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Journal of Xinjiang Normal University
Natural Sciences Edition

Vol.43 No.1
Mar. 2024

Mlinex

Bayes

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$$f \% x \, 8 \, a) \lambda \& : \lambda a^{*\lambda} x^{\lambda * \cdot}, - 9 \, x \, \tilde{v} \, a$$

$$F \% x \, 8 \, a) \lambda \& : a^{*\lambda} x^{\lambda}, - 9 \, x \, \tilde{v} \, a$$

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* 1968-

a λ a ; - λ ; - RP%a)λ&+

?^vbp

I fkbu I fkbu J ifkbu

J ifkbu J ifkbu MIaabo /--1

$$L(\lambda,\theta) = \omega\left[\left(\frac{\theta}{\lambda}\right)^{c} + c\ \mathrm{ik}\left(\frac{\theta}{\lambda}\right) + 1\right],\ \omega ; -, c\ \mathrm{e}\ - \quad .$$

θ λ J ifkbu

J ifkbu ?roo î

?^vbp [6] J ifkbu ?^vbp

J ifkbu ?âei j ^kk*Pqo^r_

J ifkbu ?âei j ^kk

J ifkbu c c ; - c 9 -

J ifkbu

?^vbp J ifkbu

?^vbp B*?^vbp

1

J I B

1 [9] $X_1, X_2, \dots, X_n$ $RP(a,\lambda)$ a λ

$X = (X_1, X_2, \dots, X_n)$ $x_1, x_2, \dots, x_n$ $RP(a,\lambda)$ a λ

$$\hat{\lambda}_{MLE} = n\left(\sum_{i=1}^{n} \mathrm{ik}\frac{\hat{\alpha}_{MLE}}{x_i}\right)^{-1},$$

$$\hat{\alpha}_{MLE} = \mathrm{j^u}\{x_i\} = x_{(n)}.$$

J >M

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$$\hat{\lambda}_{MAP} : \frac{n (\beta * .}{\gamma * t}$$

$t : \Phi_{i:.}^{n} \%\text{ik}\, x_i * \text{ik}\, a\&$ $\Gamma(\beta)\gamma)$ $\beta)\gamma$ $\beta ; -)\gamma ; -+$

λ $\Gamma(\beta)\gamma)$ $\beta)\gamma$ $\beta ; -)\gamma ; -$ $p\%X|\lambda\&$

$X_.)X_/)$ dט$)X_n$ λ

$$\pi(\lambda) : \frac{\gamma^{\beta}}{\Gamma(\beta)} \lambda^{\beta * \cdot} e^{*\gamma\lambda} \quad /$$

$$p\%X|\lambda\& : \prod_{i:.}^{n} \%\lambda a^{*\lambda} x^{\lambda * \cdot}\& : \lambda^{n} a^{*n\lambda} \prod_{i:.}^{n} \left(x_i^{\lambda * \cdot}\right) : \frac{\lambda^{n}}{\prod_{i:.}^{n} x_i} e^{\lambda t}) t : \Phi_{i:.}^{n} \%\text{ik}\, x_i * \text{ik}\, a\& \quad 0$$

$$p\%X|\lambda\&\pi\%\lambda\& : \frac{\lambda^{n}}{\prod_{i:.}^{n} x_i} e^{\lambda t} \frac{\gamma^{\beta}}{\Gamma(\beta)} \lambda^{\beta * \cdot} e^{*\gamma\lambda} : \frac{\gamma^{\beta}}{\Gamma(\beta) \prod_{i:.}^{n} x_i} \lambda^{n (\beta * \cdot} e^{*\%\gamma * t\&\lambda} \quad 1$$

λ λ $\hat{\lambda}$ λ

$\hat{\lambda}$ $p\%X|\lambda\&\pi\%\lambda\&$

$g\%\lambda\& : \lambda^{n (\beta * \cdot} e^{*\%\gamma * t\&\lambda}$ $p\%X|\lambda\&\pi\%\lambda\&$ λ

