

AI1110: Probability and Random Variables

Assignment 6

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Outline

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2 Solution

- Data Given from Question
- Finding EF'
- Result

Question

Prove that if E and F are independent events, then so are the events E and F' .

Data Given from Question

Theory

Probability of Intersection of 2 or more independent events is the product of probability of the events happening individually.

Given, E and F are independent events. Thus,

$$\Pr(EF) = \Pr(E) \times \Pr(F) \quad (1)$$

Finding EF'

F' and F are mutually exclusive events. E can be expressed such as:

$$E = EF + EF' \quad (2)$$

EF and EF' are also mutually exclusive events. Therefore,

$$\Pr(E) = \Pr(EF) + \Pr(EF') \quad (3)$$

$$\implies \Pr(EF') = \Pr(E) - \Pr(EF) \quad (4)$$

Result

Using (1) and (4), we get,

$$\Pr(EF') = \Pr(E) - \Pr(E) \times \Pr(F) \quad (5)$$

$$= \Pr(E)(1 - \Pr(F)) \quad (6)$$

$$\Pr(EF') = \Pr(E) \times \Pr(F') \quad (7)$$

By (7), it can be concluded that E and F' are independent events.