

# **تحليل مؤشرات سير العملية التدريسية والمستوى العلمي باستخدام تحليل التباين للبيانات المرتبة في القياسات المكررة**

**ملخص**

**Abstract :**

**In this research want to make analysis for some indicators and it's classifications that related with the teaching process and the scientific level for graduate studies in the university by using analysis of variance for ranked data for repeated measurements instead of the ordinary analysis of variance . We reach many conclusions for the important classifications for each indicator that has affected on the teaching process.**



### 1. المقدمة

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### 2. الهدف

### 3. الجانب النظري

(subject)

(  
 . (Inter-subject different) ) (Repeated Measurements Designs)

: (1)

(1)

subject	treatment				Yi.
	1	2	... j ...	t	
1	y <sub>11</sub>	y <sub>12</sub>	... y <sub>1j</sub> ...	y <sub>1t</sub>	y <sub>1.</sub>
2	y <sub>21</sub>	y <sub>22</sub>	... y <sub>2j</sub> ...	y <sub>2t</sub>	y <sub>2.</sub>
· i ·	y <sub>i1</sub>	y <sub>i2</sub>	... y <sub>ij</sub> ...	y <sub>it</sub>	y <sub>i.</sub>
n	y <sub>n1</sub>	y <sub>n2</sub>	... y <sub>nj</sub> ...	y <sub>nt</sub>	y <sub>n.</sub>
y <sub>.j</sub>	y <sub>.1</sub>	y <sub>.2</sub>	... y <sub>.j</sub> ...	y <sub>.t</sub>	y <sub>..</sub>

: (2)







$$: \quad (1) \quad [4], [3], [2], [1]$$

$$[1] = \frac{y_{..}^2}{tn} = \frac{y_{i.}^2}{t} \quad [2] = \sum y_{ij}^2 \quad [3] = \sum y_{ij}^2 \quad [4] = \frac{\sum y_{.j}^2}{n}$$

$$[1] = \frac{y_{..}^2}{tn} = \frac{G^2}{tn} = \frac{(420)^2}{6(20)} = 1470, \quad [2] = \frac{\sum y_{i.}^2}{t} = \frac{\sum P_{i.}^2}{t} = \frac{8820}{6} = 1470$$

$$[3] = \sum y_{ij}^2 = 1820, \quad [4] = \frac{\sum y_{.j}^2}{n} = \frac{\sum T_{.j}^2}{n} = \frac{31542}{20} = 1577$$

$$SS_{Methods} = [4] - [1] = 1577 - 1470 = 107$$

$$SS_{res} = [3] - [4] - [2] + [1] = 1820 - 1577 - 1470 + 1470 = 243$$

$$\chi^2_{rank} = \frac{SS_{Methods}}{(SS_{Methods} + SS_{res})/n(t-1)} = \frac{n(t-1)SS_{Methods}}{SS_{Methods} + SS_{res}} = \frac{n(t-1)SS_{Methods}}{SS_{Within\ people}}$$

$$= \frac{20(5)(107)}{107 + 243} = \frac{10700}{350} = 30.6 > \chi^2_{(5, 0.05)} = 11.0705$$

:

$$\chi^2_{ranks} = \frac{12}{nt(t+1)} \left( \sum y_{.j}^2 \right) - 3n(t+1) = \frac{12}{20(6)(6+1)} (31542) - 3(20)(6+1)$$

$$= 30.6$$

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(1)

(5)

							P <sub>i</sub>
1	1	2	3	6	5	4	21
2	1	4	2	6	3	5	21
3	1	3	2	4	6	5	21
4	1	3	2	4	6	5	21
5	1	2	4	3	5	6	21
6	4	3	2	5	6	1	21
7	2	6	3	5	1	4	21
8	4	3	6	5	2	1	21
9	4	5	3	6	1	2	21
10	1	4	2	5	6	3	21
11	1	6	4	2	3	5	21
12	1	5	2	6	3	4	21
13	2	4	3	5	1	6	21
14	3	5	1	4	2	6	21
15	1	3	2	6	5	4	21
16	2	3	4	6	5	1	21
17	1	3	2	6	5	4	21
18	6	5	2	4	3	1	21
19	4	5	3	2	6	1	21
20	4	6	3	5	2	1	21
T <sub>j</sub>	45	80	55	95	76	69	420



$$SS_{Methods} = \frac{31012}{20} - 1470 = 1550.6 - 1470 = 80.6$$

$$SS_{res} = 1820 - 1550.6 - 1470 + 1470 = 269.4$$

$$\chi^2_{rank} = \frac{SS_{Methods}}{(SS_{Methods} + SS_{res})/n(t-1)} = \frac{n(t-1)SS_{Methods}}{SS_{Methods} + SS_{res}} = \frac{n(t-1)SS_{Methods}}{SS_{Within\ people}}$$

$$= \frac{20(5)(80.6)}{80.6 + 269.4} = \frac{8060}{350} = 23.03 > \chi^2_{(5, 0.05)} = 11.0705$$

