

Nonparametric Statistics

- Parametric methods deals with estimating or testing the value(s) of parameter(s)
- Parameters are indices (mean and standard deviation)
- Nonparametric methods are procedures that work their magic without reference to specific parameters.
- Many nonparametric procedures are based on ranked data.

Nonparametric Test

1. Wilcoxon rank sum test (also known as the Mann-Whitney U test or the Wilcoxon-Mann-Whitney test)
2. Kruskal-Wallis Test
3. Friedman ANOVA
4. Kendall's W Test
5. Spearman Rank Correlation

a. Mann-Whitney U test

- test whether two samples are drawn from the same population when measurement is at least ordinal.
- it analyses the *degree of separation* (or the amount of overlap) between the two groups.
- the *null hypothesis* assumes that the two sets of scores are samples from the same population; and therefore, because sampling was random, the two sets of scores *do not differ systematically* from each other.

Understanding the output

Mann-Whitney Test

		Ranks		
	sex	N	Mean Rank	Sum of Ranks
boardexam	Male	52	108.36	5634.50
	Female	195	128.17	24993.50
	Total	247		

Test Statistics^a

	boardexam
Mann-Whitney U	4256.500
Wilcoxon W	5634.500
Z	-1.780
Asymp. Sig. (2-tailed)	.075

a. Grouping Variable: sex

b. Kruskal-Wallis H-test (for k independent samples)

- *Kruskal-Wallis one-way analysis of variance by ranks*
- It is for use with k independent groups, where k is equal to or greater than 3, and measurement is at least ordinal
- Ho: the k samples come from the same population, or from populations with identical medians.
- Kruskal-Wallis Test statistics is approximately a chi-square distribution, with $k-1$ degree of freedom

Understanding the output

Kruskal-Wallis Test

Ranks

	year1	N	Mean Rank
boardexam	2003	30	140.53
	2004	36	101.68
	2005	55	126.83
	2006	64	118.30
	2007	62	132.33
	Total	247	

Test Statistics^{a,b}

	boardexam
Chi-Square	6.477
df	4
Asymp. Sig.	.166

a. Kruskal Wallis Test

b. Grouping Variable: year1

c. Friedman ANOVA

- *Friedman two-way analysis of variance by ranks.*
- It is for use with k repeated (or correlated) measures where measurement is at least ordinal.
- H_0 : That all k samples are drawn from the same population, or from populations with equal medians
- distributed approximately as chi-square, with $(k - 1)$ degrees of freedom

Table
(Friedman's Two-Way Analysis of Variance by Ranks)

Level of Accomplishment of Camarines Norte State College in the Different Sub-Areas Under Culture, Administration, and Resources as Evaluated by the Respondents

Sub-Areas	Students			School Personnel			Community Leaders		
	Wt. Mean	Inter	Rank	Wt. Mean	Inter	Rank	Wt. Mean	Inter	Rank
1. Corporate Culture: Mission, Vision, and Philosophy	3.40	VG	2	3.96	VG	1	3.03	G	3
2. Organizational Set-up and Administration	2.19	F	2	2.70	G	1	2.09	F	3
3. Academic Qualifications: Managerial and Institutional Leadership	2.96	G	3	4.17	VG	1	3.37	G	2
4. Fiscal Management	1.09	P	3	1.50	P	2	1.61	P	1
5. Physical Facilities	2.55	F	2	2.76	G	1	2.34	F	3
6. Educational Management Information System	2.71	G	3	3.98	VG	1	3.25	G	2
7. Campus Management and Security Services	2.02	F	3	2.75	G	1	2.37	F	2
8. Student Services	2.54	F	2	2.60	G	1	2.40	F	3
9. Computer (IT) Laboratories	1.06	P	2	1.19	P	1	1.00	P	3

1.00 – 1.79	Poor	(P)	2.60 – 3.39	Good	(G)	4.20 – 5.00	Excellent	(E)
1.80 – 2.59	Fair	(F)	3.40 – 4.19	Very Good	(VG)			

Understanding the output

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Students	9	2.2800	.79234	1.06	3.40
Personnel	9	2.8456	1.05667	1.19	4.17
Community	9	2.3844	.76997	1.00	3.37

Friedman Test

Ranks

	Mean Rank
Students	1.56
Personnel	2.89
Community	1.56

Test Statistics^a

N	9
Chi-Square	10.667
df	2
Asymp. Sig.	.005

a. Friedman Test

d. Kendall's W Test

- It is similar to Friedman's ANOVA but is used specifically for assessing the agreement between raters.
- Like the correlation coefficient, Kendall's W ranges from 0 (no agreement between raters) to 1 (complete agreement between raters).
- Kendall's W is interpretable as the coefficient of concordance, which is a measure of agreement among raters.

Table
(Kendall Coefficient of Concordance (W))

Level of Accomplishment of Camarines Norte State College in the Different Sub-Areas
Under Culture, Administration, and Resources as Evaluated by the Respondents

Sub-Areas	Students			School Personnel			Community Leaders		
	Wt. Mean	Inter	Rank	Wt. Mean	Inter	Rank	Wt. Mean	Inter	Rank
1. Corporate Culture: Mission, Vision, and Philosophy	3.40	VG	1	3.96	VG	3	3.03	G	3
2. Organizational Set-up and Administration	2.19	F	6	2.70	G	6	2.09	F	7
3. Academic Qualifications: Managerial and Institutional Leadership	2.96	G	2	4.17	VG	1	3.37	G	1
4. Fiscal Management	1.09	P	8	1.50	P	8	1.61	P	8
5. Physical Facilities	2.55	F	4	2.76	G	4	2.34	F	6
6. Educational Management Information System	2.71	G	3	3.98	VG	2	3.25	G	2
7. Campus Management and Security Services	2.02	F	7	2.75	G	5	2.37	F	5
8. Student Services	2.54	F	5	2.60	G	7	2.40	F	4
9. Computer (IT) Laboratories	1.00	P	9	1.00	P	9	1.00	P	9

1.00 – 1.79	Poor	(P)	2.60 – 3.39	Good	(G)	4.20 – 5.00	Excellent	(E)
1.80 – 2.59	Fair	(F)	3.40 – 4.19	Very Good	(VG)			

Understanding the output

Kendall's W Test

Ranks

	Mean Rank
var001	7.67
var002	3.67
var003	8.67
var004	2.00
var005	5.33
var006	7.67
var007	4.33
var008	4.67
var009	1.00

Test Statistics

N	3
Kendall's W ^a	.919
Chi-Square	22.044
df	8
Asymp. Sig.	.005

a. Kendall's Coefficient of Concordance

e. Spearman rank correlation

- H_0 : There is no association between the two variables [in the population].

Nonparametric Correlations

			Students	Personnel
Spearman's rho	Students	Correlation Coefficient	1.000	.883**
		Sig. (2-tailed)	.	.002
		N	9	9
	Personnel	Correlation Coefficient	.883**	1.000
		Sig. (2-tailed)	.002	.
		N	9	9

** . Correlation is significant at the 0.01 level (2-tailed).

DIOS MABALOS!!!



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