



Universitat Autònoma de Barcelona

Servei d'Estadística

Documentación del Certificado de Acreditación y Garantía del programa estadístico G-Stat 2.0, otorgado por el Servei d'Estadística de la Universitat Autònoma de Barcelona.

**Técnica número 090:
Comparaciones múltiples con corrección de Bonferroni en Anova de un factor**

Resultado de la evaluación:

G-Stat realiza las comparaciones múltiples con corrección de Bonferroni en Anova de un factor correctamente.

OBSERVACIONES

Para validar este apartado se han utilizado las siguientes variables:

- *normal*: variable respuesta, generada a partir de una distribución Normal(0,1)
- *e*: variable explicativa, categórica a 6 niveles con 8 observaciones por nivel

Estas variables se encuentran en la base de datos *validacion1*.

En ocasiones, SAS y G-Stat presentan diferencias en los grupos homogéneos. SAS utiliza un método conjunto, mientras que G-Stat se basa en los resultados de las comparaciones obtenidas.

G-Stat realiza las comparaciones múltiples con corrección de Bonferroni en Anova de un factor correctamente.

COMANDOS / SINTAXIS

G-STAT

Anova → Anova Un Factor (a|y)

SPSS

ONEWAY normal BY e /POSTHOC = BONFERRONI ALPHA(.05).

SAS

```
PROC GLM DATA = validacion1;  
CLASS E;  
MODEL NORMAL=E;  
MEANS E / CLDIFF bon lines;  
RUN;
```

RESULTADO SPSS

Normal vs E

Comparaciones múltiples

Variable dependiente:
Bonferroni

| (I) | (J) | Diferencia de medias (I-J) | Error típico | Sig. | Intervalo de confianza al 95% | |
|-----|-----|----------------------------|--------------|-------|-------------------------------|-----------------|
| | | | | | Límite inferior | Límite superior |
| 1 | 2 | -,0175 | ,52942 | 1,000 | -1,6653 | 1,6303 |
| | 3 | -,6387 | ,52942 | 1,000 | -2,2865 | 1,0090 |
| | 4 | ,3313 | ,52942 | 1,000 | -1,3165 | 1,9790 |
| | 5 | -,6075 | ,52942 | 1,000 | -2,2553 | 1,0403 |
| | 6 | -,3712 | ,52942 | 1,000 | -2,0190 | 1,2765 |
| 2 | 1 | ,0175 | ,52942 | 1,000 | -1,6303 | 1,6653 |
| | 3 | -,6212 | ,52942 | 1,000 | -2,2690 | 1,0265 |
| | 4 | ,3488 | ,52942 | 1,000 | -1,2990 | 1,9965 |
| | 5 | -,5900 | ,52942 | 1,000 | -2,2378 | 1,0578 |
| | 6 | -,3537 | ,52942 | 1,000 | -2,0015 | 1,2940 |
| 3 | 1 | ,6387 | ,52942 | 1,000 | -1,0090 | 2,2865 |
| | 2 | ,6212 | ,52942 | 1,000 | -1,0265 | 2,2690 |
| | 4 | ,9700 | ,52942 | 1,000 | -,6778 | 2,6178 |
| | 5 | ,0313 | ,52942 | 1,000 | -1,6165 | 1,6790 |
| | 6 | ,2675 | ,52942 | 1,000 | -1,3803 | 1,9153 |
| 4 | 1 | -,3313 | ,52942 | 1,000 | -1,9790 | 1,3165 |
| | 2 | -,3488 | ,52942 | 1,000 | -1,9965 | 1,2990 |
| | 3 | -,9700 | ,52942 | 1,000 | -2,6178 | ,6778 |
| | 5 | -,9388 | ,52942 | 1,000 | -2,5865 | ,7090 |
| | 6 | -,7025 | ,52942 | 1,000 | -2,3503 | ,9453 |
| 5 | 1 | ,6075 | ,52942 | 1,000 | -1,0403 | 2,2553 |
| | 2 | ,5900 | ,52942 | 1,000 | -1,0578 | 2,2378 |
| | 3 | -,0313 | ,52942 | 1,000 | -1,6790 | 1,6165 |
| | 4 | ,9388 | ,52942 | 1,000 | -,7090 | 2,5865 |
| | 6 | ,2362 | ,52942 | 1,000 | -1,4115 | 1,8840 |
| 6 | 1 | ,3712 | ,52942 | 1,000 | -1,2765 | 2,0190 |
| | 2 | ,3537 | ,52942 | 1,000 | -1,2940 | 2,0015 |
| | 3 | -,2675 | ,52942 | 1,000 | -1,9153 | 1,3803 |
| | 4 | ,7025 | ,52942 | 1,000 | -,9453 | 2,3503 |
| | 5 | -,2362 | ,52942 | 1,000 | -1,8840 | 1,4115 |