(6)

							P <sub>i</sub>
1	1	6	3	2	5	4	21
2	6	4	3	1	5	2	21
3	6	4	3	1	5	2	21
4	6	3	4	1	5	2	21
5	6	1	2	3	4	5	21
6	1	6	3	2	5	4	21
7	6	3	2	4	5	1	21
8	5	4	2	3	6	1	21
9	6	5	3	2	4	1	21
10	6	4	1	3	5	2	21
11	6	5	4	2	1	3	21
12	6	2	1	4	3	5	21
13	6	1	2	4	5	3	21
14	5	4	3	2	6	1	21
15	5	4	3	1	6	2	21
16	6	1	3	2	5	4	21
17	5	4	3	2	6	1	21
18	6	4	2	3	5	1	21
19	1	5	4	3	6	2	21
20	3	2	6	4	5	1	21
T <sub>j</sub>	98	72	57	49	97	47	420

$$SS_{Methods} = \frac{32056}{20} - 1470 = 1602.8 - 1470 = 132.8$$

$$SS_{res} = 1820 - 1602.8 - 1470 + 1470 = 217.2$$

$$\chi^2_{rank} = \frac{SS_{Methods}}{(SS_{Methods} + SS_{res})/n(t-1)} = \frac{n(t-1)SS_{Methods}}{SS_{Methods} + SS_{res}} = \frac{n(t-1)SS_{Methods}}{SS_{Within\ people}}$$

$$= \frac{20(5)(132.8)}{132.8 + 217.2} = \frac{13280}{350} = 35.37 > \chi^2_{(5, 0.05)} = 11.0705$$



(7)

					%80 %20	%80 %20	P <sub>i</sub>
1	6	5	4	1	2	3	21
2	5	6	2	1	4	3	21
3	5	6	2	1	4	3	21
4	5	6	2	1	4	3	21
5	1	6	5	3	2	4	21
6	6	5	4	1	2	3	21
7	6	4	3	2	5	1	21
8	6	4	1	2	5	3	21
9	6	5	2	1	4	3	21
10	6	3	2	1	4	5	21
11	6	5	3	2	4	1	21
12	6	3	1	2	5	4	21
13	6	5	2	1	4	3	21
14	3	6	5	4	1	2	21
15	6	5	4	1	3	2	21
16	5	4	2	1	6	3	21
17	6	5	1	2	4	3	21
18	6	5	3	2	4	1	21
19	3	2	1	6	5	4	21
20	6	3	2	1	4	5	21
T <sub>i</sub>	105	93	51	36	76	59	420

$$SS_{Methods} = \frac{32828}{20} - 1470 = 1641.4 - 1470 = 171.4$$

$$SS_{res} = 1820 - 1641.4 - 1470 + 1470 = 178.6$$

$$\chi^2_{rank} = \frac{SS_{Methods}}{(SS_{Methods} + SS_{res})/n(t-1)} = \frac{n(t-1)SS_{Methods}}{SS_{Methods} + SS_{res}} = \frac{n(t-1)SS_{Methods}}{SS_{Within\ people}}$$

$$= \frac{20(5)(171.4)}{171.4 + 178.6} = \frac{17140}{350} = 48.97 > \chi^2_{(5, 0.05)} = 11.0705$$



(8)

							P <sub>i</sub>
1	3	4	1	2	6	5	21
2	1	5	2	3	6	4	21
3	1	4	2	3	6	5	21
4	1	4	2	3	6	5	21
5	1	5	3	2	6	4	21
6	1	4	2	3	5	6	21
7	1	5	2	3	6	4	21
8	1	2	6	3	5	4	21
9	1	5	2	3	6	4	21
10	1	5	2	3	6	4	21
11	1	4	2	3	6	5	21
12	1	4	2	3	5	6	21
13	1	4	2	3	6	5	21
14	1	2	5	4	6	3	21
15	1	4	2	3	6	5	21
16	1	4	3	2	6	5	21
17	1	4	2	3	6	5	21
18	6	1	5	2	3	4	21
19	6	4	5	3	2	1	21
20	5	1	6	2	4	3	21
T <sub>j</sub>	36	75	58	56	108	87	420

$$SS_{Methods} = \frac{32654}{20} - 1470 = 1632.7 - 1470 = 162.7$$

$$SS_{res} = 1820 - 1632.7 - 1470 + 1470 = 187.3$$

$$\chi^2_{rank} = \frac{SS_{Methods}}{(SS_{Methods} + SS_{res})/n(t-1)} = \frac{n(t-1)SS_{Methods}}{SS_{Methods} + SS_{res}} = \frac{n(t-1)SS_{Methods}}{SS_{Within\ people}}$$

$$= \frac{20(5)(162.7)}{162.7 + 187.3} = \frac{16270}{350} = 46.49 > \chi^2_{(5, 0.05)} = 11.0705$$





