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RES500 – Fundamentals of Quantities Analysis

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Module 4: Probability

Exercises 13:

n is the number of trials, and p is the probability of success;

The data set's mean tells us the average case, and the standard deviation tells us how many points alter from the norm. And another view for the mean tells us which data set is higher(better) or lower(worse) in the average case. The standard deviation tells us which data set has a larger spread, meaning data is more spread out from the mean. Let's look at the formula with question 13 normal approximation to binomial distribution;

μ=n*p

σ =50*0.65=32.5$\sqrt{np(1-p)}$ = $\sqrt{50 * (0.65) * (1 - 0.65)}$ = 3.372684

I use the continuity correction of the normal binomial distribution for less than or equal to 25 with the standard normal distribution as a z-score tells how many standard deviations away individual data values drop from the mean;

Z = (x- μ)/ σ

Z = (25.5 – 32.5)/ 3.372684 = -2.075498 that result compare from table of Standard normal probabilities for negative Z-score. Thus the probability of coming up heads 25 or fewer times from the z-table P(x<=25) = P(Z< -2.075498)= 0.0188 means 1% of values fall bellow a z-score of -2.075498.

Exercises 25;

P(low risk) = 0.40 p(fault accident l Low risk) = 0

p(moderate risk) = 0.40 p(fault accident l moderate risk) = 0.10

p(high risk) = 0.20 p(fault accident l high risk) =0.20

This is conditional probability tells the probability of one thing being true given that another thing is true as another name Bayes' theorem. This conditional probability of fault accident is given high risk. Let's formalize it;

P(Y l X_1) = $\frac{P(X \cap Y)}{P(X)}$

(high-risk l fault accident) =

$$\frac{\text{P(high risk)} * \text{P(fault accident l high risk)}}{\text{P(low risk)} * \text{P(fault accident l low risk)} + P(moderate\ risk) * P(fault\ accident\ l\ moderate\ risk) + P(hhigh\ risk) * P(fault\ accident\ l\ high\ risk)}$$

=$(0.20 * 0.20)/(0.40 * 0 + \ 0.40 * 0.10 + 0.20 * 0.20)$

=0.50

The high risk client has %50 probability to fault accident in the next year.

Reference;

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Normal Approximation to Binomial Distribution Calculator with Examples - VrcAcademy

How to use the Z Table (With Examples) - Statology

Conditional Probability Distribution | Brilliant Math & Science Wiki