AOV - CO5 - 2024-08-29 - Analyze data for Analysis of Variance

29 August 2024 09:19

→ DWM CN
A B
B C
C A

Independence Attributes

→ Kruskal - Wallis Test

→ <u>Mann Whitney U-Test:</u>

Works for independent samples & analogous of t-test.

→ $H_0 : M_1 = M_2$ against $H_1 : M_1 > M_2$
or $H_1 : M_1 < M_2$ or $H_1 : M_1 \neq M_2$

→ First rank the data belonging to single sample in either an increasing or decreasing order of magnitude.

→ After ranking find the sum of the <u>ranks</u> assigned to values of first sample (R_1)

assigned to values of first sample (R_1) & other as (R_2).

-> Test Statistic i.e U-Test which is a measurement of the difference between ranked observations of 2 samples.

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

-> H_0 for U-Test is 2 samples come from identical populations.

-> H_1 for U-Test is 2 samples do not come from identical populations.

-> Mean $= \mu_U = \frac{n_1 \cdot n_2}{2}$

-> S.D $= \sigma_U = \sqrt{\frac{n_1 \cdot n_2 (n_1 + n_2 + 1)}{12}}$

Example:

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One Sample: 53, 38, 69, 57, 46, 39, 73, 48, 73, 74, 60, 78

Other Sample: 44, 40, 61, 52, 32, 44, 70, 41, 67, 72, 53, 72

-> Sample items in ascending order

32	46	61	73
38	48	67	74
39	52	69	78
40	53	70	
41	53	72	
44	57	72	
44	60	73	

Rank

1	8	15	21.5
2	9	16	23
3	10	17	24
4	11.5	18	
5	11.5	19.5	
6.5	13	19.5	
6.5	14	21.5	

No of Relatable Sample:

B	A	B	A
A	B	B	A
A	B	A	A
B	A	B	
B	A	B	
B	A	B	

$R_1 = 2 + 3 + 8 + 9 + 11.5 + 13 + 14 + 17 + 21.5 + 21.5 + 23 + 24$

$R_1 = 167.5$

$n_1 = n_2 = 12$

B	A	B
B	A	B
B	A	A

$n_1 \,\&\, n_2 = \underline{\underline{12}}$

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

$$= 12 \cdot 12 + \frac{12(12+1)}{2} - 167.5$$

$$U = \underline{\underline{54.5}}$$

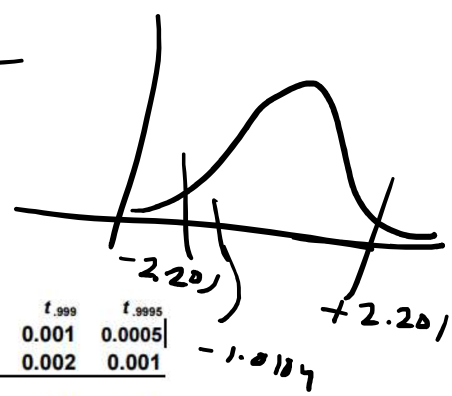
$$\mu_U = \frac{n_1 \times n_2}{2} = \frac{12 \times 12}{2} = \underline{\underline{72}}$$

$$\sigma_U = \sqrt{\frac{n_1 \cdot n_2 (n_1 + n_2 + 1)}{12}} = \sqrt{\frac{12 \cdot 12 (12+12+1)}{12}}$$

$$= \underline{\underline{17.3}}$$

$$Z_c = \frac{U - \mu_U}{\sigma_U} = \frac{54.5 - 72}{17.3}$$

$$= \underline{-1.0104}$$



cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408

4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
z	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%
	Confidence Level										

∴ Accept Null Hypothesis & we conclude that both the data belongs to same population.