Data Analytics Day 2 (Quiz)

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1. Suppose a company offers three different delivery methods for their products: standard delivery, express delivery, and same-day delivery 60% of customers choose standard delivery, 30% choose express delivery, and 10% choose same-day delivery. The delivery success rates are 95% for standard delivery, 90% for express delivery, and 85% for same-day delivery. If a customer's delivery fails, what is the probability that they chose express delivery?

   Jawab :

   Peluang :

   - Standard Delivery = 60% = 0.6
   - Express Delivery = 30% = 0.3
   - Same-Day Delivery = 10% = 0.1

   Success Rate :

   - Standard Delivery = 95% = 0.95 → Fail = 0.05
   - Express Delivery = 90% = 0.90 → Fail = 0.10
   - Same-Day Delivery = 85% = 0.85 → Fail = 0.15

   Jika delivery customernya gagal, berapa probabilitas mereka memilih express delivery?

   Menggunakan Teorama Bayes, karena memungkinkan membuat probabilitas berdasarkan informasi baru.

   $$P(A \mid B) = P(B \mid A) * P(A) / P(B)$$

   $$\mathrm{P(Express \mid Fail)} = \frac{\mathrm{P(Fail \mid Express)} * \mathrm{P(Express)}}{\mathrm{P(Fail)}}$$

   $$\mathrm{P(Fail \mid Express)} * \mathrm{P(Express)} = 0.10 \text{ x } 0.3 = 0.03$$

   $$\mathrm{P(Fail)} = (0.05\ x\ 0.6) + (0.10\ x\ 0.3) + (0.15\ x\ 0.1) = 0.03 + \ 0.03 + 0.015 = 0.075$$

   $$\mathrm{P(Express \mid Fail)} = \frac{0.03}{0.075} = 0.4 = 0.4\ x\ 100\% = 40\%$$

   Probabilitas mereka memilih express delivery sebesar 40%.

2. If a medical test is 95% accurate in detecting a disease and 1% of the population has the disease. Calculate the probability of having the disease given a positive test result!

   Jawab :

   Medical Test : 95% True, 1% Sakit

   Peluang Sakit : 1% = 0.01 → Tidak Sakit = 0.99

   Peluang Positif : 95% = 0.95 → Negatif = 0.05

   Peluang terkena Sakit jika medical test nya positif.

   $$\mathrm{P(Sakit \mid Positif)} = \frac{\mathrm{P(Positif \mid Sakit)} * \mathrm{P(Sakit)}}{\mathrm{P(Positif)}}$$

$$P(\text{Positif} \mid \text{Sakit}) * P(\text{Sakit}) = 0.95 \text{ x } 0.01 = 0.0095$$

$$P(\text{Positif}) = (0.95 \text{ x } 0.01) + (0.05 \text{ x } 0.99) = 0.0095 + 0.0495 = 0.059$$

$$P(\text{Sakit} \mid \text{Positif}) = \frac{0.0095}{0.059} = 0.1610 \; x \; 100\% = 16.10\%$$

Peluang terkena Sakit jika medical test nya positif adalah 16.10%.