

## **Analysis of Variance**

ANOVA is also a parametric technique of hypothesis testing and is an extension of the 't' test of mean difference. That is, it is an over all test of significance of difference between means when the number of groups is more than 2. This technique is most often used in experiment which involves at least two sets of variables namely dependent and independent. Independent variables can be either treatment or classification.

An independent variable whether of the treatment type or of the classification type is called as a factor. The different categories or different treatments of the independent variables are called as levels. Experiments involving one factor are called single factor experiments or one-way ANOVA. When the number of factors is two such experiments are called two factor experiments or two-way ANOVA.

Since ANOVA is a parametric test, it requires some basic assumptions. They are

1. Random sampling and independent of groups
2. Homogeneity of group variances
3. Normality of the dependent variable
4. Dependent variable in Interval scale

Even though there are tests to see whether the condition 2 given above is satisfied or not, taking of a large sample will assume that there exist homogeneity of group variances. Similarly, violation of the assumption of normality will not affect the study if a sufficient number of cases are samples or the sample is very large.

### **Principle of ANOVA**

If the groups are independent random samples from the same population with homogeneous variance, the two variances 'within' and 'between' are unbiased estimates of the total variance or population variation. We are then testing for the significance of the difference between the two types of variances by means of the F test.

#### **Between group variance**

The variation of group means from the total mean of all groups is referred to as between group variance.

#### **Within group variance**

The average variability of the scores or measures within each group is called within group variance.

#### **Total variance**

The variation of individual scores of measures from the total mean is referred to as total variance.

## Degrees of freedom

df for total group  $= N - 1$

df for between groups  $= \text{no. of groups} - 1$

df for within groups  $= N - \text{no. of groups}$