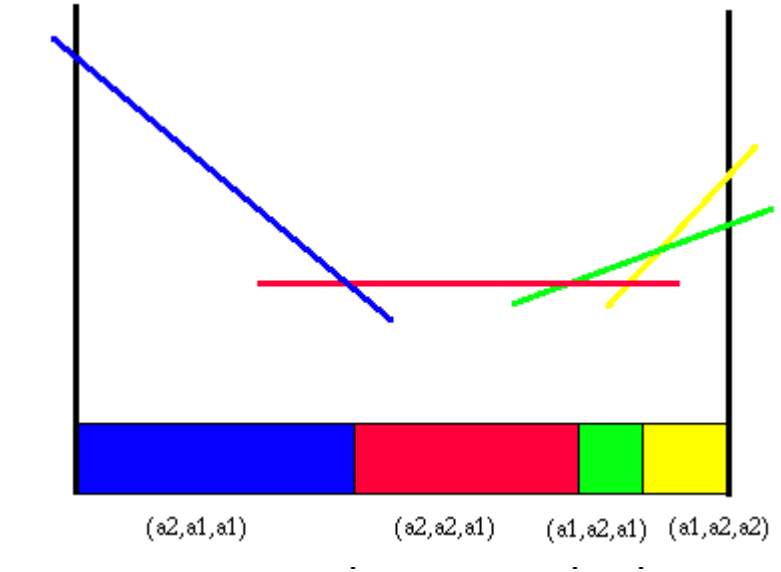
Resolution

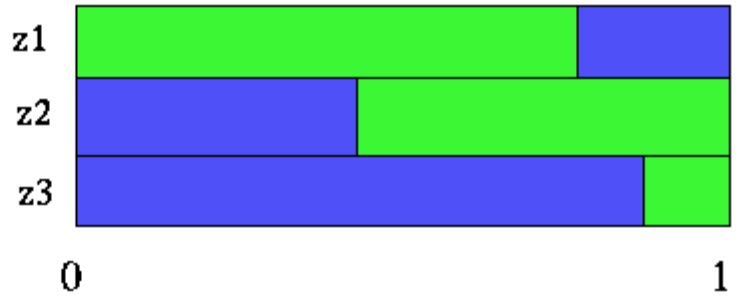
immediate reward



future value $V(b') = \sum V(b'|o)p(o|b)$

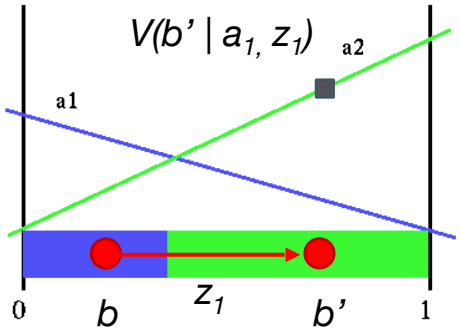




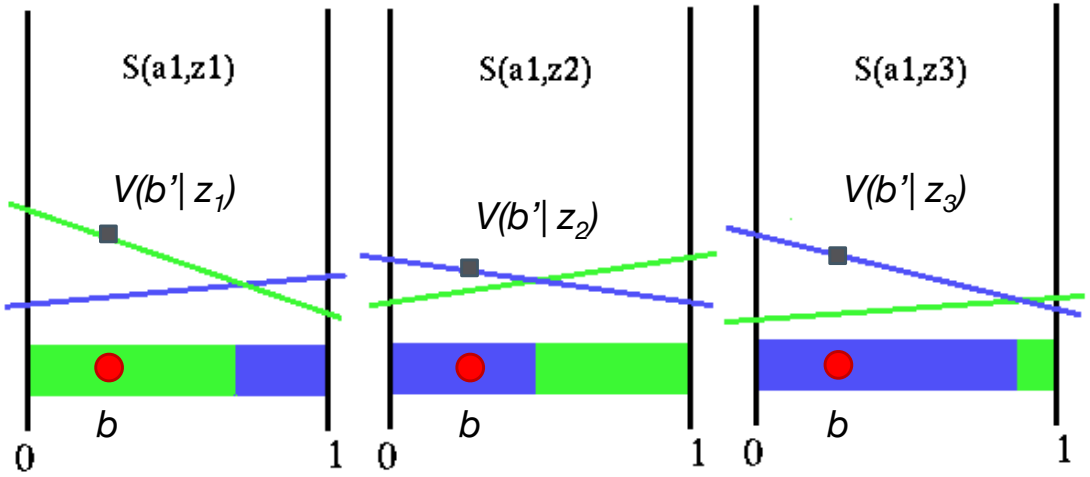


