



Elements Of Statistics

Class-BCA III Semester



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OUTLINE-

UNIT :- II

CENTRAL TENDENCY

MEDIAN

DEMERIT AND MERIT

Calculation of Median



- **Individual Series**

N = no. of observations or items in the series

- Arrange all the items in ascending or descending order of magnitude.

Case I N = Odd

Median = Value at $\frac{(N+1)}{2}$ th position in

the arranged series.

Case II N = Even

Median = A.M of values at $\frac{N}{2}$, $\frac{N+1}{2}$ th

position.



Calculation of Median – Illustration (Individual Series)

Ex.1 Find the median 5, 7, 9, 12, 10, 8, 7, 15, 21

Solution: Arranging in ascending order we get

5, 7, 7, 8, 9, 10, 12, 15, 21

Here $N = 9$ i.e odd

Hence $Md = \frac{(N+1)}{2}$ th item in the arranged order

2

= $\frac{(9 + 1)}{2}$ th item

2

= 5 th item

= 9 **Ans.**

Calculation of Median – Illustration (Individual Series)



Ex 2. Find the median 10, 18, 9, 17, 15, 24, 30, 11

Solution Arranging in ascending order we get

9, 10, 11, 15, 17, 18, 24, 30

Here $N = 8$ i.e even

Hence $Md = A.M$ of the $(\frac{N}{2}, \frac{N+1}{2})$ th items in the

arranged order.

= A.M of (4th, 5th) items

= $\frac{(15 + 17)}$

2

= 16 **Ans.**



Calculation of Median

- **Discrete Frequency Distribution**

(i) Find less than type cum.frequency.

(ii) Find $N/2$. ($N = \sum f$)

(iii) Find the cum.freq. just greater than $N/2$.
Suppose it is C .

(iv) Find the corresponding value of X . (the item) This is median.

Calculation of Median-Illustration (Discrete Freq. Distribution)



Height (in inches)	No. of students	Cum. Freq.
60	12	12
62	18	30
64	10	40
66	6	46
68	4	50
	$N = 50$	

Here $N = 50$

(i) $N/2 = 25$

(ii) Cum. Frequency just greater than $N/2 = 30$

(iii) Corresponding value of item is 62.

Median = 60 **Ans.**



Calculation of Median

- **Grouped Frequency Distribution**

- Find less than type cum.frequency.
- Find $N/2$. ($N = \sum f$)
- Find the cum.freq. just greater than $N/2$. Suppose it is X .
- Look for the cum.freq. preceding X . Find the corresponding class interval. This is median class

Formula Used

$$Md = L1 + \frac{N/2 - C}{f} (L2 - L1)$$

Where $L1 = L.L$ of median class

$L2 = U.L$ of median class

$C =$ cum.freq. of class preceding the median class.

$f =$ frequency of median class.

Calculation of Median-Illustration (Grouped Freq. Distribution)



C.I	Freq.(f)	Cum. Freq
10-15	200	200
15-20	700	900
20-25	900	1800
25-30	800	2600
30-35	600	3200
35-40	400	3600
	$\Sigma f =$ 3600	

$$N/2 = 3600/2 = 1800$$

Cum.freq. just greater than 1800 is 2600.
Hence median class is 25-30.

$$\text{Hence } L1 = 25$$

$$L2 = 30$$

$$C = 1800$$

$$f = 800$$

$$\text{Md} = 25 + \frac{1800 - 1800}{800} (30 - 25)$$

$$= 25 \text{ Ans.}$$



Calculation of Missing Frequencies when median is known :
Illustration : Median = 50

Expenditure	No. of Families	Cumulative Freq.
0-20	14	14
20-40	? = f_1	$14 + f_1$
40-60	27	$41 + f_1$
60-80	? = f_2	$41 + f_1 + f_2$
80-100	15	$56 + f_1 + f_2$
	N = 100	

Calculation of Missing Frequencies when median is known : Illustration



Here median = 50

$$L_1 = 40$$

$N = 100$

$$L_2 = 60$$

$N/2 = 50$

$$f = 27$$

Hence median class 40-60

$$C = 14 + f_1$$

$$\text{Md} = L_1 + \frac{N/2 - C}{f} (L_2 - L_1)$$

$$50 = 40 + \frac{50 - (14 + f_1)}{27} (60 - 40)$$

$$10 = \frac{720 - 20 f_1}{27}$$

$f_1 = 450/20 = 22.5 = 23$ families approx.

$$N = 56 + f_1 + f_2$$

$$100 = 56 + 23 + f_2$$

$f_2 = 21$ **Ans. $f_1 = 23$ and $f_2 = 21$**

Practice Numericals - Median



Q1.

Age	No. of Persons
20-25	14
25-30	28
30-35	33
35-40	30
40-45	20
45-50	15
50-55	13
55-60	7

Q2.

Value	Frequency
Less than 10	4
Less than 20	16
Less than 30	40
Less than 40	76
Less than 50	96
Less than 60	112
Less than 70	120
Less than 80	125



Practice Problems- Median

Q3. Determine the missing frequencies. The median is 46. Also determine the A.M.

Class-Intervals	Frequency
10-20	12
20-30	30
30-40	?
40-50	65
50-60	?
60-70	25
70-80	18
	229 = N



Merits - Median

- Is rigidly defined.
- Can be easily calculated.
- Not affected by extreme values.
- Can be located merely by inspection.



Demerits - Median

- May not represent the entire series in many cases.
- Not suitable for further algebraic treatment.
- More likely to be affected by sampling fluctuations.

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5. Hogg R.V. and Craig R.G. – Introduction to mathematical statistics Ed 4 {1989} – Macmillan Pub. Co. New York.
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Thanks