$g\%\lambda\&$ λ $g\%\lambda\&$ $g\%\lambda\& :$ bum x ik $\%g\%\lambda\&\&$ z

: bum x ik $\%\lambda^{n (\beta * \cdot} e^{*\%\gamma * t\&\lambda}\&$ z $g\%\lambda\&$ ik X $g\%\lambda\&$ Z

ik X $g\%\lambda\&$ Z λ -

$$\left(\text{ik X } g\%\lambda\& \text{ Z}\right)' : \frac{n (\beta * .}{\lambda} * \%\gamma * t\& : -$$

λ

$$\hat{\lambda}_{MAP} : \frac{n (\beta * .}{\gamma * t}$$

3 λ Bayes

λ ?^vbp

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λ ?^vbp

a λ J ifkbu ?^vbp

2 $X_.)X_/)$ dט$)X_n$ $RP\%a)\lambda\&$ a λ

$X : \%X_.) X_/)$ dט$) X_n\&$ $x_.) x_/)$ dט$) x_n$ J ifkbu .

$\pi\%$

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$$R(\hat{\lambda}(X)|X) = \int \omega\left[\left(\frac{\hat{\lambda}(X)}{\lambda}\right)^{c} - c\ln\left(\frac{\hat{\lambda}(X)}{\lambda}\right) - 1\right] p(X|\lambda)\pi(\lambda)d\lambda$$

$p(X|\lambda)\pi(\lambda)$ λ $X = (X_1, X_2, \dots, X_n)$

$\hat{\lambda}(X)$

$$\hat{\lambda}_{\beta}(X)=\left(E\left(\lambda^{-c}|X\right)\right)^{-\frac{1}{c}}=\frac{\left(\frac{\Gamma(n+\beta)}{\Gamma(n+\beta-c)}\right)^{\frac{1}{c}}}{(\gamma-t)}$$

$\Gamma(\beta)\gamma$ λ $\pi(\lambda)$ /

$$\pi(\lambda)=\frac{\gamma^{\beta}}{\Gamma(\beta)}\lambda^{\beta-1}e^{-\gamma\lambda}$$

$RP(a,\lambda)$ $f(x;a,\lambda)=\lambda a^{-\lambda}x^{\lambda-1},\ 0<x<a,\ \lambda>0$ 0

$$L(X|\lambda)=\prod_{i=1}^{n}(\lambda a^{-\lambda}x^{\lambda-1})=\lambda^{n}a^{-n\lambda}\prod_{i=1}^{n}\left(x_i^{\lambda-1}\right)=\frac{\lambda^{n}}{\prod_{i=1}^{n}x_i}e^{\lambda t},\ t=\sum_{i=1}^{n}(\ln x_i-\ln a)$$

λ

$$\pi(\lambda|X)=\frac{L(X|\lambda)\pi(\lambda)}{\int_0^{\infty}L(X|\lambda)\pi(\lambda)d\lambda}$$

$$=\frac{\frac{\lambda^{n}}{\prod_{i=1}^{n}x_i}e^{\lambda t}\frac{\gamma^{\beta}}{\Gamma(\beta)}\lambda^{\beta-1}e^{-\gamma\lambda}}{\int_0^{\infty}\frac{\lambda^{n}}{\prod_{i=1}^{n}x_i}e^{\lambda t}\frac{\gamma^{\beta}}{\Gamma(\beta)}\lambda^{\beta-1}e^{-\gamma\lambda}d\lambda}=\frac{\frac{\gamma^{\beta}}{\Gamma(\beta)\prod_{i=1}^{n}x_i}\lambda^{n+\beta-1}e^{-(\gamma-t)\lambda}}{\frac{\gamma^{\beta}}{\Gamma(\beta)\prod_{i=1}^{n}x_i}\int_0^{\infty}\lambda^{n+\beta-1}e^{-(\gamma-t)\lambda}d\lambda}$$

$$=\frac{\lambda^{g}\quad T}{}\qquad H$$

[redacted]

m ik $*t$ ∂ 0 $\left(\frac{\Gamma}{\Gamma\%n}\right.$ [redacted]

