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Topic: 1.11 – Independence of Attributes

Chi - Square Test for Independence of Attributes .

Attribute means quality or character^{etc}
Eg: drinking, blindness, honesty, softness etc .
Attribute can be marked in its presence or absence in a number of given population . The frequency is given by 2x2 contingency table .

a	b	a+b
c	d	c+d
a+c	b+d	N

dof : = (r-1)(s-1)

Expected frequency .

$$E(a) = \frac{(a+c)(a+b)}{N}$$
$$E(b) = \frac{(b+d)(a+b)}{N}$$
$$E(c) = \frac{(a+c)(c+d)}{N}$$
$$E(d) = \frac{(b+d)(c+d)}{N}$$



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1) On the basis of information given below about the treatment of 200 patients suffering from a disease, state whether the new treatment is comparatively superior to the conventional treatment.

	Favourable	Not favorable	Total
New	60	30	90
Conventional	40	70	110
	100	100	

H_0 : No difference between new and conventional treatment. (Attributes are independent.)

Dof : $(r-1)(c-1) = (2-1)(2-1) = 1$

Expected frequency -

$$E(60) = \frac{90 \times 100}{200} = 45$$
$$E(30) = \frac{90 \times 100}{200} = 45$$
$$E(40) = \frac{100 \times 110}{200} = 55$$
$$E(70) = \frac{110 \times 100}{200} = 55$$

O	E	$(O-E)^2$	$\frac{(O-E)^2}{E}$
60	45	225	5
30	45	225	5
40	55	225	4.09
70	55	225	4.09
			<u>18.18</u>



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Test Statistic: $\chi^2 = \frac{(O-E)^2}{E} = 18.18$

Critical value: $\alpha = 5\%$ dof: 1.

$\chi^2_{\alpha} = 3.841$

Conclusion: $18.18 > 3.841$.

H_0 rejected.