$x_1, x_2, x_3, \cdots, x_n$의 평균, 분산, 표준편차

(Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \cdots, x_n$)

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \cdots, x_n$

Start End

Start End

$x_1, x_2, x_3, \cdots, x_n$

Start End

$x_1, x_2, x_3, \cdots, x_n$

Mean :

Start End

$x_1, x_2, x_3, \cdots, x_n$

Mean : m

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\text{Mean} : m = \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n}$$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned} \text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\ &= \frac{1}{n}\sum_{i=1}^{n} x_i \end{aligned}$$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned} \text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\ &= \frac{1}{n}\sum_{i=1}^{n} x_i \end{aligned}$$

Variance :

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned} \text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\ &= \frac{1}{n}\sum_{i=1}^{n} x_i \end{aligned}$$

Variance : σ^2

Mean, Variance, Standard Deviation of $x_1, x_2, x_3, \cdots, x_n$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned} \text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\ &= \frac{1}{n}\sum_{i=1}^{n} x_i \end{aligned}$$

$$\text{Variance} : \sigma^2 = \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n}$$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\text{Mean} : m = \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

$$\text{Variance} : \sigma^2 = \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} = \frac{1}{n}\sum_{i=1}^{n} (x_i - m)^2$$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned}
\text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i
\end{aligned}$$

$$\begin{aligned}
\text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2)
\end{aligned}$$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned}\text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\ &= \frac{1}{n}\sum_{i=1}^{n} x_i\end{aligned}$$

$$\begin{aligned}\text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\ &= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n}\sum_{i=1}^{n} x_i^2\end{aligned}$$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned} \text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\ &= \frac{1}{n}\sum_{i=1}^{n} x_i \end{aligned}$$

$$\begin{aligned} \text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\ &= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2) \\ &= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \end{aligned}$$

▸ Start ▸ End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned}
\text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i
\end{aligned}$$

$$\begin{aligned}
\text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2) \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times \frac{1}{n}\sum_{i=1}^{n} x_i
\end{aligned}$$

▸ Start ▸ End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned}
\text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i
\end{aligned}$$

$$\begin{aligned}
\text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2) \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times \frac{1}{n}\sum_{i=1}^{n} x_i + m^2
\end{aligned}$$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned}
\text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i
\end{aligned}$$

$$\begin{aligned}
\text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2) \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times \frac{1}{n}\sum_{i=1}^{n} x_i + m^2 \times \frac{1}{n}\sum_{i=1}^{n} 1
\end{aligned}$$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned}
\text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i
\end{aligned}$$

$$\begin{aligned}
\text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2) \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times \frac{1}{n}\sum_{i=1}^{n} x_i + m^2 \times \frac{1}{n}\sum_{i=1}^{n} 1 \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2
\end{aligned}$$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned}
\text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i
\end{aligned}$$

$$\begin{aligned}
\text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2) \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times \frac{1}{n}\sum_{i=1}^{n} x_i + m^2 \times \frac{1}{n}\sum_{i=1}^{n} 1 \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m
\end{aligned}$$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned}
\text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i
\end{aligned}$$

$$\begin{aligned}
\text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2) \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times \frac{1}{n}\sum_{i=1}^{n} x_i + m^2 \times \frac{1}{n}\sum_{i=1}^{n} 1 \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times m
\end{aligned}$$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned}
\text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i
\end{aligned}$$

$$\begin{aligned}
\text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2) \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times \frac{1}{n}\sum_{i=1}^{n} x_i + m^2 \times \frac{1}{n}\sum_{i=1}^{n} 1 \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times m + m^2
\end{aligned}$$

▸ Start ▸ End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned}
\text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i
\end{aligned}$$

$$\begin{aligned}
\text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2) \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times \frac{1}{n}\sum_{i=1}^{n} x_i + m^2 \times \frac{1}{n}\sum_{i=1}^{n} 1 \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times m + m^2 \times \frac{1}{n} \times n
\end{aligned}$$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned}
\text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i
\end{aligned}$$

$$\begin{aligned}
\text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2) \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times \frac{1}{n}\sum_{i=1}^{n} x_i + m^2 \times \frac{1}{n}\sum_{i=1}^{n} 1 \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times m + m^2 \times \frac{1}{n} \times n \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2
\end{aligned}$$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned}
\text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i \\
\text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2) \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times \frac{1}{n}\sum_{i=1}^{n} x_i + m^2 \times \frac{1}{n}\sum_{i=1}^{n} 1 \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times m + m^2 \times \frac{1}{n} \times n \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m^2 +
\end{aligned}$$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned}
\text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i \\
\text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2) \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times \frac{1}{n}\sum_{i=1}^{n} x_i + m^2 \times \frac{1}{n}\sum_{i=1}^{n} 1 \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times m + m^2 \times \frac{1}{n} \times n \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m^2 + m^2
\end{aligned}$$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned}
\text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i
\end{aligned}$$

$$\begin{aligned}
\text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2) \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times \frac{1}{n}\sum_{i=1}^{n} x_i + m^2 \times \frac{1}{n}\sum_{i=1}^{n} 1 \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times m + m^2 \times \frac{1}{n} \times n \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m^2 + m^2 = \frac{1}{n}\sum_{i=1}^{n} x_i^2
\end{aligned}$$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned}
\text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i
\end{aligned}$$

$$\begin{aligned}
\text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2) \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times \frac{1}{n}\sum_{i=1}^{n} x_i + m^2 \times \frac{1}{n}\sum_{i=1}^{n} 1 \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times m + m^2 \times \frac{1}{n} \times n \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m^2 + m^2 = \frac{1}{n}\sum_{i=1}^{n} x_i^2 - m^2
\end{aligned}$$

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned}
\text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i
\end{aligned}$$

$$\begin{aligned}
\text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2) \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times \frac{1}{n}\sum_{i=1}^{n} x_i + m^2 \times \frac{1}{n}\sum_{i=1}^{n} 1 \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times m + m^2 \times \frac{1}{n} \times n \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m^2 + m^2 = \frac{1}{n}\sum_{i=1}^{n} x_i^2 - m^2
\end{aligned}$$

Standard Deviation

Start End

$x_1, x_2, x_3, \cdots, x_n$

$$\begin{aligned}
\text{Mean} : m &= \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i
\end{aligned}$$

$$\begin{aligned}
\text{Variance} : \sigma^2 &= \frac{(x_1 - m)^2 + (x_2 - m)^2 + \cdots + (x_n - m)^2}{n} \\
&= \frac{1}{n}\sum_{i=1}^{n}(x_i - m)^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i^2 - 2mx_i + m^2) \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times \frac{1}{n}\sum_{i=1}^{n} x_i + m^2 \times \frac{1}{n}\sum_{i=1}^{n} 1 \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m \times m + m^2 \times \frac{1}{n} \times n \\
&= \frac{1}{n}\sum_{i=1}^{n} x_i^2 - 2m^2 + m^2 = \frac{1}{n}\sum_{i=1}^{n} x_i^2 - m^2
\end{aligned}$$

Standard Deviation : $\sigma = \sqrt{\sigma^2}$

Github:
https://min7014.github.io/math20230517001.html

Click or paste URL into the URL search bar, and you can see a picture moving.