

미디어 통계 Assignment

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1. F-Test 수행

* F-Test 를 진행하기에 앞서 필수요소인 MSwithin , MSbetween 값을 구한뒤 F-test 를 진행한다

(1) MS Within 값 구하기

$$\begin{aligned} \textcircled{1} \quad SS_{\text{within}} &= \sum SS_{\text{eachGroup}} = 1540 + 1270 + 1320 + 1266 = 5396 \\ \textcircled{2} \quad df_{\text{within}} &= N-k = 80 - 4 = 76 \\ \textcircled{3} \quad MS_{\text{within}} &= \frac{SS_{\text{within}}}{df_{\text{within}}} = \frac{5396}{76} = 71 \end{aligned}$$

(2) MS Between 값 구하기

$$\begin{aligned} \textcircled{1} \quad SS_{\text{between}} &= \left(\frac{440^2}{40} + \frac{300^2}{40} + \frac{340^2}{40} + \frac{360^2}{40} \right) - \frac{1440^2}{80} \\ &= (9680 + 4500 + 5780 + 6480) - 25920 = 26440 - 25920 = 520 \\ \textcircled{2} \quad df_{\text{between}} &= k-1 = 4 - 1 = 3 \\ \textcircled{3} \quad MS_{\text{between}} &= \frac{SS_{\text{between}}}{df_{\text{between}}} = \frac{520}{3} = 173.3 \end{aligned}$$

(3) MS FactorA 값 구하기

$$\begin{aligned} \textcircled{1} \quad SS_{\text{FactorA}} &= \left(\frac{740^2}{40} + \frac{700^2}{40} \right) - \frac{1440^2}{80} = 13690 + 12250 - 25920 \\ &= 25940 - 25920 = 20 \\ \textcircled{2} \quad df_{\text{FactorA}} &= \text{Number of GroupA} = 2 - 1 = 1 \\ \textcircled{3} \quad MS_{\text{FactorA}} &= \frac{SS_{\text{FactorA}}}{df_{\text{FactorA}}} = \frac{20}{1} = 20 \end{aligned}$$

(3) MS FactorB 값 구하기

$$\begin{aligned} \textcircled{1} \quad SS_{\text{FactorB}} &= \left(\frac{780^2}{40} + \frac{660^2}{40} \right) - \frac{1440^2}{80} = 15210 + 10890 - 25920 \\ &= 26100 - 25920 = 180 \\ \textcircled{2} \quad df_{\text{FactorB}} &= \text{Number of GroupA} = 2 - 1 = 1 \\ \textcircled{3} \quad MS_{\text{FactorB}} &= \frac{SS_{\text{FactorA}}}{df_{\text{FactorA}}} = \frac{180}{1} = 180 \end{aligned}$$

(4) MS AxB 값 구하기

- ① $SS_{AxB} = SS_{\text{between}} - SS_{\text{FactorA}} - SS_{\text{FactorB}} = 520 - 20 - 180 = 320$
- ② $df_{AxB} = df_{\text{between}} - df_{\text{FactorA}} - df_{\text{FactorB}} = 3 - 1 - 1 = 1$
- ③ $MS_{AxB} = \frac{SS_{AxB}}{df_{AxB}} = \frac{320}{1} = 320$

(5) F-Test

- ① $F_{\text{weight}} = \frac{MS_{\text{weight}}}{MS_{\text{within}}} = \frac{20}{71} = 0.2816$
- ② $F_{\text{fullness}} = \frac{MS_{\text{fullness}}}{MS_{\text{within}}} = \frac{180}{71} = 2.5352$
- ③ $F_{AxB} = \frac{MS_{AxB}}{MS_{\text{within}}} = \frac{320}{71} = 4.5070$

2. 표 정리

Table 1. Mean number of crackers eaten in each treatment condition			
		Fullness	
		Empty stomach	Full stomach
Weight	Normal	M = 22 SD=8.77	M = 15 SD = 7.96
	Obese	M = 17 SD = 8.12	M = 18 SS = 7.95

Result				
Source	SS	df	MS	F
Between treatment	520	3	173.3	2.4408
Factor A (weight)	20	1	20	0.2816
Factor B (fullness)	180	1	180	2.535
A x B interaction	320	1	320	4.5070
Within treatment	5396	76	71	
Total	5916	79	74.88	

3. 통계학적인 결정

(1) F_{weight} Test

① hypothesis

$$H1 : U_{A1} \neq U_{A2}, \quad H0 : U_{A1} = U_{A2}$$

② F-value

$$-F_{\text{weight crit}} = F(1,76) \approx F(1,60) = 4.00$$

$$-F_{\text{weight}} = 0.2816$$

③ Result

$F_{\text{weight crit}} > F_{\text{weight}}$ 이므로 0 가설 을 기각할수 없다

(2) F_{fullness} Test

① hypothesis

$$H1 : U_{B1} \neq U_{B2}, \quad H0 : U_{B1} = U_{B2}$$

② F-value

$$-F_{\text{fullness crit}} = F(1,76) \approx F(1,60) = 4.00$$

$$-F_{\text{fullness}} = 2.535$$

③ Result

$F_{\text{fullness crit}} > F_{\text{fullness}}$ 이므로 0 가설 을 기각할수 없다

(3) F_{AxB} Test

① hypothesis

$H1$: Interaction 효과가 있다, $H0$: Interaction 효과가 없다

② F-value

- $F_{AxB \text{ crit}} = F(1,76) \approx F(1,60) = 4.00$

- $F_{AxB} = 4.5070$

③ Result

$F_{AxB \text{ crit}} < F_{AxB}$ 이므로 0 가설 을 기각하고 연구 가설을 채택한다

3. 결과 설명

① $F_{\text{weight crit}} > F_{\text{weight}}$ 라는 결과가 나왔으므로

Weight 에 의해 집단간의 차이가 나지 않는다.

즉, Weight-obese, Weight-normal 집단에는

그룹내 Random 한 차이만 나타난다.

② $F_{\text{fullness crit}} > F_{\text{fullness}}$ 라는 결과가 나왔으므로

fullness 에 의해 집단간의 차이가 나지 않는다.

즉, fullness -empty, fullness -full 집단에는

그룹내 Random 한 차이만 나타난다.

③ $F_{AxB \text{ crit}} < F_{AxB}$ 라는 결과가 나왔으므로

weight, fullness 간에는 상호 효과가 있다는 결론을 내릴 수 있다.

즉, 두 요인이 상호 의존적으로 작용한다.