· Point mass

$\mu = a$

so $\hat{a} = \bar{x}$

· Bernoulli

$\mu = p$

so $\hat{p} = \bar{x}$

· Binomial.

$\mu = np, \quad \sigma^2 = np(1-p)$

$np = \frac{sum}{N} \Rightarrow \frac{sum}{N}(1-p) = \sigma^2$

$1-p = \frac{\sigma^2}{\frac{sum}{N}}$

$\hat{p} = 1 - \frac{\sigma^2 \cdot N}{sum}$

$\hat{n} = \frac{sum}{N \cdot \hat{p}}$

· Geometric

$\mu = \frac{1}{p}$

$\hat{p} = \frac{1}{\bar{x}}$

· Possion

$\mu = \lambda$

$\hat{\lambda} = \bar{x}$

· uniform.

$\mu = (a+b)/2 \quad \sigma^2 = (b-a)^2/12.$

$a+b/2 = \bar{x}$

$b = 2\bar{x} - a.$

$(2\bar{x} - a - a)^2/12 = \sigma^2.$

$\hat{a} = \bar{x} - \sqrt{\frac{3\sigma^2}{N}}$

$\hat{b} = \bar{x} + \sqrt{\frac{3\sigma^2}{N}}$

· Normal.

$\mu = \mu. \quad \sigma^2 = \sigma^2.$

$\mu = \bar{x}, \quad \hat{\sigma}^2 = \sigma^2.$

· Exponential.

$\beta = \mu$

$\beta = \bar{x}.$

· Gamma.

$\alpha\beta = \mu \quad \alpha\beta^2 = \sigma^2.$

$\alpha\beta = \bar{x}$

$\bar{x} \cdot \beta = \sigma^2$

$\hat{\beta} = \frac{\sigma^2}{\bar{x}}$

$\alpha = \frac{\bar{x}^2}{\sigma^2}.$

· beta.

$\alpha/(\alpha+\beta) = \mu, \quad \alpha\beta/((\alpha+\beta)^2(\alpha+\beta+1)) = \sigma^2$

$\frac{\alpha}{\alpha+\beta} = \bar{x}$

$\beta = \alpha \cdot \frac{1-\bar{x}}{\bar{x}} \quad \cdots ①$

$\alpha\beta/((\alpha+\beta)^2(\alpha+\beta+1)) = \sigma^2 \quad \cdots ②.$

Put ① into ② $\Downarrow$.

$\hat{\alpha} = \bar{x}\left(\frac{\bar{x} \cdot (1-\bar{x})}{\sigma^2} - 1\right) \Rightarrow \hat{\beta} = \frac{\hat{\alpha}(1-\bar{x})}{\bar{x}}$

· t v.

$$\frac{v}{v-2} = \frac{\sum_{i=0}^{n} x_i^2}{n} = t$$

$$\hat{v} = \frac{2t}{(1-t)}$$

· chisq.

$p = \mu$.

$\hat{p} = \bar{x}$

· multinomial.

same way as normal

get each the $\hat{u}$, $\hat{\sigma}^2$

and combine.

· Multivariate Normal,

$\mu = \mu$, $V(x) = \Sigma$.

$$\begin{bmatrix} \hat{\mu}_0 \\ \vdots \\ \hat{\mu}_n \end{bmatrix} = \begin{bmatrix} \bar{x}_0 \\ \vdots \\ \bar{x}_n \end{bmatrix}$$

$\hat{V}(x) = \mathrm{cov}(X)$