$t : \Phi_{i:.}\%\mathrm{ik}\,x_i * \mathrm{ik}\,a\&\ \Gamma(\beta)\gamma)$ β γ

. $RP\%a)\lambda\&$ λ J [redacted] ^vbp

$$\lambda\xi_{\beta}(X) : \frac{\left(\frac{\Gamma\%n\ (\ \beta\&}{\Gamma\%n\ (\ \beta * c\&}\right)}{\%\gamma * t\&}$$ [redacted]

$t : \Phi_{i:.}^{n}\%\mathrm{ik}\,x_i * \mathrm{ik}\,a\&+$ λ ς [redacted] ς ṃ

[redacted]

$$\pi_1(\lambda) = \int_0^m \int_0^1 \pi(\lambda) f(\beta,\gamma)\, d\beta d\gamma = \int_0^m \int_0^1 \frac{\gamma^\beta}{\Gamma(\beta)} \lambda^{\beta-1} e^{-\gamma\lambda} \frac{1}{m}\, d\beta d\gamma, \lambda > 0$$

4 0 a λ $\pi_1(\lambda)$ /

Jifkbu λ ?^vbp

$$\lambda_{HB} = \frac{\int_0^m \int_0^1 \frac{\gamma^\beta \Gamma(n+\beta+1)}{\Gamma(\beta)(\gamma - t)^{n+\beta+1}} d\beta d\gamma}{\int_0^m \int_0^1 \frac{\gamma^\beta \Gamma(n+\beta)}{\Gamma(\beta)(\gamma - t)^{n+\beta}} d\beta d\gamma}$$

$t = \sum_{i=1}^{n} (\ln x_i - \ln a)$, $\Gamma(\beta, \gamma)$ β γ $U(0,1)$ $U(0,m)$,

$X_1, X_2, \cdots, X_n$ $RP(a, \lambda)$ a

0

$$L(X|\lambda) = \prod_{i=1}^{n} \lambda a^{-\lambda} x^{\lambda-1} = \lambda^n a^{-n\lambda}\ \lambda$$

λL X

n : /- 2- .-- .2- Jifkbu ω : . λ Γ(/).) J@

/--- . / 0 .

Jifkbu c / λ

0 λ JPB+

1 Mlinex c

n	2-	.--	.2-
JIB	0+.02-	0+-25-	0+-113
>_p	-+.02-	-+-25-	-+-113
J>M	/+6032	/+6262	/+65./
>_p	-+-302	-+-1-2	-+-.55

Jifkbu ω : . n : 2- .-- .2- c : . 0 2 λ Γ(/).)

n	2-			.--			.2-		
c	.	0	2	.	0	2	.	0	2
?	/+61-0	/+54/-	/+5/5-	/+6304	/+6/64	/+6-10	/+65/5	/+63/5	/+6156
>_p	-+-264	-+./5-	-+.4/-	-+-030	-+-4-0	-+-624	-+-.4/	-+-04/	-+-2..

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. ?^vbp ?^vbp

/ Jifkbu c $RP\%a)\lambda\&$ λ ?^vbp

Jifkbu c : . Jifkbu

ω : . c : .+

0

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2 λ

k	j	? >_p
/-	-+/ -+2 .	/+50-5
2-	-+/ -+2 .	/+61-0 -+-264
.--	-+/ -+2 .	/+6304 -+-030
.2-	-+/ -+2 .	/+65/5 -+-.4/

