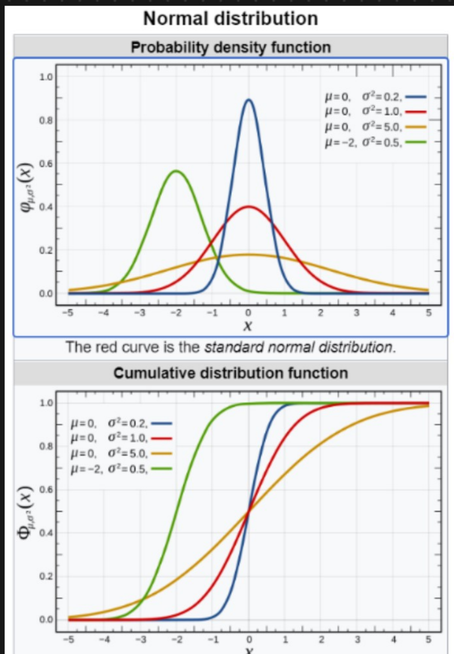
Normal/Gaussian Distribution

In probability theory and statistics, a normal distribution or Gaussian distribution is a type of continuous probability distribution for a real-valued random variable



The red curve is the *standard normal distribution.*

① Continuous random variable (pdf)

$X = \{ - - - - . \}$

$\sigma^2 \uparrow\uparrow$

Spread $\uparrow\uparrow$

→ Bell Curve

⇒ Symmetric distribution

$\boxed{\mu = \text{median} = \text{mode}}$ (mean = median = mode)

Eg ÷ Weights of students in a class {Doctors}

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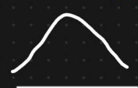
IRIS DATASET → Petal length, Sepal length



⇓ Petal Width Sepal width

Researchers

Notation $N(\mu, \sigma^2)$

Parameters ÷ $\mu \in R$ = mean (R means Reak nos)

$\sigma^2 \in R > 0$ = Variance

$x \in R$.

$$\boxed{\text{PDF} = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x_i - \mu}{\sigma}\right)^2}}$$

Mean of Normal/Gaussian

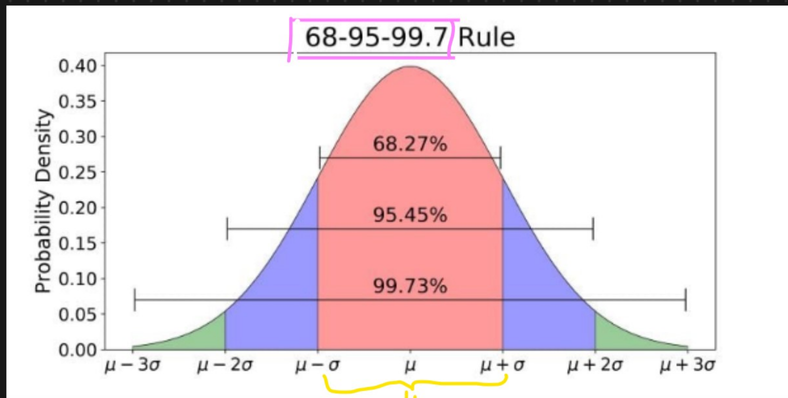
$$\mu = \sum_{i=1}^{n} \frac{x_i}{n}$$

Variance

$$\sigma^2 = \sum_{i=1}^{n} \frac{(x_i - \mu)^2}{n}$$

$$\sigma = \sqrt{\text{Variance}}$$

Emperical Rule of Normal / Gaussian Distribution



to check weather it follows the normal distribution we do it by :

QQ plot

$X = \{ - \quad - \quad - \quad - \quad - \quad - \ldots - - - \}$ follows the : $\Rightarrow$ Normal / Gaussian Distribution

Probability

probability

$$Pr(\mu - \sigma \leq X \leq \mu + \sigma) \approx 68\%$$

$$Pr(\mu - 2\sigma \leq X \leq \mu + 2\sigma) \approx 95\%$$

$$Pr(\mu - 3\sigma \leq X \leq \mu + 3\sigma) \approx 99.7\%$$