21/01/25

Day 3

(Advanced → Intermediate section)

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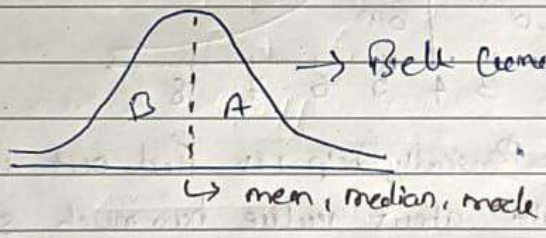
* Agenda :-

1. Distribution
   - ↳ Normal Distri
   - ↳ Standard Normal Distri
   - ↳ Z score
   - ↳ Log Normal Distri
   - ↳ Bernaulli Distri
   - ↳ Binomial Distri
   - ~~↳~~

→ Distribution :-

Ages :- {24, 26, 27, 28, 30, 32 ---------- }

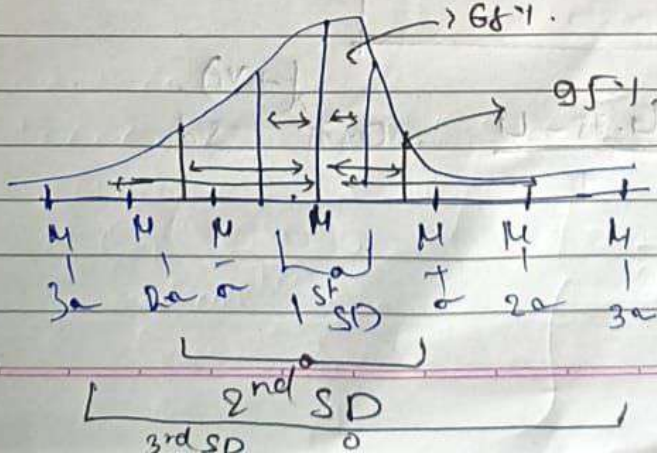
→ Gaussian / Normal Distribution



A = B

B = A

When both side are Equal we say Normal & Gaussian Distribution



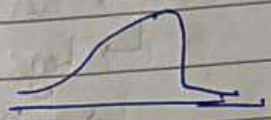
Empirical formula :- 68 - 95 - 99.7 'i. Rule

Eg :-

1. Height → Normal

⇓

Domain Expert → {Doctor}



2. Weight

3. Iris Data Set

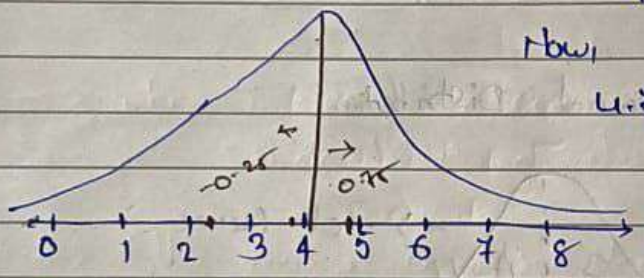
Example :- $\mu = 4$ $\sigma = 1$

4.5 → Standard deviation

4 → +0.5 sd.

Now,

4.75 ??



Z Score :- Basically help us find out whenever I talk about value how much standard deviation away it is from mean

Formula :- $Z\ Score = \frac{x_i - \mu}{\sigma}$

Eg :- $\frac{4.75 - 4}{1} = 0.75$ sd. (+ve)

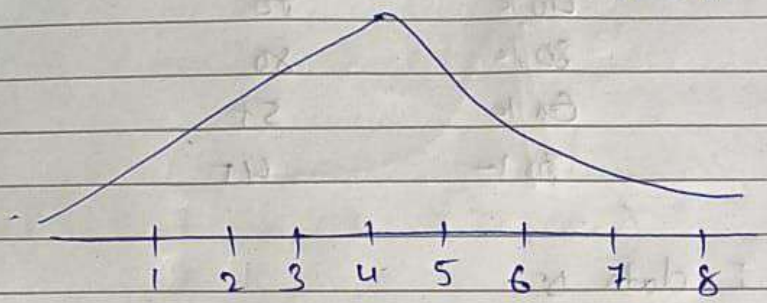
When 3.75?

$$\text{Z-Score} = \frac{3.75 - 4}{1} = -0.25$$

Now,

$\mu = 4$

$\sigma = 1$



Zscore = to every value $\frac{x_i - \mu}{\sigma}$

= Value

when, i apply all value my data look a

$$z(1) = \frac{1-4}{1} = -3$$

$\{-3, -2, -1, 0, 1, 2, 3, 4\}$

$z(2) = 2-4/1 = -2$

$z(3) = 3-4/1 = -1$

$z(4) = 4-4/1 = 0$

$z(5) = 5-4/1 = 1$

$z(6) = 6-4/1 = 2$

$z(7) = 7-4/1 = 3$

$z(8) = 8-4/1 = 4$

My data was

Normal Distribution $\{1, 2, 3, 4, 5, 6, 7\}$

⇓

Z Score (applying)