RESULTADO SAS

Normal vs E

The GLM Procedure

Comparisons significant at the 0.05 level are indicated by ***.

| E | | Difference | Simultaneous | |
|------------|-----|------------|----------------|--------|
| Comparison | | Between | 95% Confidence | |
| | | Means | Limits | |
| 3 | - 5 | 0.0313 | -1.6165 | 1.6790 |
| 3 | - 6 | 0.2675 | -1.3803 | 1.9153 |
| 3 | - 2 | 0.6213 | -1.0265 | 2.2690 |
| 3 | - 1 | 0.6388 | -1.0090 | 2.2865 |
| 3 | - 4 | 0.9700 | -0.6778 | 2.6178 |
| 5 | - 3 | -0.0313 | -1.6790 | 1.6165 |
| 5 | - 6 | 0.2362 | -1.4115 | 1.8840 |
| 5 | - 2 | 0.5900 | -1.0578 | 2.2378 |
| 5 | - 1 | 0.6075 | -1.0403 | 2.2553 |
| 5 | - 4 | 0.9388 | -0.7090 | 2.5865 |
| 6 | - 3 | -0.2675 | -1.9153 | 1.3803 |
| 6 | - 5 | -0.2362 | -1.8840 | 1.4115 |
| 6 | - 2 | 0.3538 | -1.2940 | 2.0015 |
| 6 | - 1 | 0.3713 | -1.2765 | 2.0190 |
| 6 | - 4 | 0.7025 | -0.9453 | 2.3503 |
| 2 | - 3 | -0.6213 | -2.2690 | 1.0265 |
| 2 | - 5 | -0.5900 | -2.2378 | 1.0578 |
| 2 | - 6 | -0.3538 | -2.0015 | 1.2940 |
| 2 | - 1 | 0.0175 | -1.6303 | 1.6653 |
| 2 | - 4 | 0.3488 | -1.2990 | 1.9965 |
| 1 | - 3 | -0.6388 | -2.2865 | 1.0090 |
| 1 | - 5 | -0.6075 | -2.2553 | 1.0403 |
| 1 | - 6 | -0.3713 | -2.0190 | 1.2765 |
| 1 | - 2 | -0.0175 | -1.6653 | 1.6303 |
| 1 | - 4 | 0.3312 | -1.3165 | 1.9790 |
| 4 | - 3 | -0.9700 | -2.6178 | 0.6778 |
| 4 | - 5 | -0.9388 | -2.5865 | 0.7090 |
| 4 | - 6 | -0.7025 | -2.3503 | 0.9453 |
| 4 | - 2 | -0.3488 | -1.9965 | 1.2990 |
| 4 | - 1 | -0.3312 | -1.9790 | 1.3165 |

RESULTADO G-STAT

Normal vs E

Anova Un Factor, Comparaciones Múltiples

Variable Respuesta: NORMAL
Variable Explicativa: E
Número de Casos: 48

Método: Bonferroni al 95.00%

| E | N | Media | Grupos Homogéneos |
|---|---|---------|-------------------|
| 4 | 8 | -0.8550 | X |
| 1 | 8 | -0.5237 | X |
| 2 | 8 | -0.5062 | X |
| 6 | 8 | -0.1525 | X |
| 5 | 8 | 0.0837 | X |
| 3 | 8 | 0.1150 | X |

| Contraste | Diferencia | +/- Límite |
|-----------|------------|------------|
| 1 VS 2 | -0.0175 | 1.6478 |
| 1 VS 3 | -0.6387 | 1.6478 |
| 1 VS 4 | 0.3313 | 1.6478 |
| 1 VS 5 | -0.6075 | 1.6478 |
| 1 VS 6 | -0.3712 | 1.6478 |
| 2 VS 3 | -0.6212 | 1.6478 |
| 2 VS 4 | 0.3488 | 1.6478 |
| 2 VS 5 | -0.5900 | 1.6478 |
| 2 VS 6 | -0.3537 | 1.6478 |
| 3 VS 4 | 0.9700 | 1.6478 |
| 3 VS 5 | 0.0312 | 1.6478 |
| 3 VS 6 | 0.2675 | 1.6478 |
| 4 VS 5 | -0.9387 | 1.6478 |
| 4 VS 6 | -0.7025 | 1.6478 |
| 5 VS 6 | 0.2362 | 1.6478 |

* Diferencia estadísticamente significativa.