data
fecha

$y_e = \alpha x_i + \beta \;\therefore\; e_i = y_i - (\alpha x_i + \beta)$

$e_i = y_i - \alpha x_i - \beta$ = total ERROR = $\sum_i e_i^2$

total error = $\sum_i (y_i - \alpha x_i - \beta)^2 \Rightarrow$

$\underset{\alpha,\beta}{\arg\min} \sum_i (y_i - \alpha x_i - \beta)^2 \Rightarrow S(\alpha,\beta) = \sum_i (y_i - \alpha$

$\frac{\partial S(\alpha,\beta)}{\partial \beta} \Rightarrow \frac{\partial \sum_i (y_i - \alpha x_i - \beta)^2}{\partial e} = \frac{\partial S}{\partial x} \cdot \frac{\partial x}{\partial \beta}$

$\sum 2(y_i - \alpha x_i - \beta)\cdot(-1) = \sum (y_i - \alpha x_i - \beta) = 0$

$\times \frac{1}{-2n} \Rightarrow -\frac{2}{2n}\sum y_i + \sum_i y_i - \sum_i \alpha x_i - \sum_i \beta = 0$

$\div n \Rightarrow \bar{y} - \alpha \bar{x} - \beta = 0 \Rightarrow \boxed{\beta = \bar{y} - \alpha \bar{x}}$

$e_i = y_i - \alpha x_i - \beta$ = total ERROR = $\sum_i e_i^2$

total error = $\sum_i (y_i - \alpha x_i - \beta)^2 \Rightarrow$

$\underset{\alpha,\beta}{\operatorname{argmin}} \sum_i (y_i - \alpha x_i - \beta)^2 \Rightarrow S(\alpha,\beta) = \sum_i (y_i - \alpha x_i - e)$

$\frac{\partial S(\alpha,\beta)}{\partial \beta} \Rightarrow \frac{\partial \sum_i (y_i - \alpha x_i - \beta)^2}{\partial e} = \frac{\partial S}{\partial x} \cdot \frac{\partial x}{\partial \beta}$ (x)

$\sum 2(y_i - \alpha x_i - \beta) \cdot (-1) = \sum (y_i - \alpha x_i - \beta) = 0$ $\quad / -2$

$\times \frac{1}{-2n} \Rightarrow -\frac{x}{2n}\sum y_i + \sum_i y_i - \sum_i \alpha x_i - \sum_i \beta = 0$

$\div n \Rightarrow \bar{y} - \alpha \bar{x} - \beta = 0 \Rightarrow \boxed{\beta = \bar{y} - \alpha \bar{x}}$

$\frac{\partial S(\alpha,\beta)}{\partial \alpha} = \frac{\partial \sum_i^n (y_i - \alpha x_i - \beta)^2}{\partial \alpha} = \frac{\partial S}{\partial x}\frac{\partial x}{\partial \alpha} \Rightarrow$ (x)

$\sum_i^n 2(y_i - \alpha x_i - \beta) \cdot (+x_i) = 0 \quad \div -2$

$\sum_i^n x_i (y_i - \alpha x_i - \bar{y} + \alpha \bar{x}) = 0$

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$$\sum_i^n x_i \left(y_i - \bar{y} + \alpha(\bar{x} - x_i) \right) = 0$$

$$\sum_i^n x_i (y_i - \bar{y}) + \alpha \cdot \sum x_i (\bar{x} - x_i) = 0$$

$$\alpha \sum_i^n x_i (\bar{x} - x_i) = \sum_i^n x_i (\bar{y} - y_i) \quad x(-1)$$

$$\alpha = \frac{\sum_i^n x_i (y_i - \bar{y})}{\sum_i^n x_i (x_i - \bar{x})}$$