Resolution

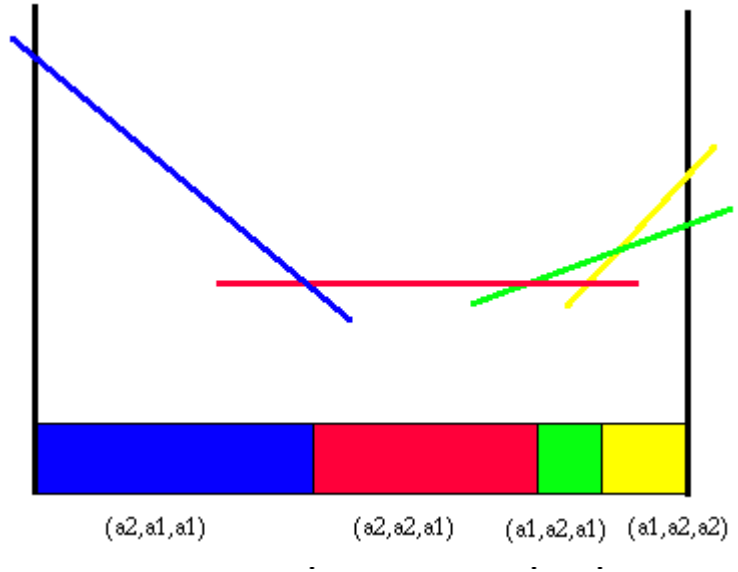
immediate reward

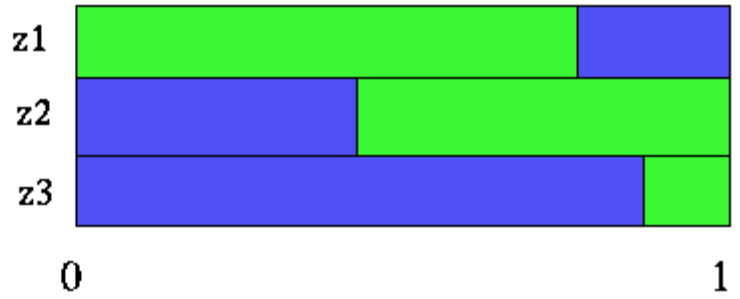


future value $V(b') = \sum V(b'|o)p(o|b)$



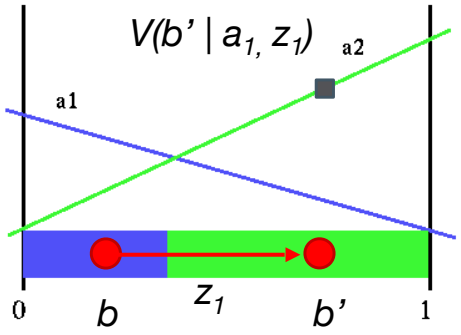
belief value $V(b) = r(b) + \gamma V(b')$



