MEAN DEVIATION

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MEAN DEVIATION

➤ *It is a statistical measure of the average deviation of values from the mean in a sample.*

➤ It is also known as mean absolute deviation

➤ It is the measure of statistical dispersion

PURPOSE

❑ Mean absolute deviation (MAD) of a data set is the average distance between data value and the mean .

❑ MAD is a way to describe variation in a data set.

❑ MAD helps us to get a sense of how spread out the values in a data set .

FORMULAS

- UNGROUPED DATA

$$\text{Mean Deviation} = \frac{\Sigma |x - \mu|}{N}$$

X = EACH VALUE   μ = MEAN   N = NO OF VALUES

EXAMPLE OF UNGROUPED DATA

Example= the mean deviation of 3 ,6 , 6,7,8,11,15,16 .

- **Step 1 : find the mean**

mean = (3+6+6+7+8+11+15+16)/8

=72/8 =9

MEASURE OF MEAN DEVIATION

□ Step 2; find the distance of each value from the mean

value	$\lvert x - \mu \rvert$	
3	$\lvert 3\text{-}9 \rvert =$	6
6	$\lvert 6\text{-}9 \rvert =$	3
6	$\lvert 6\text{-}9 \rvert =$	3
7	$\lvert 7\text{-}9 \rvert =$	2
8	$\lvert 8\text{-}9 \rvert =$	1
11	$\lvert 11\text{-}9 \rvert =$	2
15	$\lvert 15\text{-}9 \rvert =$	6
16	$\lvert 16\text{-}9 \rvert =$	7

MEASURE OF MEAN DEVIATION

☐ Step 3;find the mean of those distance:

mean deviation=
(6+3+3+2+1+2+6+7)\9
= 30\9
=3.33

MEASURE OF MEAN DEVIATION

So, the mean=9, and

the mean deviation =3.33

➤ It tells us how far , on average , all values are from the middle.

➤ In that examples the values are, on average, 3.33away from the middle.

GROUPED DATA

$$MD = \frac{\sum f |x - \mu|}{\sum f}$$

WHERE,

μ = mean   x = each value

f = frequency

EXAMPLE

x	f	fx	x- x	|x-x|	F |x -x|
0	4	0	-1.8	1.8	7.2
1	12	12	-0.8	0.8	9.6
2	8	16	0.2	0.2	1.6
3	2	6	1.2	1.2	2.4
4	1	4	2.2	2.2	2.2
5	2	10	3.2	3.2	6.4
6	1	6	4.2	4.2	4.2
	∑f=30	∑ f x=54			33.6

STEPS TO FIND MEAN DEVIATION

Step 1;find the mean by using the formula

$\mu = \sum f\, x / \sum f$

=54/30

=1.8

MEASURE OF MEAN DEVIATION

Step 2; solve for │x-μ│ and multiply it to the frequency of each class to find the ∑f │x - μ│

=33.6

MEASURE OF MEAN DEVIATION

Step 3; divide the answer of $\sum f \left| x - \mu \right|$ to the $\sum f$
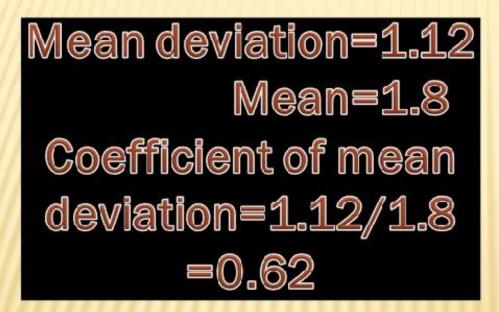
=33.6/30

=1.12

Mean deviation = 1.12

COEFFICIENT OF MEAN DEVIATION

➢ *It is defined as the ratio of mean deviation of the average used in calculations of the mean deviation.*

thus:

Coefficient of Mean deviation=

Mean deviation from mean/mean

EXAMPLE

Mean deviation=1.12
Mean=1.8
Coefficient of mean deviation=1.12/1.8
=0.62

ADVANTAGES OF MEAN DEVIATION

- Simple and easy:

    Mean deviation can be computed easily by using simple formula . It can be easily understood.

ADVANTAGES

❑ Easy comparison:

                         Different items of observation can be easily compared with mean deviation.

ADVANTAGES

❑ Better measure:

         Mean deviation is better than quartile deviation and range because it is based on all the observations of the series.

ADVANTAGES

❑ Less affected:

   Mean deviation is less affected by extreme values in the series while comparing to standard deviation.

ADVANTAGES

❑ Usefulness:

It is very useful in various fields such as;

➢ Economics
➢ Commerce etc.

DISADVANTAGES

- Difficulty:

    It become difficult to compute mean deviation in case of fractions.

DISADVANTAGES

☐ Ignore negative signs:

Mean deviation is not a good measure as it ignores negative signs of deviations.

DISADVANTAGES

❑ Not applicable:

         Mean deviation is not applicable for algebraic calculations.

MEAN DEVIATION FOR MODE

Ungrouped data

$$= \Sigma |x\text{-mode}|/n$$

Grouped data

$$= \Sigma f |x\text{-mode}|/\Sigma f$$

MEAN DEVIATION FOR MEDIAN

Ungrouped data

$$= \Sigma \, |x\text{-median}| \, /N$$

Groped data

$$= \Sigma f \, |x\text{-median}| \, /\Sigma f$$