

M.Ed 308 : Advanced Research Methodology and Inferential Statistics

**UNIT:3 Analysis and Interpretation of Data**

**Descriptive Statistics : Significance and Uses of-----**

1. *Measures of Central Tendency*

2. *Measures of Variability*

3. *Measures of Relative Positions: Quartile, Deciles, Percentile standard Scores ( Z and T)*

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# केंद्रीय प्रवृत्ती ( Central Tendency)

Central tendency is a descriptive summary of a dataset through a single value that reflects the centre of the data distribution.

*A measure of central tendency is a single value that attempts to describe a set of data by identifying the central position within that set of data.*

*Central Tendency means the method of finding out the central value or average value of a statistical series of quantitative information.*

*श्रेणीचे प्रतिनिधित्व करणारा अंक. गुणांक श्रेणीतील आकड्यांना उतरत्या किंवा चढत्या क्रमाने लिहिले असता मध्यभागी येणाऱ्या गुणांक / आकड्यांच्या जवळपासचे असतात म्हणून त्यांना केंद्रीय प्रवृत्ती म्हणतात.*

## *Measures of Central Tendency:*

1. Mean मध्यमान
2. Median मध्यगा /मध्यांक
3. Mode बहुलक

## *1. Mean मध्यमान*

Mean is the point on the score scale corresponding to the sum of the scores divided by their number.

*The mean is the arithmetic average.*

गुणांकांची सरासरी म्हणजे मध्यमान . सर्व गुणांकांच्या बेरजेला एकूण संख्येने भागले असता येणाऱ्या संख्येला त्या वितरणाचे मध्यमान म्हणतात . त्यास अंकगणीतिय मध्यमान ( Arithmetic Mean) म्हणतात .

*मध्यमान = सर्व गुणांकांची बेरीज / एकूण प्राप्तांक संख्या*

Methods of Calculating A.M..

1. When Statistical data is not Classified i.e. Ungrouped data
2. When Statistical data is classified i.e. Grouped data, Means when frequency distribution table is given

# Calculate Mean by using Assumed Mean method ( SHORT METHOD )

गृहीत मध्यमान घेऊन मध्यमान काढा

C.I	X <sub>m</sub>	f	d'	fd'
70-74	72	1	+5	+5
65-69	67	3	+4	+12
60-64	62	4	+3	+12
55-59	57	7	+2	+14
50-54	52	8	+1	+8
45-49	47	12	0	0
40-44	42	5	-1	-5
35-39	37	7	-2	-14
30-34	32	2	-3	-6
25-29	27	1	-4	-4
		N=50		∑fd' = +22

C.I = Class Interval, X<sub>m</sub> = Midpoint of C.I  
f = Frequency, d' = Deviation,

How to calculate-----

$$X_m = (\text{H.L. of CI} + \text{L.L of CI}) / 2$$

e.g X<sub>m</sub> of 65-69 = (69.5 + 64.5) / 2

$$d' = (X_m - \text{AM}) / i$$

$$= 67$$

$$\text{Length of CI (i) = H.L - L.L}$$

$$= 69.5 - 64.5$$

$$= 5$$

N = Total Students, f = Frequency  
d' = Deviation of C.I from C.I of AM  
i = Length of C.I

∑fd' = Sum of multiplication frequency and deviation

$$M = \text{A.M.} + (\sum fd' / N) \times i$$

$$= 47 + (22 / 50) \times 5$$

$$= 47 + 0.44 \times 5$$

$$= 47 + 2.20$$

$$= 49.20$$

***Interpretation :***

*The mean of given frequency distribution table is 49.20. This means that the students who secured more marks than the 49.20 is having good achievements and those having less marks than 49.20 is having low achievements in the class/subjects.*

Home work : Calculate Mean by using Assumed Mean method ( SHORT METHOD )  
गृहीत मध्यमान घेऊन मध्यमान काढा

Ex-1

C.I	f
90-99	5
80-89	7
70-79	11
60-69	13
50-59	15
40-49	10
30-39	8
20-29	5
10-19	1

Ex-2

C.I	f
65-69	2
60-64	1
55-59	7
50-54	19
45-49	14
40-44	9
35-39	6
30-34	2

Ex-3

C.I	f
42-46	4
37-41	2
32-36	7
27-31	8
22-26	4
17-21	5
12-16	3
7-11	2

Ex-4

C.I	f
42-45	1
38-41	1
34-37	1
30-33	0
26-29	5
22-25	4
18-21	8
14-17	7
10-13	9
6-9	2

## 2. Median

- The median is the middle value.
- It is the value that splits the dataset in half.

