

SEC 1-FAE1-DELA ROSA, R

Github Link:

https://github.com/rddelarosa/APM1110/blob/main/FAE1/SEC_1-FAE1-DELA-ROSA%2C-R.md?plain=1

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13. A malicious spyware can infect a computer system though the Internet or through email. The spyware comes through the Internet 70% of the time and 30% of the time, it gets in through email. If it enters via the Internet the anti-virus detector will detect it with probability 0.6, and via email, it is detected with probability 0.8.

Given

```
P_net <- 0.7
P_mail <- 0.3
P_D_net <- 0.6
P_D_mail <- 0.8
```

(a) What is the probability that this spyware infects the system?

```
P_Not_D_net <- 1 - P_D_net
P_Not_D_mail <- 1 - P_D_mail

P_Infect <- (P_net * P_Not_D_net) + (P_mail * P_Not_D_mail)

cat("The probability that this spyware infects the system is:", P_Infect)
```

```
## The probability that this spyware infects the system is: 0.34
```

(b) If the spyware is detected, what is the probability that it came through the Internet?

```
P_Detect <- (P_net * P_D_net) + (P_mail * P_D_mail)
P_Internet_given_Detect <- (P_net * P_D_net) / P_Detect

cat("The probability that the spyware came through the Internet and infects the system is:", P_Internet,
```

```
## The probability that the spyware came through the Internet and infects the system is: 0.6363636
```

14. Of the emails you receive 20% are spam on average. Your spam filter is able to detect 90% of them but also misclassifies as spam 15% of the genuine emails.

Given

```
P_Spam <- 0.2
P_Genuine <- 0.8
P_Detect_Spam <- 0.9
P_False_Positive <- 0.15
```

(a) If an email arrives and is marked spam, what is the probability that it really is spam?

```
P_Marked_Spam <- (P_Spam * P_Detect_Spam) + (P_Genuine * P_False_Positive)
P_Spam_given_Marked <- (P_Spam * P_Detect_Spam) / P_Marked_Spam
cat("The probability that the email arrives is spam:", P_Spam_given_Marked)
```

```
## The probability that the email arrives is spam: 0.6
```

(b) If an email arrives and is not marked spam, what is the probability that it is legitimate?

```
P_Not_Marked_Spam <- (P_Spam * (1 - P_Detect_Spam)) + (P_Genuine * (1 - P_False_Positive))
P_Genuine_given_Not_Marked <- (P_Genuine * (1 - P_False_Positive)) / P_Not_Marked_Spam

cat("The probability that the email arrived is legitimate:", P_Genuine_given_Not_Marked)
```

```
## The probability that the email arrived is legitimate: 0.9714286
```