More on Axiomatic Approach to Probability

Data Science and A.I. Lecture Series

Bindeshwar Singh Kushwaha

PostNetwork Academy

Statement of the First Proof

Prove: $P(A \cap B^c) = P(A) - P(A \cap B)$

- This formula expresses the probability of A occurring without B.
- It uses the complement rule and properties of set operations.

Proof of the First Statement

- The event A can be partitioned into two disjoint subsets:

$$A = (A \cap B) \cup (A \cap B^c)$$

Proof of the First Statement

- The event A can be partitioned into two disjoint subsets:

$$A = (A \cap B) \cup (A \cap B^c)$$

- Using the additivity property of probabilities:

$$P(A) = P(A \cap B) + P(A \cap B^c)$$

Proof of the First Statement

- The event A can be partitioned into two disjoint subsets:

$$A = (A \cap B) \cup (A \cap B^c)$$

- Using the additivity property of probabilities:

$$P(A) = P(A \cap B) + P(A \cap B^c)$$

- Rearranging gives:

$$P(A \cap B^c) = P(A) - P(A \cap B)$$

Statement of the Second Proof

Prove: $P(A^c \cap B) = P(B) - P(A \cap B)$

- This formula expresses the probability of B occurring without A.
- It also uses the complement rule and properties of set operations.

Proof of the Second Statement

- The event B can be partitioned into two disjoint subsets:

$$B = (A \cap B) \cup (A^c \cap B)$$

Proof of the Second Statement

- The event B can be partitioned into two disjoint subsets:

$$B = (A \cap B) \cup (A^c \cap B)$$

- Using the additivity property of probabilities:

$$P(B) = P(A \cap B) + P(A^c \cap B)$$

Proof of the Second Statement

- The event B can be partitioned into two disjoint subsets:

$$B = (A \cap B) \cup (A^c \cap B)$$

- Using the additivity property of probabilities:

$$P(B) = P(A \cap B) + P(A^c \cap B)$$

- Rearranging gives:

$$P(A^c \cap B) = P(B) - P(A \cap B)$$

Example 4: Calculate $P(A \cap B^c)$

Given: $P(A) = 0.6,\ P(A \cap B) = 0.2$

- By the formula:

$$P(A \cap B^c) = P(A) - P(A \cap B)$$

Example 4: Calculate $P(A \cap B^c)$

Given: $P(A) = 0.6,\ P(A \cap B) = 0.2$

- By the formula:

$$P(A \cap B^c) = P(A) - P(A \cap B)$$

- Substitute the values:

$$P(A \cap B^c) = 0.6 - 0.2$$

Example 4: Calculate $P(A \cap B^c)$

Given: $P(A) = 0.6,\ P(A \cap B) = 0.2$

- By the formula:

$$P(A \cap B^c) = P(A) - P(A \cap B)$$

- Substitute the values:

$$P(A \cap B^c) = 0.6 - 0.2$$

- Simplify:

$$P(A \cap B^c) = 0.4$$

Example 5: Calculate $P(A^c \cap B)$

Given: $P(B) = 0.7$, $P(A \cap B) = 0.3$

- By the formula:

$$P(A^c \cap B) = P(B) - P(A \cap B)$$

Example 5: Calculate $P(A^c \cap B)$

Given: $P(B) = 0.7$, $P(A \cap B) = 0.3$

- By the formula:

$$P(A^c \cap B) = P(B) - P(A \cap B)$$

- Substitute the values:

$$P(A^c \cap B) = 0.7 - 0.3$$

Example 5: Calculate $P(A^c \cap B)$

Given: $P(B) = 0.7$, $P(A \cap B) = 0.3$

- By the formula:
$$P(A^c \cap B) = P(B) - P(A \cap B)$$
- Substitute the values:
$$P(A^c \cap B) = 0.7 - 0.3$$
- Simplify:
$$P(A^c \cap B) = 0.4$$

Reach PostNetwork Academy

Website

www.postnetwork.co

Reach PostNetwork Academy

Website

www.postnetwork.co

YouTube Channel

www.youtube.com/@postnetworkacademy

Reach PostNetwork Academy

Website

www.postnetwork.co

YouTube Channel

www.youtube.com/@postnetworkacademy

Facebook Page

www.facebook.com/postnetworkacademy

Reach PostNetwork Academy

Website

www.postnetwork.co

YouTube Channel

www.youtube.com/@postnetworkacademy

Facebook Page

www.facebook.com/postnetworkacademy

LinkedIn Page

www.linkedin.com/company/postnetworkacademy

Thank You!