

MEASURES OF DEVIATION FROM NORMAL DISTRIBUTION

IV SEMESTER MSc ZOOLOGY MIDHILA MOHAN Assistant professor on Contract

MEASURES OF DEVIATION FROM THE NORMAL DISTRIBUTION

<u>SKEWNESS</u>

<u>KURTOSIS</u>

STANDARD NORMAL DISTRIBUTION

- ✓ Normal distribution depends solely on the values of mean(μ) and standard deviation (σ).
- Different normal distribution do have different means and different standard deviations. Therefore, normal distribution curves, through bell-shaped ,will have different shapes and different sizes.
- ✓ To avoid these differences ,these different normal curves are standardized and converted to one standard normal distribution curve.
- ✓ The mean of standard normal distribution curve is taken as zero (i.e. $\mu = 0$) and its standard deviation ($\sigma = 1$). Therefore , a normal curve with mean 0 and standard deviation one is the standard normal curve .

- ✓ For converting a normal curve in to standard normal curve , the original x-scale is changed to z scale .
- ✓ In x- scale mean is μ and standard deviation σ but in z- scale mean is 0 and standard deviation is 1.
- \checkmark Here z is the normal variable and is called standard normal variable .
- ✓ It is the normal variate with mean(μ)= 0 and standard deviation (σ)= 1.

MEASURES OF DEVIATION FROM THE NORMAL DISTRIBUTION *Skewness and Kurtosis*

SKEWNESS

When the frequency distribution is asymmetrical , the distribution is known as Skewed.

The data may be skewed to the left or right .

In skewed distribution, the frequency curve or distribution curve is not bellshaped and values do not lie equally on both sides of measures of central tendency.

In skewed distribution curve the mean, median and mode do not fall in the

They fall at different points . The median and mean fall either to the right or to the left of mode .

For example, population density in culture medium which increases exponentially, exhibit skewed distribution.

Features of Skewed Distribution

> The frequency curve is not bell-shaped .

>Mean , median and mode of the normal distribution do not coincide.

The sum of positive deviations from median differs from the sum of negative deviation.

 \searrow In clowed distribution curve the first and third quartiles of frequency curve.

Types of skewness

Skewness can be two types :

Positive and Negative

1,Positive Skewness : The frequency distribution curve is said to be positively skewed when it slopes more towards the right .

In such a distribution Mean > Median > Mode.

➢The positive skewness indicates that Mean is more influenced than the Median and Mode .

2,<u>Negative Skewness</u>: A curve is negatively skewed when it slopes more towards left . In types of Mean < Median < Mode .

Measures of Skewness

Skewness can be measured in terms of differences between Mean and Mode .

The various measures of skewness are :

1, Absolute Skewness

2, Relative Skewness

3, Standardised Skewness

- 4, Karl Pearson's coefficient of skewness
- 5, Bowle's coefficient of skewness

I, Absolute Skewness :

➢It is the difference Mean and Mode i.e. Skewness = Mean − Mode).

In a symmetrical distribution , the absolute skewness will be zero because mean is equal to mode .

>In positively skewed distribution ,the absolute skewness will be positive because mean has greater value than mode.

➢In negatively skewed distribution absolute skewness will have negative value because mean is less than mode.

➢Absolute skewness measure cannot be used to compare two or more frequency distribution .

II, Relative Skewness :

➢It is expression of skewness in relative terms .Therefore , the magnitudes Of the differences are divided by standard deviation of the distribution .

➤The relative measures of skewness are also called coefficient of skewness and are determined by following expressions'

Coefficient of skewness = <u>Mean - Mode</u> Standard deviation ($\sigma\sigma$

Or = <u>Mean - Median</u> = <u>Median - mode</u> Standard deviation (σ) = <u>Median - mode</u> Standard deviation (σ)

III, <u>Standardised Skewness Measure :</u>

$$M'_3 = \underline{m_3}$$

IV, Karl – Pearson's coefficient of skewness :

- $S_{\kappa} = 3(Mean Median)$ Standard deviation
- V, Bowle's Coefficient of Skewness:

$$S_{\kappa} = \frac{Q_3 + Q_1 2 \text{ Median}}{Q_3 - Q_1}$$