*The Median of distribution is the point on the score scale below which one half , or 50% of the scores fall.*

*The Median is defined as that point on the scale measurement above which are exactly half the cases and below which are the other half. ( Note that it is defined as a point not as a score or any particular measurement )*

मध्यांक किंवा मध्यगा हा असा बिंदू कि ज्याचे खाली ५० % व ज्याचे वर ५०% प्राप्तांक येतात. *मध्यांक किंवा मध्यगा हा एक बिंदू आहे प्राप्तांक नव्हे.*

## Calculate Median when frequency distribution table is given

प्राप्तांकांचे वर्गीकरण दिले असता मध्यगा काढणे

C.I	f	Cf
70-74	1	50
65-69	3	49
60-64	4	46
55-59	7	42
50-54	8	35
45-49	12 (fm)	27
40-44	5	15 F
35-39	7	10
30-34	2	3
25-29	1	1
	N=50	

Cf- Cummulative Frequency  
संचित वारंवारिता

$$\text{Mdn} = L + \frac{(N/2) - F}{f_m} \times i$$

$$= 44.5 + \frac{(25-15)}{12} \times 5$$

$$= 44.5 + 4.17$$

$$= 48.67$$

$$N/2 = 50/2 = 25$$

= वारंवारितेचा निम्मा भाग

i.e. Find out in which Cf N/2 is included

L= Lowest Limit of Median

C.I= 44.5 (ज्या वर्गन्तरात मध्यगा आहे त्या वर्गान्तराची खालची प्रत्येक्ष मर्यादा )

F= Cf of CI which is below the Median

CI=15 ( मध्यांक वर्गांतराच्या खालील वर्गान्तराची संचित वारंवारिता )

f<sub>m</sub> = Frequency of Median CI= 12 (मध्यांक असलेल्या वर्गान्तराची वारंवारिता )

i = Length of CI =5

( वर्गान्तराची लांबी )



### *Interpretation :*

The median of given frequency distribution table is 48.67. From this we conclude that there is a 50% student above 48.67 and 50 % students below 48.67

*दिलेल्या वारंवारिता विभाजनाची मध्यगा ४८.६७ आहे. यावरून असा निष्कर्ष काढता येईल की ४८.६७ या प्राप्तांक च्या वर ५०% विद्यार्थी आणि खाली ५०% विद्यार्थी आहेत.*

Home work :*Calculate Median of following frequency distribution table*

Ex-1

C.I	f
90-99	5
80-89	7
70-79	11
60-69	13
50-59	15
40-49	10
30-39	8
20-29	5
10-19	1

Ex-2

C.I	f
65-69	2
60-64	1
55-59	7
50-54	19
45-49	14
40-44	9
35-39	6
30-34	2

Ex-3

C.I	f
42-46	4
37-41	2
32-36	7
27-31	8
22-26	4
17-21	5
12-16	3
7-11	2

Ex-4

C.I	f
42-45	1
38-41	1
34-37	1
30-33	0
26-29	5
22-25	4
18-21	8
14-17	7
10-13	9
6-9	2

### 3. Mode

e.g. 10, 16,12,14,25, 16, 18,20,23,16,19

In this series the most often recurring measure, namely 16, is the crude or empirical mode.

A mode of a distribution is a point on the score scale corresponding to a frequency which is large in relation to other frequency values in its neighborhood.

दिलेल्या मालिकेत जास्त वेळा येणारा प्राप्तांक म्हणजे बहुलक. किंवा ज्याची वारंवारिता जास्त आहे तो बहुलक होय .

#### *Types of Mode ---*

1. *Crude Mode (अंदाजी बहुलक)* - वारंवारिता विभाजन तक्त्यात **सर्वात जास्त वारंवारिता** असणाऱ्या **वर्गातराचा मध्यबिंदू** हा बहुलक होय .त्यास अंदाजी बहुलक म्हणतात.

In a distribution of grouped data, the crude mode is the midpoint of that class-interval having the greatest frequency

2. *True Mode (खरे बहुलक)* – दिलेल्या वारंवारिता वितरणामध्ये ज्या बिंदू भोवती किंवा शिखराभोवती जास्तीत जास्त केंद्रीकरण झालेले असते त्यास खरे बहुलक म्हणतात . म्हणजेच ज्या प्राप्तांकाची वारंवारिता इतर कोणत्याही प्राप्तांका पेक्षा जास्त असते तो प्राप्तांक म्हणजे खरे बहुलक होय.

*True Mode calculated from a frequency distribution as-----*

$$*Mo = 3 Mdn - 2 Mean*$$