Details of T Test In Statistics

Let us consider two samples, sample-A, and sample-B. We have the following information about both samples:

	Sample-A	Sample-B
Sample Size	n_1	n_2
Sample Mean	$\overline{x_1}$	$\overline{x_2}$
Sample Standard Deviation	s_1	s_2

Then the pooled variance is given as,

$$Pooled\ variance = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$$

Depending on this, we calculated the pooled standard deviation. Which is denoted by s_p. This is given by,

$$s_p = \sqrt{Pooled\ variance}$$

Putting the value of the pooled variance we get,

$$s_p = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$$

Now once we define the pooled variance and pooled standard deviation, we can now define the standard error by using the given expression. The standard error can be denoted by the term S.E., which is given as,

$$S.E. = t_{\frac{\alpha}{2}}\, s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

For T test here we consider the coefficient $t_{\frac{\alpha}{2}}$ as 2 approximately for 95 % confidence interval.

Finally, the T statistics value, given as t is calculated by the following formula,

$$t = \frac{\overline{x_1} - \overline{x_2}}{s_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Here the degrees of freedom will be given as

$$d.f. = n_1 + n_2 - 2$$

When the calculated P value is less than 0.05, we say that the P value is not significant to confirm the Null Hypothesis. Which means if P value is less than 0.05, we reject the Null Hypothesis and accept the Alternative Hypothesis.