(9)

							P <sub>i</sub>
1	1	6	2	3	4	5	21
2	6	5	2	1	3	4	21
3	4	6	1	3	2	5	21
4	4	6	1	3	2	5	21
5	2	6	1	4	3	5	21
6	3	6	1	4	5	2	21
7	6	5	1	2	3	4	21
8	3	2	6	4	1	5	21
9	2	6	1	3	5	4	21
10	3	6	2	1	4	5	21
11	6	4	2	1	3	5	21
12	4	5	1	2	3	6	21
13	6	5	1	2	3	4	21
14	1	6	3	2	4	5	21
15	5	6	1	2	4	3	21
16	2	3	1	4	5	6	21
17	6	2	3	4	1	5	21
18	5	6	3	1	2	4	21
19	5	4	1	3	2	6	21
20	3	2	1	5	4	6	21
T <sub>j</sub>	77	97	35	54	63	94	420

$$SS_{Methods} = \frac{32284}{20} - 1470 = 1614.2 - 1470 = 144.2$$

$$SS_{res} = 1820 - 1614.2 - 1470 + 1470 = 205.8$$

$$\chi^2_{rank} = \frac{SS_{Methods}}{(SS_{Methods} + SS_{res})/n(t-1)} = \frac{n(t-1)SS_{Methods}}{SS_{Methods} + SS_{res}} = \frac{n(t-1)SS_{Methods}}{SS_{Within\ people}}$$

$$= \frac{20(5)(144.2)}{162.7 + 187.3} = \frac{14420}{350} = 41.2 > \chi^2_{(5, 0.05)} = 11.0705$$



(10)

							P <sub>i</sub>
1	3	2	1	5	4	6	21
2	6	3	1	4	2	5	21
3	6	1	2	3	4	5	21
4	6	2	1	3	4	5	21
5	4	2	1	3	5	6	21
6	5	6	2	4	1	3	21
7	4	2	1	6	3	5	21
8	4	5	3	6	1	2	21
9	6	2	1	4	3	5	21
10	4	3	1	6	2	5	21
11	6	4	3	2	1	5	21
12	3	2	1	4	6	5	21
13	4	3	1	5	2	6	21
14	6	3	1	5	2	4	21
15	3	4	1	6	2	5	21
16	3	2	5	1	6	4	21
17	6	5	2	4	1	3	21
18	1	4	2	6	3	5	21
19	4	3	2	5	1	6	21
20	5	2	1	4	3	6	21
T <sub>j</sub>	89	60	33	86	56	96	420

$$SS_{Methods} = \frac{32358}{20} - 1470 = 1617.9 - 1470 = 147.9$$

$$SS_{res} = 1820 - 1617.9 - 1470 + 1470 = 202.1$$

$$\chi^2_{rank} = \frac{SS_{Methods}}{(SS_{Methods} + SS_{res})/n(t-1)} = \frac{n(t-1)SS_{Methods}}{SS_{Methods} + SS_{res}} = \frac{n(t-1)SS_{Methods}}{SS_{Within\ people}}$$

$$= \frac{20(5)(147.9)}{147.9 + 202.1} = \frac{14790}{350} = 42.26 > \chi^2_{(5, 0.05)} = 11.0705$$



(11)

							P <sub>i</sub>
1	5	4	6	1	3	2	21
2	3	6	5	1	4	2	21
3	6	5	4	1	3	2	21
4	3	4	6	1	5	2	21
5	3	1	2	4	6	5	21
6	2	1	3	4	5	6	21
7	4	5	3	1	6	2	21
8	5	3	4	1	6	2	21
9	3	2	6	1	5	4	21
10	5	4	6	1	3	2	21
11	3	5	6	1	4	2	21
12	2	3	5	1	6	4	21
13	2	3	5	1	6	4	21
14	2	3	5	1	6	4	21
15	1	5	4	2	6	3	21
16	3	4	5	1	6	2	21
17	3	4	6	1	5	2	21
18	6	1	2	4	5	3	21
19	5	3	2	1	6	4	21
20	6	1	3	4	5	2	21
T <sub>j</sub>	72	67	88	33	101	59	420

$$SS_{Methods} = \frac{32188}{20} - 1470 = 1609.4 - 1470 = 139.4$$

$$SS_{res} = 1820 - 1609.4 - 1470 + 1470 = 210.6$$

$$\chi^2_{rank} = \frac{SS_{Methods}}{(SS_{Methods} + SS_{res})/n(t-1)} = \frac{n(t-1)SS_{Methods}}{SS_{Methods} + SS_{res}} = \frac{n(t-1)SS_{Methods}}{SS_{Within\ people}}$$

$$= \frac{20(5)(139.4)}{139.4 + 210.6} = \frac{13940}{350} = 39.83 > \chi^2_{(5, 0.05)} = 11.0705$$