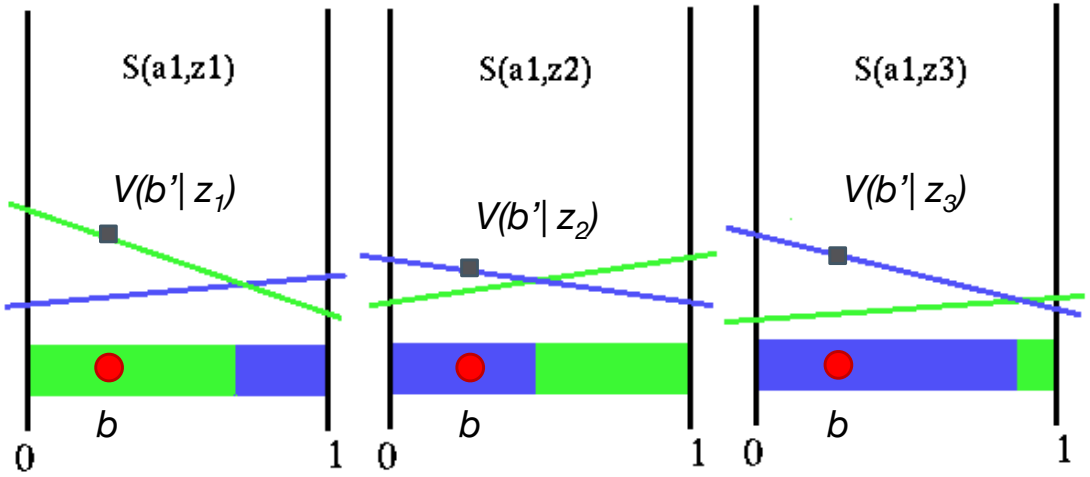


Resolution

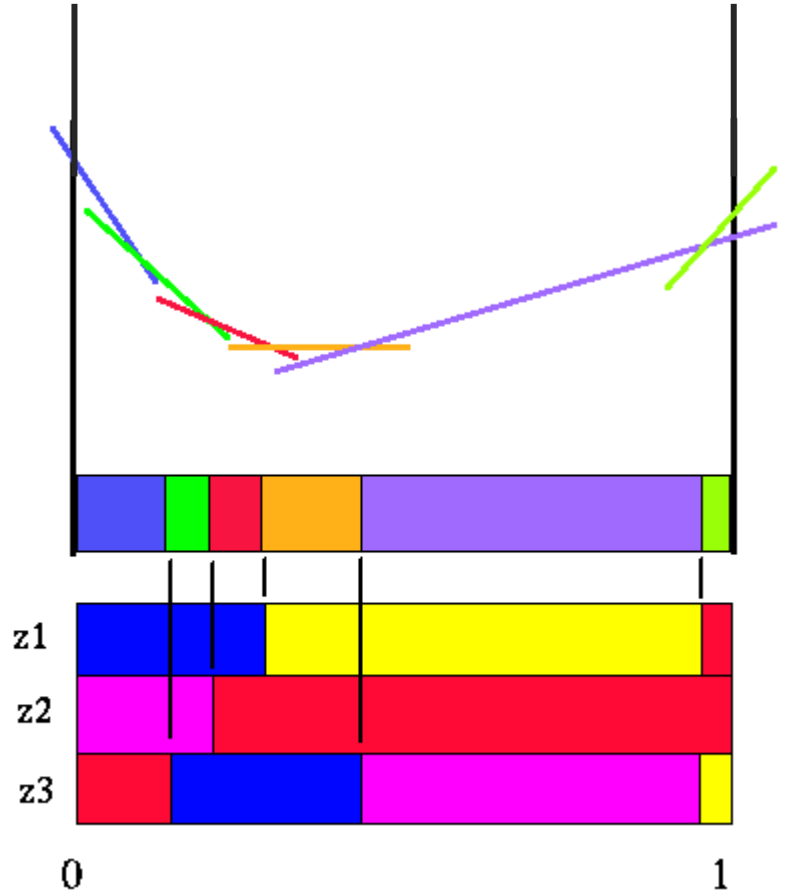
immediate reward



future value $V(b') = \sum V(b'|o)p(o|b)$



belief value $V(b) = r(b) + \gamma V(b')$



POMDP solution

alpha vectors (.alpha file)

// action
// v_1 v_2 v_3 …
//
// …

b = [p(s=s_1) p(s=s_2) p(s=s_3) …], sum to 1

V(action, b) = v1 p(s=s_1) + v2 p(s=s_2) + v3 p(s=s_3)

