$$ax_i + b$$
의 평균과 분산 (Mean and Variance of $ax_i + b$)

x_i	f_i	$x_i f_i$
x_1	f_1	x_1f_1
:	:	:
x_n	f_n	$x_n f_n$

x_i	f_i	$x_i f_i$
x_1	f_1	x_1f_1
:	:	:
x_n	f_n	$x_n f_n$

$$f_1+f_2+f_3+\cdots+f_n$$

x_i	f_i	$x_i f_i$
x_1	f_1	x_1f_1
:	:	:
x_n	f_n	$x_n f_n$

$$f_1 + f_2 + f_3 + \dots + f_n = \sum_{i=1}^n f_i$$

x_i	f_i	$x_i f_i$
x_1	f_1	x_1f_1
:	:	:
x_n	f_n	$x_n f_n$

$$f_1 = f_1 - f_2 + f_3 + \dots + f_n = \sum_{i=1}^n f_i = N$$

▶ Start ▶ End

x_i	f_i	$x_i f_i$
x_1	f_1	x_1f_1
:	:	:
x_n	f_n	$x_n f_n$

$$\left. egin{array}{c} rac{f_i}{f_1} \\ \vdots \\ f_n \end{array}
ight] f_1 + f_2 + f_3 + \cdots + f_n = \sum_{i=1}^n f_i = N$$

▶ Start ▶ End

x_i	f_i	$x_i f_i$
x_1	f_1	x_1f_1
:	:	:
x_n	f_n	$x_n f_n$

$$\begin{array}{c} \frac{if_i}{f_1} \\ \vdots \\ if_n \end{array} \qquad f_1 + f_2 + f_3 + \dots + f_n = \sum_{i=1}^n f_i = N$$

• Mean m' of $ax_i + b$

m'

▶ Start ▶ End

x_i	f_i	$x_i f_i$
x_1	f_1	x_1f_1
	:	:
x_n	f_n	$x_n f_n$

$$f_1 + f_2 + f_3 + \dots + f_n = \sum_{i=1}^n f_i = N$$

$$m' = \frac{\sum_{i=1}^{n} (ax_i + b)f_i}{\sum_{i=1}^{n} f_i}$$

▶ Start ▶ End

x_i	f_i	$x_i f_i$	
<i>x</i> ₁ :	f_1 :	x_1f_1 \vdots x_nf_n	$f_1 + f_2 + f_3 + \cdots + f_n = \sum_{i=1}^n f_i = N$
x_n	f_n	$x_n f_n$	<i>i</i> =1

$$m' = \frac{\sum_{i=1}^{n} (ax_i + b)f_i}{\sum_{i=1}^{n} f_i} = \frac{a\sum_{i=1}^{n} x_i f_i + b\sum_{i=1}^{n} f_i}{\sum_{i=1}^{n} f_i}$$

▶ Start ▶ End

x_i	f_i	$x_i f_i$
x_1	f_1	x_1f_1
•	:	:
x_n	f_n	$x_n f_n$

$$f_1 + f_2 + f_3 + \dots + f_n = \sum_{i=1}^n f_i = N$$

$$m' = \frac{\sum_{i=1}^{n} (ax_i + b)f_i}{\sum_{i=1}^{n} f_i} = \frac{a\sum_{i=1}^{n} x_i f_i + b\sum_{i=1}^{n} f_i}{\sum_{i=1}^{n} f_i} = a \times \frac{\sum_{i=1}^{n} x_i f_i}{\sum_{i=1}^{n} f_i}$$

▶ Start ▶ End

$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		x_i x_1 \vdots x_n	f_i f_1 \vdots f_n	$x_i f_i$ $x_1 f_1$ \vdots $x_n f_n$	$f_1 + f_2 + f_3 + \cdots + f_n = \sum_{i=1}^n f_i = N$
---	--	----------------------------	----------------------------	--	---

$$m' = \frac{\sum_{i=1}^{n} (ax_i + b)f_i}{\sum_{i=1}^{n} f_i} = \frac{a \sum_{i=1}^{n} x_i f_i + b \sum_{i=1}^{n} f_i}{\sum_{i=1}^{n} f_i} = a \times \frac{\sum_{i=1}^{n} x_i f_i}{\sum_{i=1}^{n} f_i} + b$$