⇓

$\{-3, -2, -1, 0, 1, 2, 3\}$

⇓

Standard Normal distri

→ Standard Normal distribution $(\mu = 0, \sigma = 1)$

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* Practical Application :-

→ Dataset :-

(units)

→ (years) → (₹) → (kg)

Age	Salary	weight
24	40 k	70
25	80 k	80
26	60 k	55
27	70 k	45

When I data is

$\mu = 0$, $\sigma = 1$

↓↓

(applying) :- Standard Normal dist

→ when i apply zscore it converts Standard normal distribution

→ This process is also known as Standardization

Now,

→ Normalization :- (Min-Max)

↳ (0 to 1)

How do to be normalization

MinMax Scaler → (0 to 1)

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Q Where do we do Normalization ?

In deep learning

CNN → Image classification

Pixels → 0-255 → minmax scaler → 0-1

* Practical Example (Z-score) :-

→ ODI . Cricket score

2021

Score Avg = 250

Standard deviation = 10

Team Avg
Rishab pant final score = 240

2022

Score Avg = 260

Standard deviation = 12

Team Avg
Rishab Pant final score = 245

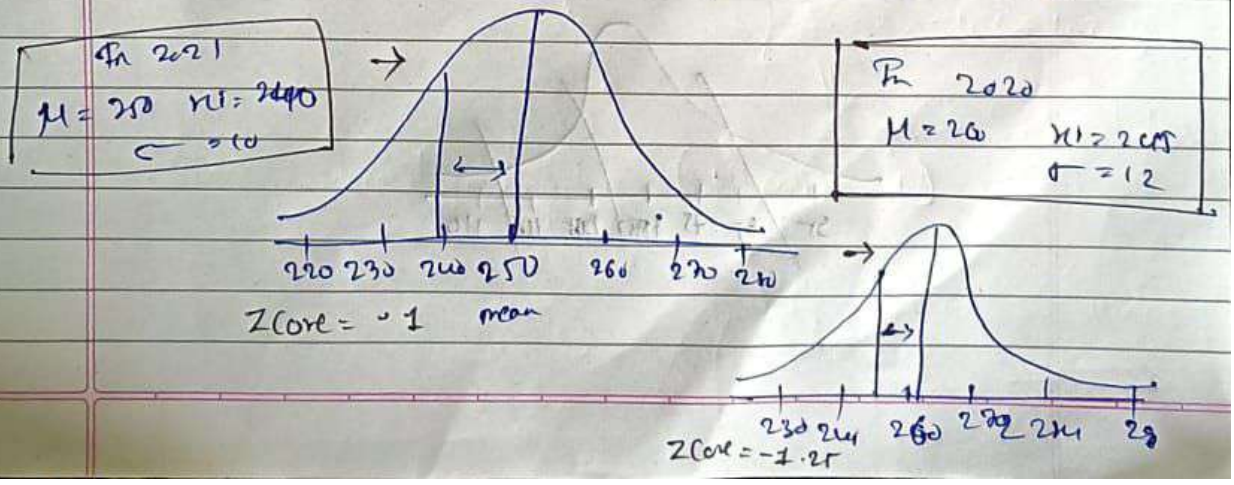
→ Compare to both the scores in which year Rishab pant final score was better ?

→ How we do

Z-score

2020 : $\frac{x_i - \mu}{\sigma} = \frac{240 - 250}{10} = \frac{-10}{10} = -1$

2021 : $\frac{x_i - \mu}{\sigma} = \frac{245 - 260}{12} = \frac{-15}{12} = -1.25$



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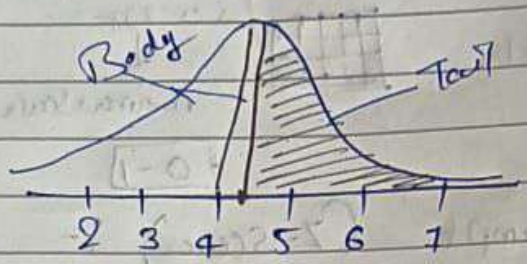
*Stats interview Questions :-

I have x variable



Q. what percentage of scores falls above 4.25 ?

$$z = \frac{x_i - \mu}{\sigma} = \frac{4.25 - 4}{1} = 0.25$$

z score to find area of the body curve

Q) In India the avg IQ is 100, with a Standard deviation = 15
what percentage of the population would you expect to have an IQ lower than 85 ?

$$\Rightarrow \frac{x_i - \mu}{\sigma} \quad \therefore z = \frac{85 - 100}{15} = -1$$