School of Engineering and Applied Science (SEAS), Ahmedabad University

Probability and Stochastic Processes (MAT277)

Homework Assignment-2

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1. (a) **Let event A be the probability that Omega is significant:** $\Pr(A) = 0.75$

   (b) **Let there be an event that the Algorithm Delta produces a positive result, given that Omega is significant:** $\Pr(B|A) = 1 - 0.15 = 0.85$

   (c) **Let there be an event that the Algorithm Delta produces a positive result, given that Omega is insignificant:** $\Pr(B|A') = 0.15$

   (d) **The probability that Omega is insignificant:** $\Pr(A') = 0.25$

The Probability that the message is significant given Algorithm Delta is positive is,

$$Pr(A|B) = \frac{Pr(B|A).Pr(A)}{Pr(B|A).Pr(A) + Pr(B|A').Pr(A')}$$

$$= \frac{(0.85).(0.75)}{(0.85).(0.75) + (0.15).(0.25)}$$

$$= \frac{0.6375}{0.675}$$

$$= 0.9444444$$

$$\boxed{\therefore \Pr(A|B) \approx 0.945}$$

Hence, as the probability that message contains critical information is less than 95%, we should opt for further analysis.

2.