Mlinex	Bayes

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D

1 λ ?^vbp

E*?^vbp Я ł A : . ?^vbp λ

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j ′	j ′	j ′
. /+36	/1+/ -	1 -+20
. 1+01	/1+22	13+- .
. 1+03	/2+-1	2 /+2 /
. 2+1 /	/4+65	22+21
. 3+64	/5+16	4 /+66
. 6+35	0 -+25	40+3 .
/0+4 /	0 -+5 /	

X : %$X_.$)$X_/$)ɗɥ)$X_{/-}$& E%X& : 0/+2-
Var%X& : 012+2-+

$$E\%X\& : \frac{\lambda a}{\lambda\ (\ .}$$

$$Var\%X\& : \frac{\lambda a^{/}}{\%\lambda\ (\ .\&^{/}\%\lambda\ (\ /\&}$$

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	Mlinex				Bayes			
5		a		λ		y		
a	40+3.	.03	/--	/11	/12	5--	512	52-
j /								
./+36	*-+430	*.+-0-	*.+.65	*.+/51	*.+/53	*.+5--	*.+5/0	*.+5/3
.1+01	*-+4.-	*-+644	*.+.11	*.+/0.	*.+/00	*.+414	*.+44-	*.+440
.1+03	*-+4.-	*-+643	*.+.11	*.+/0-	*.+/0/	*.+413	*.+44-	*.+44/
.2+1/	*-+346	*-+612	*.+..0	*.+.66	*.+/-.	*.+4.2	*.+406	*.+41.
.3+64	*-+304	*-+6-1	*.+-4.	*.+.25	*.+.26	*.+340	*.+364	*.+34-
.6+35	*-+240	*-+51-	*.+--4	*.+-60	*.+-62	*.+3-6	*.+300	*.+302
/0+4/	*-+16/	*-+425	-+6/3	*.+-./	*.+-.1	*.+2/5	*.+22.	*.+221
/1+/-	*-+150	*-+42-	-+6.4	*.+--1	*.+--2	*.+2.6	*.+210	*.+213
/1+22	*-+144	*-+410	-+6..	*-+664	-+666	*.+2.0	*.+204	*.+206
/2+-1	*-+135	*-+402	-+6-/	*-+656	-+66.	*.+2-1	*.+2/5	*.+20.
/4+65	*-+1/-	*-+354	-+521	*-+61.	-+61/	*.+123	*.+15-	*.+150
/5+16	*-+1./	*-+346	-+513	*-+600	-+601	*.+115	*.+14/	*.+142
0-+25	*-+05.	*-+315	-+5.3	*-+6-/	-+6-1	*.+1.5	*.+11.	*.+111
0-+5/	*-+045	*-+312	-+5./	*-+566	-+6--	*.+1.1	*.+105	*.+11.
1-+20	*-+/26	*-+2/3	-+360	*-+45-	-+45.	*.+/62	*.+0.6	*.+0//
13+-.	*-+/-1	*-+14.	-+305	*-+4/2	-+4/3	*.+/1-	*.+/31	*.+/34
2/+2/	*-+.14	*-+1.0	-+25.	*-+334	-+336	*.+.50	*.+/-4	*.+/-6
22+21	*-+.//	*-+056	-+223	*-+310	-+312	*.+.25	*.+.5/	*.+.52
4/+66	*-+--1	*-+/4-	-+105	*-+2/1	-+2/3	*.+-1-	*.+-31	*.+-33
40+3.	-	*-+/34	*-+101	*-+2/-	*-+2//	*.+-03	*.+-3-	*.+-3/
Q:pr j ild u ,^	*5+0/.	*.0+320	*.4+--/	*.5+40-	*.5+432	*/6+-10	*/6+2.6	*/6+24-
v:ild .*. ' *i > *. '.6+2	/+/.0	.+045	.+..1	.+-.1	.+-./	-+33.	-+32-	-+316

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Jifkbu

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2 ﹢ A ﹢ / - / .﹢
3 ﹢ A ﹢ / - / -﹢
4 ﹢