▶ Start ▶ End

x_i	f_i	$x_i f_i$
x_1	f_1	x_1f_1
:	:	:
x_n	f_n	$x_n f_n$

$$f_1 + f_2 + f_3 + \dots + f_n = \sum_{i=1}^n f_i = N$$

$$m' = \frac{\sum_{i=1}^{n} (ax_i + b)f_i}{\sum_{i=1}^{n} f_i} = \frac{a\sum_{i=1}^{n} x_i f_i + b\sum_{i=1}^{n} f_i}{\sum_{i=1}^{n} f_i} = a \times \frac{\sum_{i=1}^{n} x_i f_i}{\sum_{i=1}^{n} f_i} + b = am + b$$

▶ Start ▶ End

x_i	f_i	$x_i f_i$
x_1	f_1	x_1f_1
:	:	:
x_n	f_n	$x_n f_n$

$$f_1 + f_2 + f_3 + \dots + f_n = \sum_{i=1}^n f_i = N$$

• Mean m' of $ax_i + b$

$$m' = \frac{\sum_{i=1}^{n} (ax_i + b)f_i}{\sum_{i=1}^{n} f_i} = \frac{a \sum_{i=1}^{n} x_i f_i + b \sum_{i=1}^{n} f_i}{\sum_{i=1}^{n} f_i} = a \times \frac{\sum_{i=1}^{n} x_i f_i}{\sum_{i=1}^{n} f_i} + b = am + b$$

▶ Start ▶ End

x_i	f_i	$x_i f_i$
x_1	f_1	x_1f_1
:	:	:
x_n	f_n	$x_n f_n$

$$f_1 + f_2 + f_3 + \cdots + f_n = \sum_{i=1}^n f_i = N$$

• Mean m' of $ax_i + b$

$$m' = \frac{\sum_{i=1}^{n} (ax_i + b)f_i}{\sum_{i=1}^{n} f_i} = \frac{a\sum_{i=1}^{n} x_i f_i + b\sum_{i=1}^{n} f_i}{\sum_{i=1}^{n} f_i} = a \times \frac{\sum_{i=1}^{n} x_i f_i}{\sum_{i=1}^{n} f_i} + b = am + b$$

$$\sigma'^2$$

▶ Start ▶ End

x_i	f_i	$x_i f_i$
x_1	f_1	x_1f_1
:	:	:
x_n	f_n	$x_n f_n$

$$f_1 + f_2 + f_3 + \dots + f_n = \sum_{i=1}^n f_i = N$$

• Mean m' of $ax_i + b$

$$m' = \frac{\sum_{i=1}^{n} (ax_i + b)f_i}{\sum_{i=1}^{n} f_i} = \frac{a\sum_{i=1}^{n} x_i f_i + b\sum_{i=1}^{n} f_i}{\sum_{i=1}^{n} f_i} = a \times \frac{\sum_{i=1}^{n} x_i f_i}{\sum_{i=1}^{n} f_i} + b = am + b$$

$$\sigma'^{2} = \frac{\sum_{i=1}^{n} \{(ax_{i} + b) - (am + b)\}^{2} f_{i}}{\sum_{i=1}^{n} f_{i}}$$

