CS5811
October 7, 2020
Wednesday (1)

Previous class

- probabilistic reasoning
- joint probability distribution (for discrete variables)

Course logistics

week

6

hw 2 7 (Fall Break) Thu Fri

hw 3 8 exam 1 10/21 wednesday 6^00 pm

hw 4 9 (calendar)

hw 5 10

hw 6 11 presentations

12 exam 2 11/18 W 6^00 pm

Thanksgiving Break

13 } presentations

14

no final exam

Exam 1	20%
Exam 2	20%
Assignments	20%
Presentation 1	15%
Presentation 2	15%
Class attendance and participation	10%

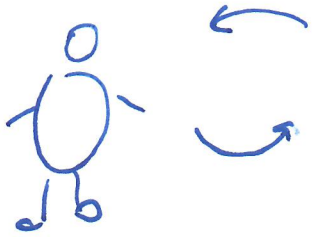
Exam 1 { Ch 3 search
Ch 6 ++ CSP
temporal CSP
PA, STN (TCSP) } hw 2

presentations

week 11 : 1/2 hour (25 min) 6 groups

1 group 3

5 groups of 2



To drive the agent's decisions under uncertainty we need two things:

1. representation of uncertain information
2. reasoning with uncertain information

probabilistic → define "algebra"

↑ rigorous

joint probability distribution table

discrete variables

states : discrete variables
Boolean
multi-valued

for every combination

n variables (Boolean) 2^n

↳ Bayesian network

6. $\mathbb{P}(r, I, H)$

$\alpha \langle$ 30 , 27 , 29 , 21 ,
rgy rgn rpy rpn ,
29 13
ray , ran $\rangle$

7. $P(r \to p) = \frac{151 + 178 + 29 + 21}{478}$

r	p	$r \to p$	$\neg r \vee p$
1	1	1	1
1	0	0	0
0	1	1	1
0	0	1	1

8. $P(p|r) = \frac{29 + 21}{149}$

↓ look at the r rows only

Neither $r \to p$ nor $p|r$ represent causality.

9. $\mathbb{P}(I|r) = \alpha \langle P(g|r), P(p|r), P(a|r) \rangle$

9. $P(C|r)$

$$\propto \left\langle \frac{30+27}{P(g|r)'}, \frac{29+21}{P(p|r)'}, \frac{29+13}{P(q|r)'} \right\rangle$$

$$\text{probability} = \frac{\text{desired}}{\text{total}}$$

CS5811 In class exercise - Working with joint probability distribution tables

Consider results of a hypothetical survey of high school students. The survey has with three questions:

- Location of the *School*: rural (r), suburban (s), urban (u)
- Most *Important* of these: grades (g), being popular (p), athletics (a)
- *Has* a pet: yes (y), no (n)

Answer				
S	I	H	Number	
r	g	y	30	
r	g	n	27	
r	p	y	29	
r	p	n	21	
r	a	y	29	
r	a	n	13	r total = 149
s	g	y	49	
s	g	n	38	
s	p	y	30	
s	p	n	12	
s	a	y	18	
s	a	n	4	s total = 151
u	g	y	20	
u	g	n	83	
u	p	y	9	
u	p	n	40	
u	a	y	6	
u	a	n	20	u total = 178
Total			478	

Compute the following probabilities or probability distributions

1. P(r)
2. $\mathbb{P}$ (S)
3. P(r,a,n)
4. P(r,a)
5. $\mathbb{P}$(r,a,H)
6. $\mathbb{P}$(r,I,H)
7. $P(\mathrm{r} \rightarrow \mathrm{p})$
8. $P(\mathrm{p} \mid \mathrm{r})$
9. $\mathbb{P}(\mathrm{I} \mid \mathrm{r})$