

Ficha nº 11 - Qui-Quadrado - "Bom Ajuste"

Estatística Aplicada

2. $N = 110 + 57 + 53 + 80 = 300$

2×4 $x + x + x + x = 1 \Rightarrow x = 0.2$

$Q = \frac{(110-120)^2}{120} + \frac{(57-60)^2}{60} + \frac{(53-60)^2}{60} + \frac{(80-60)^2}{60} = 8.47$

J-M	A-J	J-S	O-D
110	57	53	80
0.4	0.2	0.2	0.2
120	60	60	60

$H_0: p_1 = 0.4, p_2 = 0.2, p_3 = 0.2, p_4 = 0.2$

$H_1: \text{Existe um trimestre cuja proporção é diferente das que os outros}$

$c = \chi^2_{2, 0.05} = 7.81473$

Como $Q > c$, rejeita-se H_0

4. $H_0: \lambda = 2.4$

$K = 7$

$\alpha = 0.05$

$H_1: \lambda \neq 2.4$

N^o	f_i	$p_i = P(X=x_i)$	$e_i = 300 * p_i$
0	19	0.0907	27.21
1	48	0.2177	65.31
2	66	0.2613	78.39
3	74	0.2090	62.7
4	44	0.1254	37.62
5	35	0.0602	18.06
6	10	0.0241	7.23
≥ 7	4	0.0116	3.48
	300	1	300

$Q = \frac{(19-27.21)^2}{27.21} + \dots + \frac{(4-3.48)^2}{3.48} \approx 29.17$

$c = \chi^2_{6, 0.05} = 12.59159$

Como $Q > c$ rejeita-se H_0 .

e	1.79	11.78	32.43	35.57	15.54	2.68	0.19	≤ 1
m^o	5-9	10-14	15-19	20-24	25-29	30-34	35-39	
f	1	10	37	36	13	2	1	100

$\bar{x} = \frac{7 \times 1 + 12 \times 10 + 17 \times 37 + 22 \times 36 + 27 \times 13 + 32 \times 2 + 37 \times 1}{100} = 20$

$Q = \frac{(7-20)^2 \times 1 + (12-20)^2 \times 10 + (17-20)^2 \times 37 + (22-20)^2 \times 36 + (27-20)^2 \times 13 + (32-20)^2 \times 2 + (37-20)^2 \times 1}{99}$

≈ 5.03

$$b) i) P(X < 9.5) = P\left(\frac{X-20}{5} < \frac{9.5-20}{5}\right) = P(Z < -2.10) = 0.0179$$

$$ii) P(9.5 < X < 14.5) = P(X < 14.5) - P(X < 9.5) = P(Z < -1.10) - 0.0179 \\ = 0.1357 - 0.0179 = 0.1178$$

$$iii) P(14.5 < X < 19.5) = P(X < 19.5) - P(X < 14.5) = P(Z < -0.10) - P(Z < -1.10) \\ = 0.4602 - 0.1357 = 0.3245$$

$$iv) P(19.5 < X < 24.5) = P(X < 24.5) - P(X < 19.5) = P(Z < 0.9) - P(Z < -0.10) \\ = 0.8139 - 0.4602 = 0.3537$$

$$v) P(24.5 < X < 29.5) = P(X < 29.5) - P(X < 24.5) = P(Z < 1.9) - P(Z < 0.9) \\ = 0.9713 - 0.8139 = 0.1574$$

$$vi) P(29.5 < X < 34.5) = P(X < 34.5) - P(X < 29.5) = P(Z < 2.9) - P(Z < 1.9) \\ = 0.9981 - 0.9713 = 0.0268$$

$$vii) P(X < 34.5) = 1 - P(X > 34.5) = 1 - P(Z > 2.9) = 1 - 0.9981 = 0.0019$$

$$\Rightarrow c) Q = \frac{(1-1.79)^2}{1.79} + \frac{(10-11.78)^2}{11.78} + \frac{(37-37.45)^2}{37.45} + \frac{(36-35.47)^2}{35.47} + \frac{(13-15.54)^2}{15.54} + \frac{(3-2.87)^2}{2.87} \\ = 1.68 \quad \leftarrow \{1.45\}$$

Como $Q < c$, não se rejeita H_0

$$c = \chi^2_{5,0.05} = 11.07050$$

1. máquina	1	2	3	4
méd. / 500	10	25	0	5

$$\bar{p} = \frac{10+25+0+5}{500 \times 4} = 0.02$$

$$\bar{x} = 500 \times 0.02 = 10$$

$$Q = \frac{(10-10)^2}{10} + \frac{(25-10)^2}{10} + \frac{(0-10)^2}{10} + \frac{(5-10)^2}{10} = 35$$

$$\left\{ \begin{array}{l} H_0: p_1 = p_2 = p_3 = p_4 = 0.02 \\ H_1: \exists i: p_i \neq 0.02 \end{array} \right.$$

$$c = \chi^2_{3,0.05} = 7.81473$$

Como $Q > c$ rejeita-se H_0

3. comissão/dia	1	2	3	4
m° dias	70	60	40	30

$$\frac{200}{4} = 50$$

$$Q = \frac{(70-50)^2}{50} + \frac{(60-50)^2}{50} + \frac{(40-50)^2}{50} + \frac{(30-50)^2}{50} = 20$$

$$\left\{ \begin{array}{l} H_0: p_1 = p_2 = p_3 = p_4 = \frac{1}{4} \\ H_1: \exists i: p_i \neq \frac{1}{4} \end{array} \right.$$

$$\chi^2_{3,0.01} = 11.34487$$

Como $Q > c$ rejeita-se H_0