Estadística

14-6-19

modelos de probabilidad

Discretas:

Binomial (n, p) $\qquad q = 1-p$

$$P[x=k] \binom{n}{k} p^{k} \cdot q^{n-k} \qquad \binom{n}{k} = \frac{n!}{k! \cdot (n-k)!}$$

$P(7, 0'2)$

$$P[x=4] = \binom{7}{4} \cdot 0{,}2^{4} \cdot 0{,}8^{3} = 0{,}0287$$

Relación 5

3

$B(n, p) \rightarrow B(12, 0{,}05) \quad q = 0{,}95$

$P[x \geq 2] \rightarrow 1 - P[x \leq 1] = 1 - 0{,}8816 = 0{,}1184$

$P[n=2] \rightarrow 0{,}0988$

me = media $= n \cdot p$

σ = desviación típica $= \sqrt{n \cdot p \cdot q}$

Poisson

$P(\lambda)$ $\begin{cases} \text{media } \lambda \\ \text{desviación } \lambda \\ \text{Desviación típica } \sqrt{\lambda} \end{cases}$

⑧

$P(\lambda) = P(3)$

3 veces cada 5 min →

→ 6 veces cada 10 min

$P[x=6] = 0{,}1054$

0,6 veces cada min

$P(\lambda) = P(6)$

$P[x=3] = 0{,}0892$

$P(\lambda) = P(0{,}6)$

$P[z=2]\ 0{,}0988$

(11) $P(\lambda) = P(4)$

$P[x=2] = 0{,}1465$ $\quad P[x<3] \to P[y \leq 2] = 0{,}2381$

$P[x=8]$

contínuas

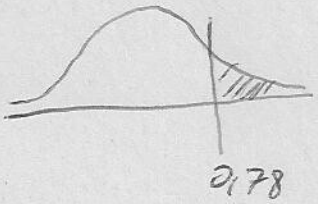
<u>normal:</u>

$N(\mu, \sigma)$

$P[z \leq 1{,}33] = 0{,}9082$

$P[Z > 0{,}78] = 1 - P[Z \le 0{,}78] = 1 - 0{,}7823 =$

$= 0{,}2177$



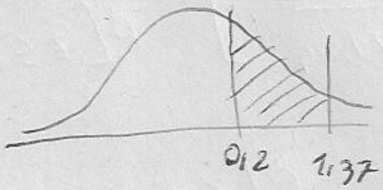
$P[Z \le -1{,}82] = 1 - P[Z \le 1{,}82] = 1 - 0{,}9656$

también se puede mirar la tabla de negativas

$P[Z > -1{,}05] = P[Z \le 1{,}05]$

también $\rightarrow 1 - [P \le -1{,}05]$

$P[0{,}2 \le Z \le 1{,}37]$



$\rightarrow P[Z \le 1{,}37] - P[Z \le 0{,}2] = 0{,}3354$

$0{,}9147 - 0{,}5793$

Tipificar

$N(13,6) = \boxed{Z = \frac{X-\mu}{\sigma}}$

$P[X \le 17]$ $\quad Z = \frac{17-13}{6} = \frac{4}{6} = 0{,}6$

$P[Z \le 0{,}66] = 0{,}7454$

$$B(n,p) \rightarrow N(\underset{\substack{\text{media}\\ \mu}}{n\cdot p},\ \underset{\sigma}{\sqrt{npq}})$$

$$P(\lambda) \rightarrow N(\underset{\mu}{\lambda},\ \underset{\sigma}{\sqrt{\lambda}})$$

$$B(1000,\ 0{,}15) \sim N(150,\ 11'29)$$

$$P[x \geq 125] = z = \frac{125-150}{11{,}9}\ ;\ z = \frac{-25}{11{,}29} = -2{,}21$$

$$P[z \leq -2{,}21] = 0{,}0135$$

$$P[140 \leq X \leq 155] = P\left[z \leq \frac{155-150}{11{,}29}\right] - P\left[z \leq \frac{140-150}{11{,}29}\right] =$$

$$= P[z \leq 0{,}49] - P[z \leq -0{,}58] = \ldots$$

<u>Intervalos de confianza</u>

α = nivel de confianza

$1-\alpha = 90$

$\alpha = 10\% \rightarrow \alpha/2 = 0{,}05$

$[\min, \max] \longrightarrow \dfrac{\text{amplitud}}{2} = \text{error} = \varepsilon$

$(\bar{x} - \varepsilon, \bar{x} + \varepsilon)$

cuanto mas alto el nivel de confianza ~~mas~~ menos amplio el intervalo

$$s = \sqrt{\frac{n}{n-1}} \cdot \sigma$$

$$1 - \alpha = 0{,}95 \rightarrow \alpha = 0{,}05 \rightarrow \frac{\alpha}{2} = 0{,}025$$

$$z_{\alpha/2} = \frac{1 + 0{,}95}{2} = \frac{1{,}95}{2} = 0{,}975$$ → buscamos en la tabla normal "inversamente"

$$IC = \left[p - \underbrace{z_{\alpha/2}\sqrt{\frac{pq}{n}}}_{\text{error}},\ p + z_{\alpha/2} \cdot \sqrt{\frac{pq}{n}}\right]$$