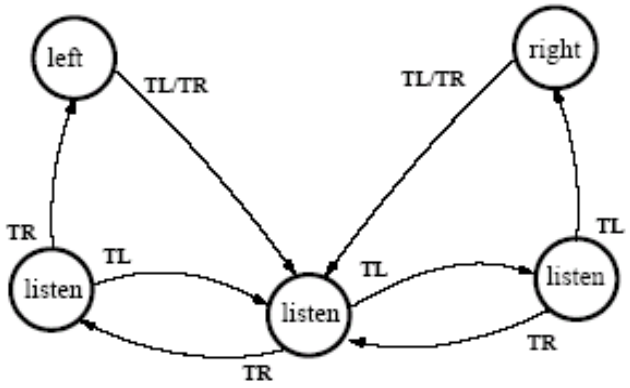
Some actions can have multiple alpha vectors, some none!

POMDP solution

belief MDP (.pg file)

POMDP solution

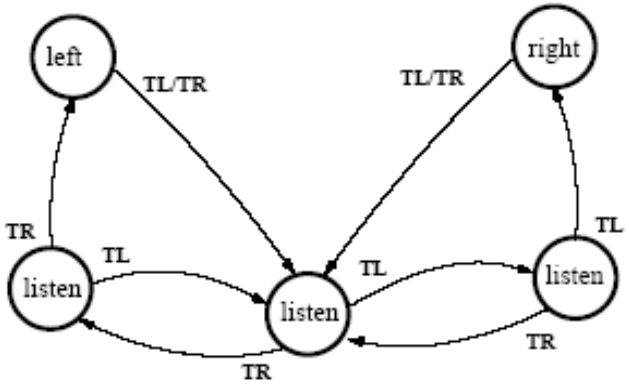
belief MDP (.pg file)

