Homework 2

Lydia Holtrop
CS 344

#2 di.) $\mathbf{P}(\text{Cloudy}) = \langle 0.5, 0.5 \rangle$

ii.) $\mathbf{P}(\text{Sprinkler} \mid \text{cloudy}) = \langle \mathbf{P}(\text{sprinkler} \mid \text{cloudy}),\ P(\neg\text{sprinkler} \mid \text{cloudy}) \rangle$

$= \langle 0.10, 0.90 \rangle$

d.iii.) $\mathbf{P}(\text{Cloudy} \mid \text{sprinkler} \wedge \neg\text{rain}) = \alpha \sum P(\text{Cloudy}, \text{sprinkler}, \neg\text{rain})$

$= \alpha \sum P(\text{cloudy}) \cdot P(\text{sprinkler} \mid \text{cloudy}) \cdot P(\neg\text{rain} \mid \text{cloudy})$

$= \alpha \langle (0.5 \cdot 0.1 \cdot 0.2),\ (0.5 \cdot 0.5 \cdot 0.8) \rangle$

$= \alpha \langle \underset{0.21}{0.01},\ \underset{0.21}{0.2} \rangle$

$\approx \langle 0.0476, 0.95238 \rangle$

d.iv.) $\mathbf{P}(\text{WetGrass} \mid \text{cloudy} \wedge \text{sprinkler} \wedge \text{rain}) = \mathbf{P}(\text{WetGrass} \mid \text{sprinkler} \wedge \text{rain})$

$= \langle 0.99, 0.01 \rangle$

d.v.) $\mathbf{P}(\text{Cloudy} \mid \neg\text{WetGrass}) = \alpha \sum P(\text{Cloudy}, \text{sprinkler}, \text{rain}, \text{wetGrass})$

$= \alpha \langle 0.5\big((0.1 \cdot 0.8 \cdot 0.01) + (0.1 \cdot 0.2 \cdot 0.1) + (0.9 \cdot 0.8 \cdot 0.1) + (0.9 \cdot 0.2 \cdot 1)\big),$
$0.5\big((0.5 \cdot 0.2 \cdot 0.01) + (0.5 \cdot 0.8 \cdot 0.1) + (0.5 \cdot 0.2 \cdot 0.1) + (0.5 \cdot 0.8 \cdot 1)\big) \rangle$

$= \alpha \langle 0.1274, 0.2255 \rangle$

$= \langle 0.361, 0.639 \rangle$