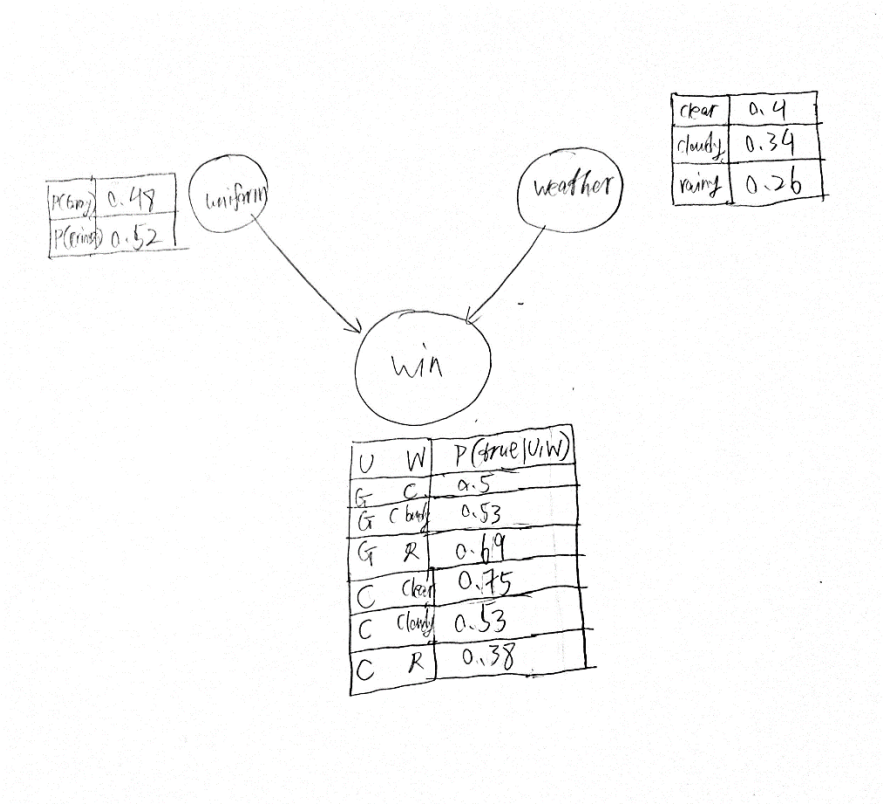
HW8

Haorui Zhang

10-27-2021

CS 440



1.
2.

a. P(Uniform = crimson, Weather = clear, Win = true, CallFriends = true, BuyJersey = true) = P(Uniform = crimson)*P(weather = clear)*P(Win = true|Uniform=crimson,Weather=clear)*P(CallFriends = true|Win = true)*P(BuyJersey = true|Win = true) = 0.6*0.3*0.9*0.7*0.6 = 0.068

b. P(CallFriends = true | Uniform = gray, weather = cloudy) = $\propto P(CallFriends = true, Uniform = gray, weather = cloudy) = \propto \sum_W \sum_B P(Callfriends = true, W, B, gray, cloudy) = \propto \sum_W \sum_B P(Callfriends = true) * P(W|Gray, Cloudy) * P(B|W) * P(Gray) * P(Cloudy) = \propto P(Callfriends = true) * [P(Gray) * P(Cloudy) * P(\sim w|Gray, Cloudy) * P(b|\sim w) + P(Gray) * P(Cloudy) * P(\sim w|Gray, Cloudy) * P(\sim b|\sim w) + P(Gray) * P(Cloudy) * P(w|Gray, Cloudy) * P(b|w) + P(Gray) * P(Cloudy) * P(w|Gray, Cloudy) * P(\sim b|w)] = \propto 0.9 * (0.4 * 0.4 * 0.6 * 0.4 + 0.4 * 0.4 * 0.6 * 0.7 + 0.4 * 0.4 * 0.4 * 0.6 + 0.4 * 0.4 * 0.4 * 0.3) = \propto 0.19872$

$$\propto = 2.26$$

$$\text{P(CallFriends} = \text{true} \mid \text{Uniform} = \text{gray}, \text{weather} = \text{cloudy}) = 2.26 * 0.19872 = 0.449$$

c. P(Uniform = crimson | CallFriends = true, BuyJersey = true) = $\propto$
$P(crimson, call, buy) = \propto \sum_{Weather} \sum_{Win} P(crimson, Weather, Win, call, buy) = \propto$
$P(crimson) *$ [P(clear)*P(win|clear, crimson)*P(call|win)*P(buy|win)+
P(clear)*P(~win|clear, crimson)*P(call|~win)*P(buy|~win)+ P(cloudy)*P(win|cloudy, crimson)*P(call|win)*P(buy|win)+ P(cloudy)*P(~win|cloudy, crimson)*P(call|~win)*P(buy|~win)+ P(rainy)*P(win|rainy, crimson)*P(call|win)*P(buy|win)+ P(rainy)*P(~win|rainy, crimson)*P(call|~win)*P(buy|~win)] = $\propto 0.6 * (0.3 * 0.9 * 0.7 * 0.6 + 0.3 * 0.1 * 0.2 * 0.3 + 0.4 * 0.6 * 0.7 * 0.6 + 0.4 * 0.4 * 0.2 * 0.3 + 0.3 * 0.4 * 0.7 * 0.6 + 0.3 * 0.6 * 0.2 * 0.3) = \propto * 0.6 * 0.2868 = \propto 0.17208$

$$\propto = \frac{1}{0.17208 + 0.11472} = 3.4867$$

P(Uniform = crimson | CallFriends = true, BuyJersey = true)=3.4867*0.17208 = 0.6

3. Uniform: Crimson
Weather: Cloudy
Win|Crimson, Cloudy: True
CallFriends | Win = True: True
BuyJersey | win = True: true
P(Uniform = Crimson, Weather = cloudy, Win = true, CallFriends = true, buyjersey = true) = P(Uniform = Crimson)*P(Weather = Cloudy) * P(Win = true | Crimson, Cloudy) * P(Callfriends = true | win = true)*P(Buyjersey = true | win = true) = 0.6*0.4*0.6*0.7*0.6=0.06048