ANOVA stands for Analysis Of Variance. Ronald Fisher founded ANOVA in the year 1918. The name Analysis Of Variance was derived based on the approach in which the method uses the variance to determine the means, whether they are different or equal.
It is a statistical method used to test the differences between two or more means. It is used to test general differences rather than specific differences among means. It assesses the significance of one or more factors by comparing the response variable means at different factor levels.
The null hypothesis states that all population means are equal. The alternative hypothesis proves that at least one population mean is different.
It provides a way to test various null hypothesis at the same time.

Assumptions

There are four main assumptions are as follows:

- The expected values of the errors are zero
- The variances of all the errors are equal to each other
- The errors are independent
- They are normally distributed

ANOVA Types

Following are the different types explained in detail:

1. One Way between groups

One Way is used to check whether there is any significant difference between the means of three or more unrelated groups. It mainly tests the null hypothesis.
H_0: $\mu_1 = \mu_2 = \mu_3 = ... = \mu_x$
Where μ means group mean and x means a number of groups. One Way gives a significant result. One way is an omnibus test statistic, and it will not let you know which specific groups were different from each other. To know the specific group or groups that differed from others, you need to do a post hoc test.

2. One Way ANOVA repeated measures

Repeated measures ANOVA is more or less equal to One Way ANOVA but used for complex groupings. Repeated measures investigate about the
1. changes in mean scores over three or more time points.
2. differences in mean scores under different conditions.

3. Two way between groups

The two way ANOVA compares the mean difference between groups that have been split into two factors. A two-way ANOVA's main objective is to find out if there is any interaction between the two independent variables on the dependent variables. It also lets you know whether the effect of one of your independent variables on the dependent variable is the same for all the values of your other independent variable.

4. Two-way repeated measures

Two way repeated measures the mean differences between the groups that have been split into two within the independent variables. A two way the repeated measure is often used in research where a dependent variable is measured more than twice under two or more conditions.