Mann Whitney U Test

This is an extension of one of the rank test. This is one of the most imp & powerful non parametric test of significance. At the same time it is an useful alternative of parametric 't' Test. When an investigator wants to test the significance of difference bet two independent samples drawn from same population or drawn from two indep. population & he has doubts about the normality of the distribution. Mann-Whitney U test is one of the imp alternatives that he can have from the statistics. The power ~~test & effic~~ efficiency of Mann W. U. test is 95.5%. It can be used with groups having diff numbers or diff. sig. & N = total no. But this test has its own limitation. It should not be used with such distributions that have frequent ties. The steps of Mann Whitney U. tests are —

1) Scores of the both groups are jointly ranked.

2) Sum the ranks

based on the statistic U. In a small sample U is ~~in~~ expressed by the nos. of scores in the group levelled as preceeds the no. of scores in n_1. The group having smaller no. is assigned as n_1 + the group having larger no. is ~~ag~~ assigned as n_2. $U = n_1 n_2 - U_1$. Where as n_1 is the total no. in smaller gr. N_2 total no. in larger group + U_1 = Sum total of ranks in n_1 group. In larger sample when agn is no tie in distri.

$$U = n_1 n_2 + \frac{n_1 (n_1+1)}{2} - R_1 \text{ or}$$

$$n_1 n_2 + \frac{n_2 (n_2+1)}{2} - R_2$$

Find out the Z value for u.

$$Z = \frac{2U_1 - n_1(N+1)}{\sqrt{\frac{n_1 n_2 (N+1)}{3}}}$$

Sum of the Tie i.e $\Sigma T = t^3 - t$

If there is tie in distri. then we use this formula:-

$$Z = \frac{2U_1 - n_1 (N+1)}{\sqrt{\frac{n_1 n_2}{N(N-1)} \left(\frac{N^3 - N - \Sigma T}{3}\right)}}$$

gr. ① Scores	gr. ②	R1	R2
78	110	7	9
64	70	4	5
75	53	6	3
45	51	1	2
82		8	

U_2 26 19 U_1

~~U = Z = 26 − 19 (~~

$$Z = \frac{2 \times 19 - 4(9+1)}{\sqrt{\frac{4 \times 5 (9+1)}{3}}}$$

$$\frac{38 - 40}{\sqrt{\frac{200}{3}}} = \frac{-2}{8.1}$$

$$= -.246$$

Rating

$$2^3 - 2 + 5^3 - 5 + 4^3 - 4 + 7^3 - 7 + 2^3 - 2 + 6^3 - 6 + 4^3 - 4 + 3^3 - 3 + 3^3 - 3$$

$$6 + 120 + 60 + 306 + 6 + 210 + 60 + 24 + 24 = 846$$

Rating on oral socialization anxiety

Gr ①	Gr ②	R_1	R_2
13	17	28/29.5	39
12	16	24.5	38
12		24.5	
10	15	16	36
10	15	16	36
10	15	16	36
10	14	16	32
9	14	12	32
8	14	9.5	32
8	13	9.5	28.5
7	13	5	29.5
7	13	5	29.5
7	12	5	24.5
7	12	5	24.5
7	12	5	24.5
6	12	1.5	24.5
	11	20.5	20.5
	11	[illegible]	20.5
		200	
	10		16
	10		16
	10		16
	8		9.5
	8		9.5
	6		1.5
			580

$$z = \frac{2\times 200 - 16(39+1)}{\sqrt{\frac{16\times 23}{39(39-1)}\left(\frac{39^3-39}{3} - 844?\right)}}$$

$$= \frac{400 - 16\times 40}{\sqrt{\frac{368}{39\times 38}\left(\frac{1521-39}{3} - 846?\right)}}$$

~~= 400~~

120
306
210

$$\frac{400-640}{\sqrt{\frac{368}{1448}\left(\frac{1482}{3} - 846\right)}}$$

$$= \frac{-240}{\sqrt{\frac{368}{1448}\left(\frac{1482}{3} - 846\right)}}$$

$$= \frac{-240}{\sqrt{\frac{368}{1448}(494 - 846)}}$$

$$= \frac{-240}{\sqrt{.25\times 352}}$$

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Practicals

Perception

1) Method of Reproduction
2) Method of Comparison
3) Method of Estimation

Prob. I) Conduct an exp. to demonstrate the extent & direction of error in perception of temporal interval.

2) Conduct an exp. to make a comparitive study of short time interval & long time interval.

3) Conduct an exp. to make a comparitive study of perception of ~~fel~~ filled time interval & unfilled time interval.

4) Conduct an exp to make a comparitive study of time interval engaged in pleasant task & monotonous tasks.

I Design:- (method of Repro.)

Std. time	method	No. of trials
5 or 7 sec.	method of Repro.	30 or 40

No. of trials	Set time	Repratured time
1	7 Sec.	5 Sec.
2	7 Sec.	9 Sec.