

Statistics Practical

Abdullah Al Mahmud

2024-02-29

Contents

Determination of Arithmetic Mean, Combined Arithmetic Mean, Geometric Mean, and Harmonic Mean from Grouped and Ungrouped Data.	2
Construction of Histogram and Ogive	3
Problem	3
Solution	3
Theory	3
Determination of Quartiles, Deciles, and Percentiles	4
Problem	4
Solution	4
Theory	4
Solution of Different Types of Problems Using Histogram and Ogive	6
Problem	6
Determination of First Four Moments from Data	7
Determination of Skewness and Kurtosis and Their Types	8
Construction of Box & Whisker Plot and Five Numbers Summary And Analysis of Their Properties	9
Determination of General Trend of Time Series and Prediction	10

Determination of Arithmetic Mean, Combined Arithmetic Mean, Geometric Mean, and Harmonic Mean from Grouped and Ungrouped Data.

Construction of Histogram and Ogive

Problem

Given below are daily wages of 30 workers in an agency.

515, 833, 938, 511, 960, 968, 542, 842, 767, 694, 674, 955, 675, 972, 501, 987, 708, 846, 568, 721, 592,
867, 644, 966, 663, 551, 746, 942, 760, 601

Draw a Histogram and an Ogive from the data and interpret.

Solution

Theory

A histogram is constructed from a frequency distribution with continuous class intervals. The frequencies corresponding to different classes are shown on the axis as bars, leaving no space or gap between the bars.

Determination of Quartiles, Deciles, and Percentiles

Problem

Given below are temperatures (in degree Celsius) of a city in 30 random days in a year.

33.86, 34.83, 35.59, 31.66, 26.31, 26.90, 33.10, 26.52, 35.17, 25.21, 25.28, 28.38, 29.62, 30.69, 32.72, 30.00, 30.14, 27.97, 28.45, 35.93, 33.34, 29.07, 34.00, 27.55, 34.03, 33.76, 29.48, 31.24, 33.79, 33.41

Find the quartiles, 4th and 7th Decile, and 35th & 87th Percentiles from the data and interpret.

Solution

Theory

Determination of First Quartile

Let n = no. of observations

If n = odd

Location of first quartile = $\frac{n+1}{4}$ th item

Location of 2nd quartile = $\frac{2(n+1)}{4}$ th item

Other quantiles are determined in the same way.

If n = even

Location of first quartile = $\frac{\frac{n}{4}th + \frac{(n+1)}{4}th}{2}$

Location of 2nd quartile = $\frac{\frac{2n}{4}th + \frac{2(n+1)}{4}th}{2}$

Other quantiles are determined similarly.

The general formula to find the i th quantile, which divides the dataset into k parts.

$$Q_i = \frac{i(n+1)}{k}th; \text{ if } n \text{ is odd}$$

$$Q_i = \frac{\frac{in}{k}th + (\frac{in}{k} + 1)th}{2}; \text{ if } n \text{ is even}$$

Solution of Different Types of Problems Using Histogram and Ogive

Problem

The following are the scores of 80 applicants in a screening test given by an institution.

Score	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	84-89	90-94
Frequency	3	5	11	15	20	8	7	5	4	2

- Draw an Ogive and therefrom find Q_3 , D_4 , and P_{47} and interpret.
- Construct a histogram from the data and find Mode.

Determination of First Four Moments from Data

Determination of Skewness and Kurtosis and Their Types

Construction of Box & Whisker Plot and Five Numbers Summary And Analysis of Their Properties

Determination of General Trend of Time Series and Prediction