Assignment 7

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AI21MTECH02003

I. Prob 6.15

Problem: Given two independent events A and B such that they are independent and P(A) = 0.3 and P(B) = 0.6, find.
(a) P(A and B)
(b) P(A and not B)
(c) P(A or B)
(d) P(neither A nor B)

Solution (a): P(A and B):
Two events are independent if:
$Pr(A \cap B) = Pr(A) * Pr(B)$ Given Pr(A) = 0.3 and Pr(B) = 0.6

$$\begin{aligned} Pr(\text{A and B}) &= Pr(A \cap B) && (1)\\ &= Pr(A) \times Pr(B) && (2)\\ &= 0.3 \times 0.6 && (3)\\ &= 0.18 && (4) \end{aligned}$$

(b): P(A and nor B):

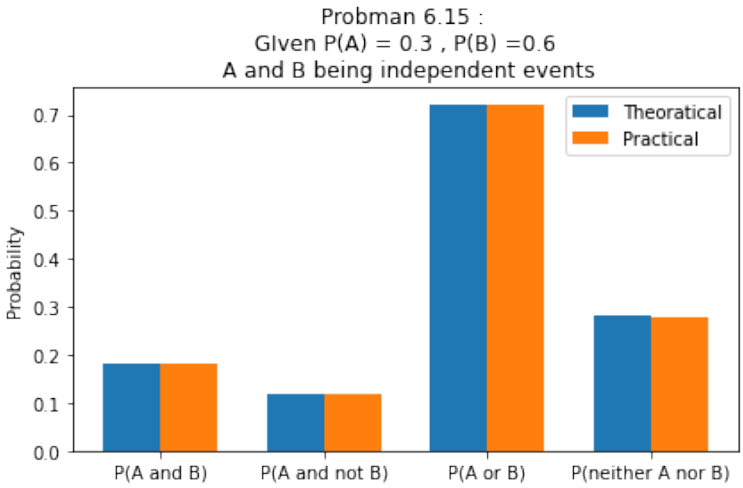
$$\begin{aligned} Pr(\text{A and not B}) &= Pr(A \cap B') && (5)\\ &= Pr(A) - Pr(A \cap B) && (6)\\ &= 0.3 - 0.18 && (7)\\ &= 0.12 && (8)\\ & && (9) \end{aligned}$$

(c): P(A or B):

$$\begin{aligned} Pr(\text{A or B}) &= Pr(A \cup B') && (10)\\ &= Pr(A) + Pr(B) - Pr(A \cap B) && (11)\\ &= 0.3 + 0.6 - 0.18 && (12)\\ &= 0.72 && (13)\\ & && (14) \end{aligned}$$

(d): P(Neither A nor B):

$$\begin{aligned} Pr(\text{neither A nor B}) &= Pr(A' and B') && (15)\\ &= Pr(A' \cup B') && (16)\\ &= 1 - Pr(A \cup B) && (17)\\ &= 1 - 0.72 && (18)\\ &= 0.28 && (19) \end{aligned}$$



Code source: https://github.com/harshal9876/AI5002/blob/main/Asssignment_7/Codes/Assignment_7.py
LaTex code : https://github.com/harshal9876/AI5002/blob/main/Asssignment_7/Assignment_7.tex