**Measures of Central Tendency**

We can condense the information given in a frequency distribution still further and find a single value which will represent all the values of the distribution. Any number that is used in this way to represent the distribution is called an “average”. Since all representatives values (averages) tend to lie in the “center” of the distribution, these are called measures of central tendency. They are also called measures of location because they locate the center of the distribution.

A *parameter* is a measure used to describe a characteristics of a population. A *statistic* is the same type of measure used to describe a characteristic of a sample. Parameters are fixed numbers, i.e. they are constants. Statistic vary from sample to sample from the same population. In general, corresponding to each population parameter there will be a statistic to be computed from the sample. We shall try to use Greek letters such as **µ, σ, ρ**, etc. for population parameters and Roman letters such as $\overbar{X, } S, r, etc.$ for values of corresponding statistic.

**Types of Averages:** Various types of averages in common use are

1. The arithmetic mean
2. The Median
3. The Mode
4. The geometric mean
5. The harmonic mean

**The Arithmetic Mean:** Arithmetic mean is the most commonly used average. It is usually referred to the average or simple the mean.

Mean is defined as the value obtained by dividing the sum of the values by their number. Thus the mean of the values $X\_{1, } X\_{2,}……..X\_{n} $denoted by $\overbar{X }$(read as X-bar), is

$$\overbar{X}=\frac{ X\_{1, }+X\_{2,}+……..+X\_{n}}{n}= \frac{\sum\_{i=1}^{n}X\_{i} }{n}= \frac{\sum\_{}^{}X}{n}$$

**Example: The arithmetic mean of the values 5, 8, 10, 12, and 7 is**

$$\overbar{X}=\frac{5+8+10+12+7}{5}=\frac{42}{5}=8.4$$

**Arithmetic mean for grouped data: If** $X\_{1, } X\_{2,}……..X\_{n}$ are the mid points with $f\_{1}, f\_{2}, …..f\_{k}$ as the corresponding class frequencies, the mean for grouped data is given by

$$\overbar{X}=\frac{\sum\_{}^{}fX}{\sum\_{}^{}f}=\frac{\sum\_{}^{}fX}{n}$$

**Example**

|  |  |  |  |
| --- | --- | --- | --- |
| **Class limits** | **Mid points (X)** | **Frequency (f)** | **fX** |
| 45-49 | 47 | 1 | 47 |
| 50-54 | 52 | 4 | 208 |
| 55-59 | 57 | 17 | 969 |
| 60-64 | 62 | 28 | 1736 |
| 65-69 | 67 | 25 | 1675 |
| 70-74 | 72 | 18 | 1296 |
| 75-79 | 77 | 13 | 1001 |
| 80-84 | 82 | 6 | 492 |
| 85-89 | 87 | 5 | 435 |
| 90-94 | 92 | 2 | 184 |
| 95-99 | 97 | 1 | 97 |
| **Sum** |  | **120** | **8140** |

$$\overbar{X}=\frac{\sum\_{}^{}fX}{\sum\_{}^{}f}=\frac{8140}{120}=67.83$$