[130111]

DERIVE BAYES INFERENCE

$$LLH(x) * Prior(x) = \left(\frac{1}{\sigma_{LLH}\sqrt{2\pi}} \cdot \frac{1}{\sigma_p\sqrt{2\pi}}\right) \cdot e^{-\frac{1}{2}\left(\frac{x-\mu_{LLH}}{\sigma_{LLH}}\right)^2} \cdot e^{-\frac{1}{2}\left(\frac{x-\mu_p}{\sigma_p}\right)^2}$$

$$\rightarrow \cdot\, e^{-\frac{1}{2}\left(\frac{x}{\sigma_p}\right)^2} \quad \text{if } \mu_p = 0$$

$$\rightarrow \frac{1}{2\pi \cdot \sigma_{LLH} \cdot \sigma_p} \cdot \ldots$$

$*$ as $\exp(x) \cdot \exp(y) = \exp(x+y)$

$$\rightarrow \cdot\, e\left[-\frac{1}{2}\frac{(x-\mu_{LLH})^2}{\sigma_{LLH}^2} - \frac{1}{2}\frac{(x)^2}{\sigma_p^2}\right]$$

$$\rightarrow \frac{1}{2\pi \cdot \sigma_{LLH} \cdot \sigma_p} \cdot e\left[-\frac{(x-\mu_{LLH})^2}{2\sigma_{LLH}^2} - \frac{(x)^2}{2\sigma_p^2}\right]$$

$*(a-b)^2 = a^2 - 2ab + b^2$

$$— \cdot\, e \cdot \left[-\frac{(x^2 - 2 \cdot \mu_{LLH} + \mu_{LLH}^2)}{2\sigma_{LLH}^2} - \frac{x^2}{2\sigma_p^2}\right]$$

$$— \cdot\, e\left[\frac{-x^2 + 2 \cdot \mu_{LLH} - \mu_{LLH}^2}{2\sigma_{LLH}^2} - \frac{x^2}{2\sigma_p^2}\right]$$

$$— \cdot\, e^{\frac{-2\cancel{\sigma_p^2} \cdot x^2 + 4\cancel{\sigma_p^2} \cdot \mu_{LLH} - 2\cancel{\sigma_p^2} \cdot \mu_{LLH}^2 - 2\sigma_{LLH}^2 \cdot x^2}{4\sigma_{LLH}^2 \cdot \cancel{\sigma_p^2}}}$$

$$\cdot \frac{1}{2\pi \cdot \sigma_{LLH} \cdot \sigma_p} \cdot e^{\frac{-(2 \cdot x^2) + 4\mu_{LLH} - 2\mu_{LLH}^2 - (2x^2) \cdot \frac{\sigma_{LLH}^2}{\sigma_p^2}}{4 \cdot \sigma_{LLH}^2}}$$

36 ?

14h

GENERAL

if $\mu_p \neq 0$

$$\mu_{post} = \mu_L \cdot \frac{c^2 + \left(\frac{\sigma}{\sigma_p}\right)^2 \cdot \frac{\mu_p}{\mu_L}}{\left(\frac{\sigma}{\sigma_p}\right)^2 + c^2}$$

$\boxed{\text{if } \mu_p = 0}$, $\mu_L \cdot \frac{c^2}{c^2 + \left(\frac{\sigma}{\sigma_p}\right)^2}$

$$\rightarrow \mu_L \cdot \frac{c^2}{k^2 + c^2} = \mu_{post}$$

OK

$$\mu_{post} = \frac{\frac{\mu_L}{2\sigma_L^2} + \frac{\mu_p}{2\sigma_p^2}}{\frac{1}{2\sigma_L^2} + \frac{1}{2\sigma_p^2}}$$

$\sigma = cte.$

$\mu_L = v_{real}$

$k = \frac{\sigma}{\sigma_{prior}}$

$$\rightarrow \frac{\frac{\mu_L}{\left(\frac{\sigma}{c}\right)^2} + \frac{\mu_p}{\sigma_p^2}}{\frac{1}{\left(\frac{\sigma}{c}\right)^2} + \frac{1}{\sigma_p^2}} = \frac{\frac{\mu_L}{\frac{\sigma^2}{c^2}} + \frac{\mu_p}{\sigma_p^2}}{\frac{1}{\frac{\sigma^2}{c^2}} + \frac{1}{\sigma_p^2}} = \frac{\left(\frac{1}{\frac{\sigma^2}{c^2}}\right) \cdot \mu_L + \frac{\mu_p}{\sigma_p^2}}{\left(\frac{1}{\frac{\sigma^2}{c^2}}\right) \cdot 1 + \frac{1}{\sigma_p^2}}$$

$$\rightarrow \frac{\mu_L + \frac{\mu_p \cdot \left(\frac{\sigma^2}{c^2}\right)}{\sigma_p^2}}{1 + \frac{\left(\frac{\sigma^2}{c^2}\right)}{\sigma_p^2}} = \mu_L \cdot \frac{1 + \frac{\frac{\mu_p}{\mu_L} \cdot \left(\frac{\sigma^2}{c^2}\right)}{\sigma_p^2}}{1 + \frac{\left(\frac{\sigma^2}{c^2}\right)}{\sigma_p^2}} = \mu_L \cdot \frac{1 + \left(\frac{\sigma}{\sigma_p}\right)^2 \times \frac{1}{C^2}}{1 + \left(\frac{\sigma}{\sigma_p}\right)^2 \times \frac{1}{c^2}}$$