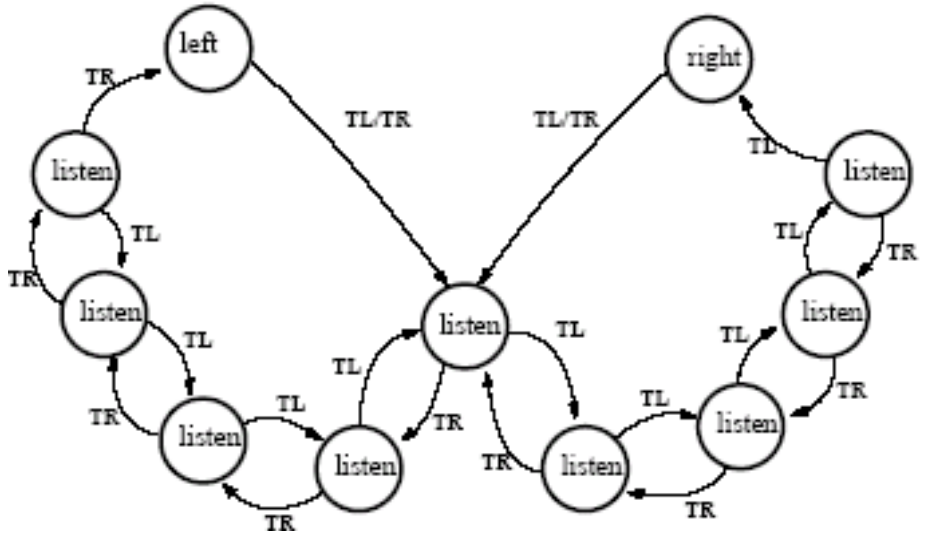


$p(o_{TL} \mid \text{listen}, TL) = 0.99$

POMDP solution

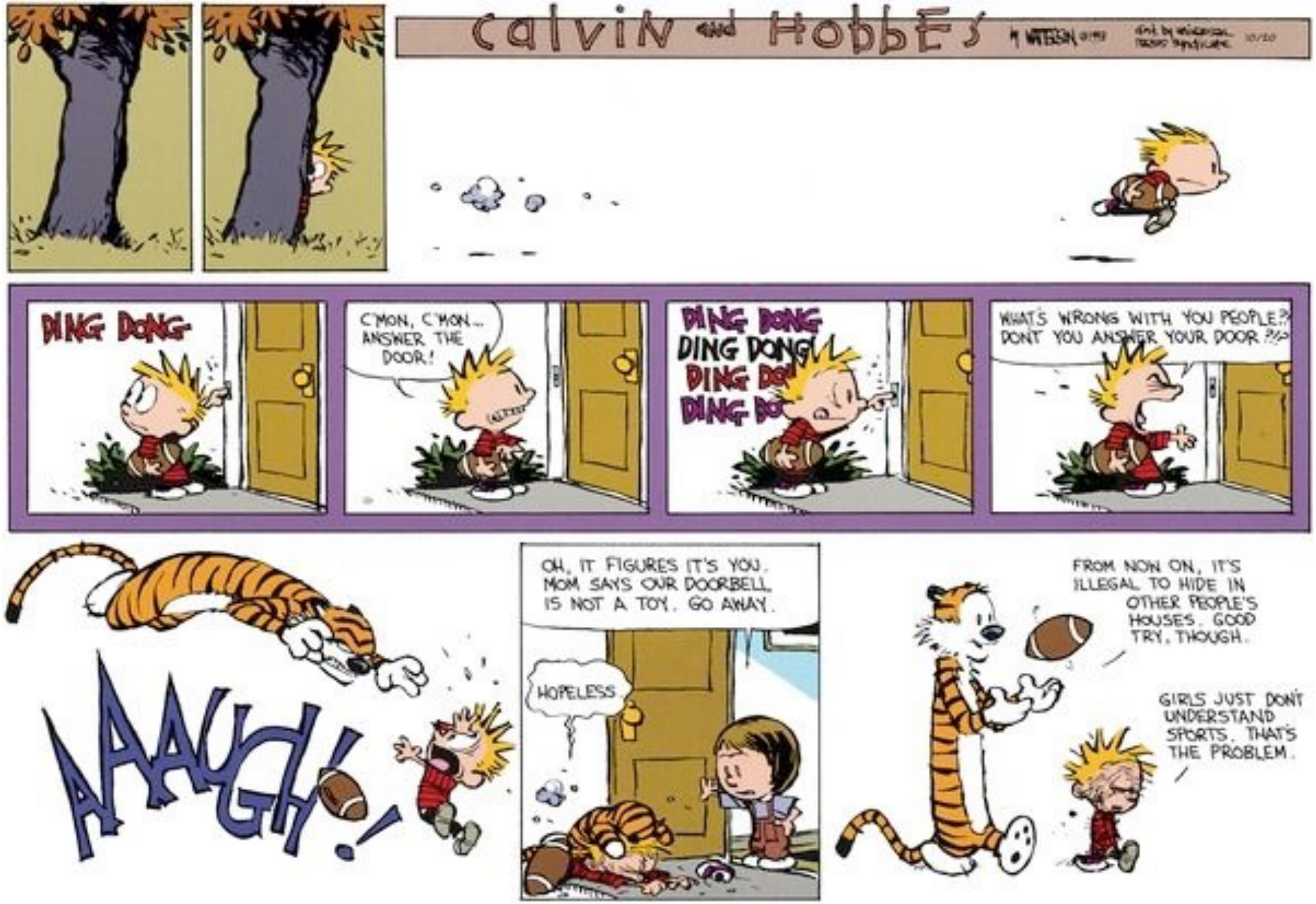
belief MDP (.pg file)





$p(o_{TL} \mid \text{listen}, TL) = 0.99$

$p(o_{TL} \mid \text{listen}, TL) = 0.75$


Calvin and Hobbes
DING DONG
C'MON, C'MON... ANSWER THE DOOR!
DING DONG DING DONG DING DONG
WHAT'S WRONG WITH YOU PEOPLE?! DON'T YOU ANSWER YOUR DOOR?!?
AAAUGH!
OH, IT FIGURES IT'S YOU. MOM SAYS OUR DOORBELL IS NOT A TOY. GO AWAY.
HOPELESS
FROM NOW ON, IT'S ILLEGAL TO HIDE IN OTHER PEOPLE'S HOUSES. GOOD TRY, THOUGH.
GIRLS JUST DON'T UNDERSTAND SPORTS. THAT'S THE PROBLEM.