Cpts_540 hw8

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1.a. Define the sets: breeze, known, frontier and other.

Define the sets: Breeze as followed:

Breeze: $\neg Breeze_{1,1} \wedge \neg Breeze_{1,2} \wedge \neg Breeze_{1,3} \wedge \neg Breeze_{2,3} \wedge \neg Breeze_{3,3}$

Define the sets: Known as followed:

Known: $\neg Pit_{1,1} \wedge \neg Pit_{1,2} \wedge \neg Pit_{1,3} \wedge \neg Pit_{2,3} \wedge \neg Pit_{3,3} \neg Pit_{2,1} \neg Pit_{2,2} \neg Pit_{1,4} \neg Pit_{2,4}$

Define the sets: Frontier as followed:

Frontier: $\{Pit_{4,3}, Pit_{3,2}\}$

Define the sets: Others followed:

Other: Other 4 Pit variables

1b. Following the method in the textbook and lecture, compute the probability distribution P (Pit3,4 | breeze, known). Show your work.

The solution as followed:

$\boldsymbol{P}(Pit_{3,4}|Breeze, known) = \alpha \boldsymbol{P}(Pit_{3,4}) \sum frontier\ \boldsymbol{P}(Breeze|known, Pit_{3,4}, frontier) P(frontier)$

$= \alpha < 0.2(0.2 \times 0.2 + 0.2 \times 0.8 + 0.2 \times 0.8 + 0.8 \times 0.8), 0.8 \times (0.2 \times 0.2 + 0.2 \times 0.8 + 0.8 \times 0.2) >$

$= \alpha < 0.2, 0.288 >$

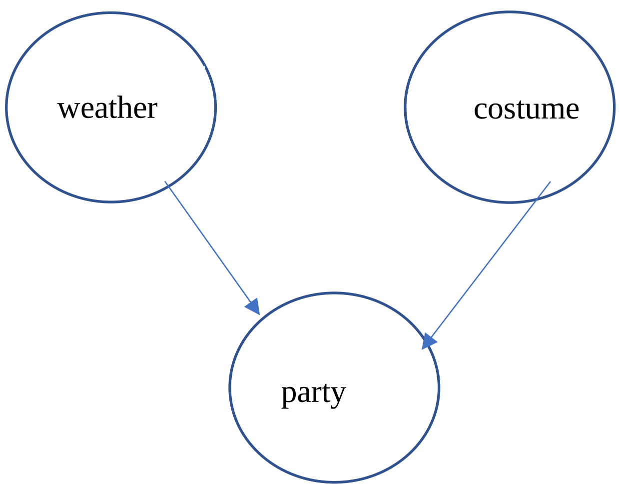
$= < 0.409, 0.591 >$

*2.*

| *weather* | | |
|---|---|---|
| clear | *cloudy* | *rain* |
| *0.2* | *0.5* | *0.3* |

| *Costume* | |
|---|---|
| *Yes* | *No* |
| *0.6* | *0.4* |

2.




| *Weather* | *Costume* | *Party* | |
|---|---|---|---|
| | | Yes \| | No |
| clear | Yes | 0.7 | 0.3 |
| clear | No | 0.4 | 0.6 |
| cloudy | Yes | 0.6 | 0.4 |
| cloudy | No | 0.6 | 0.4 |
| rain | Yes | 0.5 | 0.5 |
| rain | No | 0.2 | 0.8 |

3.

a. $P(AIDone = true, Costume = false, Party = true, Havefun = true, Makefriends = true) = P(AIDone = true) \times P(Costume = false) \times P\ (Party = true|AIDone = true, Costume = false)\ \times P(Makefriends = true|AIDone = true, Costume = false)$

=0.4* 0.7 * 0.5 * 0.6 * 0.7

=0.0588

b.

$\boldsymbol{P}(Havefun|AIDone = false, Custome = true) = \frac{\boldsymbol{P}(AIDone=false,Custome=true,Havefun)}{P(AIDone=false,Custome=true)}$

$= \alpha < P(AIDone = false, Custome = true, Havefun = true), P(AIDone = false, Custome = true, Havefun = false) >$

$= \alpha < 0.6 \times 0.3 \times (0.6 \times 0.4 + 0.2 \times 0.6, 0.6 \times 0.3 \times (0.4 \times 0.4 + 0.8 \times 0.6), >$

$= \alpha < 0.0648, 0.1152 >$

$=< 0.36, 0.64 >$

Therefore:

$P(Havefun = true|AIDone = false, Custome = true) = 0.36$

c.

$\boldsymbol{P}(AIDone|Havefun = true, Makefriends = true)$

$= \frac{P(Havefun = true, Makefriends = true|AIDone) * P(AIDone)}{P(Havefun=true), Makefriends=true}$

$= \alpha < P(AIDone = true) * P(Havefun = true, Makefriends = true|AIDone = true), P(AIDone = false) *$
$P(Havefun = true, Makefriends = true|AIDone = false) >$

$= \alpha < 0.4 \times \big(0.6 \times 0.7 \times (0.3 \times 0.9 + 0.5 \times 0.7) + 0.2 \times 0.4 \times (0.1 \times 0.3 + 0.5 \times 0.7)\big), 0.6 \times \big((0.6 \times 0.7) \times (0.4 \times 0.3 +$
$0.2 \times 0.7) + 0.2 \times 0.4 \times (0.6 \times 0.3 + 0.7 \times 0.8)\big)$

$= \alpha < 0.11632, 0.10104 >$

$=< 0.5351, 0.4649 >$

Above all:

$P(AIDone = true|Havefun = true, Makefriends = true) = 0.5351$