▶ Start ▶ End

x_i	f_i	$x_i f_i$	
x_1	f_1	x_1f_1	
:	:	:	
x_n	f_n	$x_n f_n$	

$$f_1 + f_2 + f_3 + \dots + f_n = \sum_{i=1}^n f_i = N$$

• Mean m' of $ax_i + b$

$$m' = \frac{\sum_{i=1}^{n} (ax_i + b)f_i}{\sum_{i=1}^{n} f_i} = \frac{a\sum_{i=1}^{n} x_i f_i + b\sum_{i=1}^{n} f_i}{\sum_{i=1}^{n} f_i} = a \times \frac{\sum_{i=1}^{n} x_i f_i}{\sum_{i=1}^{n} f_i} + b = am + b$$

$$\sigma'^{2} = \frac{\sum_{i=1}^{n} \{(ax_{i} + b) - (am + b)\}^{2} f_{i}}{\sum_{i=1}^{n} f_{i}} = a^{2}$$

→ Start → End

x_i	f_i	$x_i f_i$
x_1	f_1	x_1f_1
:	:	:
x_n	f_n	$x_n f_n$

$$f_1 + f_2 + f_3 + \dots + f_n = \sum_{i=1}^n f_i = N$$

• Mean m' of $ax_i + b$

$$m' = \frac{\sum_{i=1}^{n} (ax_i + b)f_i}{\sum_{i=1}^{n} f_i} = \frac{a\sum_{i=1}^{n} x_i f_i + b\sum_{i=1}^{n} f_i}{\sum_{i=1}^{n} f_i} = a \times \frac{\sum_{i=1}^{n} x_i f_i}{\sum_{i=1}^{n} f_i} + b = am + b$$

$$\sigma'^{2} = \frac{\sum_{i=1}^{n} \{(ax_{i} + b) - (am + b)\}^{2} f_{i}}{\sum_{i=1}^{n} f_{i}} = a^{2} \times \frac{\sum_{i=1}^{n} (x_{i} - m)^{2} f_{i}}{\sum_{i=1}^{n} f_{i}}$$

→ Start → End

x_i	f_i	$x_i f_i$
x_1	f_1	x_1f_1
:	:	:
x_n	f_n	$x_n f_n$

$$f_1 + f_2 + f_3 + \dots + f_n = \sum_{i=1}^n f_i = N$$

• Mean m' of $ax_i + b$

$$m' = \frac{\sum_{i=1}^{n} (ax_i + b)f_i}{\sum_{i=1}^{n} f_i} = \frac{a\sum_{i=1}^{n} x_i f_i + b\sum_{i=1}^{n} f_i}{\sum_{i=1}^{n} f_i} = a \times \frac{\sum_{i=1}^{n} x_i f_i}{\sum_{i=1}^{n} f_i} + b = am + b$$

$$\sigma'^{2} = \frac{\sum_{i=1}^{n} \{(ax_{i} + b) - (am + b)\}^{2} f_{i}}{\sum_{i=1}^{n} f_{i}} = a^{2} \times \frac{\sum_{i=1}^{n} (x_{i} - m)^{2} f_{i}}{\sum_{i=1}^{n} f_{i}} = a^{2} \sigma^{2}$$

→ Start → End

x_i	f_i	$x_i f_i$
x_1	f_1	x_1f_1
:	:	:
x_n	f_n	$x_n f_n$

$$f_1 + f_2 + f_3 + \dots + f_n = \sum_{i=1}^n f_i = N$$

• Mean m' of $ax_i + b$

$$m' = \frac{\sum_{i=1}^{n} (ax_i + b)f_i}{\sum_{i=1}^{n} f_i} = \frac{a\sum_{i=1}^{n} x_i f_i + b\sum_{i=1}^{n} f_i}{\sum_{i=1}^{n} f_i} = a \times \frac{\sum_{i=1}^{n} x_i f_i}{\sum_{i=1}^{n} f_i} + b = am + b$$

$$\sigma'^{2} = \frac{\sum_{i=1}^{n} \{(ax_{i} + b) - (am + b)\}^{2} f_{i}}{\sum_{i=1}^{n} f_{i}} = a^{2} \times \frac{\sum_{i=1}^{n} (x_{i} - m)^{2} f_{i}}{\sum_{i=1}^{n} f_{i}} = a^{2} \sigma^{2}$$

Github:

https://min7014.github.io/math20230528001.html

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