

## Hypothesis : Chi-squared Test

\* It is statistical test used to Compare observed results with expected results.

\* The purpose of this test is to determine if a difference between observed data and expected data is due to chance or is due to a relationship between the variables you are using.

Null hypothesis : There is no relationship

Formula :-

$$\chi^2 = \frac{(O - E)^2}{E}$$

E = Expected Frequency  
O = Observed frequency

$$\chi^2 = (c-1)(r-1)$$

c = no. of columns

r = no. of rows

Table value to be calculated from chi-square table.

∴ If, calculated value < Table value,  
hypothesis accepted.

∴ If calculated value > Table value,  
hypothesis rejected.

$$E_1 = \frac{626 \times 213}{1189} = 112.143$$

$$E_2 = \frac{626 \times 345}{1189} = 181.6$$

$$E_3 = \frac{626 \times 440}{1189} = 231.6$$

$$E_4 = \frac{626 \times 191}{1189} = 100.5$$

112.143	97.4	3.4	213
181.6	157.8	5.5	345
231.6	201.3	7	440
100.5	87.3	3	191
626	544	19	1189

$$E_1 = 112.143$$

$$E_2 = 181.6$$

$$E_3 = 231.6$$

$$E_4 = 100.5$$

$$E_5 = \frac{544 \times 213}{1189} = 97.4$$

$$E_5 = 97.4$$

$$E_6 = \frac{544 \times 345}{1189} = 157.8$$

$$E_6 = 157.8$$

$$E_7 = \frac{544 \times 440}{1189} = 201.3$$

$$E_7 = 201.3$$

$$E_8 = \frac{544 \times 191}{1189} = 87.3$$

$$E_8 = 87.3$$

$$E_9 = \frac{19 \times 213}{1189} = 3.4$$

$$E_9 = 3.4$$

$$E_{10} = \frac{19 \times 345}{1189} = 5.5$$

$$E_{10} = 5.5$$

$$E_{11} = \frac{19 \times 440}{1189} = 7$$

$$E_{11} = 7$$

$$E_{12} = \frac{19 \times 191}{1189} = 3$$

$$E_{12} = 3$$

O	E	$(O-E)^2$	$(O-E)^2/E$
141	112.143	832.7	7.4
179	181.6	6.7	0.03
220	231.6	134.5	0.5
86	100.5	210.3	2.1
68	97.4	864.3	8.8
159	157.8	1.4	0.01
216	201.3	216	1.07
101	87.3	187.6	2.14
4	3.4	0.3	0.1
7	5.5	2.25	0.4
4	7	9	1.2
4	3	1	0.3
			24.05

$\therefore$  Calculated value = 24.05

$$\therefore \chi^2 = (C-1)(R-1)$$

Here there are 3 columns & 4 rows

$$\chi^2 = (3-1)(4-1)$$

$$= 2 \times 3$$

5% Significance level.

$$\therefore \chi^2 = 6$$

$$\chi^2_{0.05} = 12.6$$

from table



So,

$$24.05 > 12.6$$

$$\text{calculated value} > \text{Table value}$$

The hypothesis is rejected

There is <sup>an</sup> evidence of a relationship between the age group and their movie genre inclination.

	1-10	11-20	21-30	31-40
1	8.48	2.2	1	1
2	25.7	2.1	1	1
3	1	1	1	1
4	1	1	1	1
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12	1	1	1	1
13	1	1	1	1
14	1	1	1	1
15	1	1	1	1
16	1	1	1	1
17	1	1	1	1
18	1	1	1	1
19	1	1	1	1
20	1	1	1	1

$$20.15 = \text{calculated value}$$

$$(1-2) = 1$$

$$(1-2) = 1$$

$$1.1 \times 1.1 = 1.21$$

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