Assignment 8

Ben Arancibia

October 25, 2014

Problem Set 1

Probability of $(A|B)$ is equal to $PR(B|A)$*$PR(A)$ / $PR(B)$.

So $PR(B)$ = ((.9x10) + (.5x10))/20

14/20 = 0.7

$PR(B|A) = 0.5$

$PR(A) = 0.5$

$PR(A|B)$ = (0.5 x 0.5)/(0.7)

(0.25)/(0.7)

final result: 0.3571

Problem Set 2 What happens to the probability of Difficulty of Course when you present the evidence that the received recommendation letter was good?

```
##FUTURE REFERENCE for gRain: http://www.bioconductor.org/packages/release/bioc/html/RBGL.html##

library(gRain)
```

```
## Loading required package: gRbase
```

```
yes_no <- c("yes", "no")
high_low <- c("high", "low")

#percents from variables
diff <- cptable(~difficulty, values=c(70, 30), levels=yes_no)
intell <- cptable(~intelligence, values=c(20, 80), levels=high_low)

grade_intell_diff <- cptable(~grade|intelligence:difficulty,
                             values=c(90, 10, 99, 1, 20, 80, 40, 60), levels=high_low)

sat_intell <- cptable(~sat|intelligence, values=c(80, 20, 10, 90), levels=high_low)
letter_grade <- cptable(~letter|grade, values=c(95, 5, 10, 90), levels=high_low)

p_var <- compileCPT(list(diff, intell, grade_intell_diff, sat_intell, letter_grade))

#create bayesian network
bay_network <- grain(p_var)

p_var$difficulty
```

```
## difficulty
## yes  no
## 0.7 0.3
```

p_var$difficult seems to have worked, which is just probability.

A course seems to be more difficult given that a high recommendation letter was given. ($0.84 > 0.7$)

```
bay_network_LH <- setFinding(bay_network, nodes="letter", states="high")
#query grain time
querygrain(bay_network_LH, nodes=c("letter", "difficulty"))$difficulty
```

```
## difficulty
##       yes        no
## 0.8418469 0.1581531
```

Seems that a course was difficult given a high SAT Score and a high recommendation, than just a high recommendation alone. ($0.86 > 0.84$)

```
bay_network_LHSH <- setFinding(bay_network, nodes=c("sat", "letter"), states=c("high", "high"))
#query grain time
querygrain(bay_network_LHSH, nodes=c("letter", "sat", "difficulty"), type="marginal")$difficulty
```

```
## difficulty
##       yes        no
## 0.8641436 0.1358564
```