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Day 1-26-04 Date 9:55 am

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(ex). P that A happens and B does not happen?

P_A , $P_{not\,B} = 1 - P_B$

$P_{A\,not\,B} = P_A(1 - P_B) = P_A - P_A P_B$

More on combining events

P that neither A nor B happens ?

$P_{not\,A\,not\,B} = (1 - P_A)(1 - P_B)$

(ex). P that either A or B happens or A and B happen ?

(OR cases where events are not ME.)

{ Nothing happens : nor A nor B
Something " : A or B or A and B. } ME

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$P_{something} = 1 - P_{nothing}$

$P_{nothing} = (1 - P_A)(1 - P_B)$

$P_{something} = 1 - (1 - P_A)(1 - P_B) = P_A + P_B - P_A P_B$

Composite events

Reformulation. "Rewriting" an event so that it represents a CE set of IEs.

(ex). Rolling 2 dice. P (that) 1 on 1st roll or a 4 on the 2nd roll

(these events are not ME)

all possible outcomes:

(1 1)	(1 2)	(1 4)	(1 6)
(2 1)	(2 2)	(2 4)	(2 6)
(3 1)	(3 2)	(3 4)	(3 6)
(4 1)	(4 2)	... (4 4)	... (4 6)
(5 1)	(5 2)	(5 4)	(5 6)
(6 1)	(6 2)	(6 4)	(6 6)

$P_{success} = P_A + P_B + P_C$

P_A = 1 appear in 1st roll, 4 not in 2nd roll.

P_B = 4 " " 2nd roll, 1 " " 1st roll.

P_C = 1 appear in 1st roll and 4 in 2nd roll.

} IEs and events ME. CE.

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$P_A = \frac{1}{6}\frac{5}{6} = \frac{5}{36}$;
$P_B = \frac{5}{6}\cdot\frac{1}{6} = \frac{5}{36}$
$P_c = \frac{1}{6}\cdot\frac{1}{6} = \frac{1}{36}$
$\Rightarrow P_{success} = \frac{5}{36} + \frac{5}{36} + \frac{1}{36} = \frac{11}{36}$

Correlated Events

ex: Barrell: (G) (G) (R)

$P_{green,1st} = \frac{2}{3}$
$P_{green,2nd} = \frac{1}{3}$
] history events (correlated)

Conditional Probability: Prob. of event B given that some other event (A) has occured. $P(B/A)$

A ≡ get green on 1st draw.
B ≡ get " " 2nd "

Joint Prob.: Prob. that A and B occur. $P_{AB} \equiv P(A \cap B)$

Bayes Rule: (for And events, not necessarily independent)

$$P(AB) = P(A \cap B) = P(B/A)\cdot P(A) = P(A/B)\cdot P(B)$$

If A and B are IEs: ↓reduce

$$P(AB) = P(A)\cdot P(B).$$