Day: Date:

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Data Science Group 2

Median

L = Lower class boundary

C = Cumulative frequency of preceding group

h = Class Interval

F = Frequency

$n = \Sigma f$

$$\text{Median} = L + h/f(n/2 - C)$$

Example

Class	Frequency	Class boundaries	Cumulative Frequency
65-84	9	64.5-84.5	9
85-104	10	84.5-104.5	19
105-124	17	104.5-124.5	36
125-144	10	124.5-144.5	46
145-164	5	144.5-164.5	51
165-184	4	164.5-184.5	55
185-204	5	184.5-204.5	60
	$\Sigma f = 60$		

$n/2 = 30$

Applying Formula $= L + h/f(n/2 - C)$

$= 104.5 + 20/17((60/2) - 19) = 116.8$

Mode

L = Lower classboundary of mode group

f_m = Freq of mode group

f_1 = Freq of preceding group

f_2 = Freq of following group

h = class interval

$$\text{Mode} = L + \frac{f_m - f_1}{(f_m - f_1) + (f_m - f_2)} \times h$$

Example

Same Data

Highest frequency = 17

by formula

$$\text{Mode} = 104.5 + \frac{17 - 10}{(17-10) + (17-10)} \times 20$$

$$= 114.5$$

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Distributions

Binomial distribution

$$P(x) = {}^{n}C_x \cdot p^x \cdot q^{n-x}$$

n = n.o of trials

x = Successfull trials

P = Probability of Successfull trials

q = Probability of unsuccessfull trials.

Example.

If ten coins are thrown simultaneously Find probability of getting at least 3 heads

$$P(x \geq 3) = P(x=3) + P(x=4) + \cdots + P(x=10)$$

$$P(x \geq 3) = 1 - [P(x=0) + P(x=1) + P(x=2)]$$

$$= 1 - \left[\frac{1}{1024} \times {}^{10}C_0 + \frac{1}{1024} \times {}^{10}C_1 + \frac{1}{1024} {}^{10}C_2 \right]$$

$$= 1 - \frac{1}{1024} \left[1 + 10 + \frac{10!}{2!8!} \right]$$

$$= 1 - \frac{56}{1024}$$

$$= \frac{968}{1024}$$

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Poisson Distribution.

$$P(x) = \frac{e^{-x} m^x}{x!}$$

m = Average

x = no of success

Example.

If a random variable X follows poisson distribution such that

$P(X=1) = P(X=2)$ Find

(i) Mean (ii) $P(X=0)$ (iii) S.D of Dist

(i) by given Condition $\rightarrow P(X=1) = P(X=2)$

$$\frac{e^{-m} m^1}{1!} = \frac{e^{-m} m^2}{2!}$$

$2 = m$.

mean = 2

(ii) $P(X=0)$

$$= \frac{e^{-m} m^0}{0!}$$

$$= e^{-m}$$

$$= e^{-2} \quad \therefore m = 2$$

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(iii) S.D of Poisson dist.

$S.D = \sqrt{m}$

$S.D = \sqrt{2}$

Variance $= (S.D)^2 = (\sqrt{2})^2 = 2$

Hypergeometric Distribution:

$$P(x) = \frac{{}^{K}C_x \times {}^{N-K}C_{n-x}}{{}^{N}C_n}$$

N = Total population.

K = Success from Total Population

x = Success from Sample Space.

n = Success or Selected cards.

Example

Suppose we randomly Select 5 cards with replacement From ordinary dect of playing Cards what is the probability of getting exactly 2 red Card.

$N = 52 \qquad n = 5$

$K = 26 \qquad x = 2$

$$P(X=2) = \frac{({}^{26}C_2)({}^{52-26}C_{5-2})}{{}^{52}C_5}$$

$$= \frac{325 \times 2600}{2598960} = 0.32513.$$