Relación 7

3

$\bar{x} = 20{,}75$

$s = 2{,}12$

$$\left[\bar{x} - t_{n-1, 1-\frac{\alpha}{2}} \frac{s}{\sqrt{n}},\ \bar{x} + t_{n-1, 1-\frac{\alpha}{2}} \frac{s}{\sqrt{n}}\right]$$

$$\left[20'75 - 2'365 \cdot \frac{2{,}12}{\sqrt{8}},\ 20'75 + 2'365 \cdot \frac{2{,}12}{\sqrt{8}}\right]$$

$1 - \alpha = 0{,}95$ $\quad \alpha/2 = 0{,}025$

$\alpha = 0{,}05$ $\quad 1 - \alpha/2 = 0{,}975$

$[18'97,\ 22'52]$

$$\sigma^2$$

$$IC(\sigma^2)\left[\frac{(n-1)s^2}{\chi^2_{n-1/\alpha/2}}, \frac{(n-1)s^2}{\chi^2_{n-1/\alpha/2}}\right] = \left[\frac{(8-1)(2'12)^2}{14,2}, \frac{(8-1)(2'12)^2}{2'17}\right]$$

$1-\alpha = 0,9$

$\alpha = 0,1$

$\alpha/2 = 0,05$

$1-\alpha/2 = 0,93$

(13) $\bar{x}_1 = 1,001$ cm $\quad s_1 = 0,001$ cm $\quad$ 25 muestras

$\bar{x}_2 = 0,995$ cm $\quad s_2 = 0,002$ cm $\quad 1-\alpha = 95\% \quad \alpha = 0,05$

g' $\quad \frac{\alpha}{2} = 0,025$

$1-\alpha/2 = 0,975$

$$(\mu_1-\mu_2)\ IC \left\{ (x-y) - t_{n_x+n_y-2, 1-\alpha/2} \cdot s_p \sqrt{\frac{1}{n_x}+\frac{1}{n_y}}, \right.$$

$$\left.(\bar{x}-\bar{y}) + \underline{\qquad}\right]$$

$$\left[(1,001-995)-(2,093\cdot 2,5\cdot 10^{-6}\sqrt{\frac{1}{25}+\frac{1}{25}},\right.$$

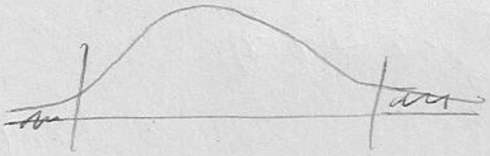
$$s_p = \sqrt{\frac{(n_y-1)s_x^2+(n_y-1)\cdot s_y^2}{n_x+n_y-2}} = \sqrt{\frac{(24)(0,001)^2+(24)\cdot(0,002)^2}{48}} =$$

$$\frac{\sigma_1^2}{\sigma_2^2} = \left[\frac{1}{F_{n_x-1,\, n_y-1,\, 1-\frac{\alpha}{2}}} \cdot \frac{S_x^2}{S_y^2} \,,\; F_{n_x-1\, n_y-1;\, 1-\frac{\alpha}{2}} \cdot \frac{S_x^2}{S_y^2}\right]$$

$$\left[\frac{1}{2{,}269} \cdot \frac{(0{,}001)^2}{(0{,}002)^2} \,,\; 2{,}269 \cdot \frac{(0{,}001)^2}{(0{,}002)^2}\right]$$

Contrastes de hipótesis

Bilaterales



$\alpha/2$ $\mu_0 = \mu$

unilateral

α $\mu_0 < \mu$ / $\mu_0 > \mu$

	bilateral	unilateral
Hipótesis nula H_0	$\mu = \mu_0$	$\mu \le \mu_0$ $\mu \ge \mu_0$
	$\mu_x = \mu_y$	$\mu_x \le \mu_y$ $\mu_x \ge \mu_y$
Hipótesis alternativa H_1	$\mu \ne \mu_0$	$\mu > \mu_0$ $\mu \le \mu_0$
	$\mu_x \ne \mu_y$	$\mu_x < \mu_y$ $\mu_x > \mu_y$

otra relación

$H_0 \rightarrow \mu_0 = 11,2h$

$H_1 = \mu_1 \neq 11,2$

es bilateral porque me dice que la media es igual a un valor

$\alpha = 0,05$

$\sigma = 2$

$n = 25$

$\alpha/2 = 0,025$

$1 - \alpha/2 = 0,975$

$s = \sqrt{\frac{n}{n-1}} \cdot 2 \rightarrow 2,04$

$T_{exp} = \frac{\bar{X} - \mu}{s/\sqrt{n}} = \frac{11,2-10}{2,04/\sqrt{25}} =$

$= 2,94$

$T_{tab} = 2,064$

mirar tablas

$gl = n-1$