Q3:

$\frac{75}{100} \times 21 = 15.75$ Index $\frac{8+7}{2} = 7.5$

Lower fence $= 3 - 1.5(4.5) = -3.65$

Higher fence $= 7.5 - 1.5(4.5) = 14.25$

So ~~the~~ we have to remove the Data who not ranging between (−3.65 to 14.25)

we remove 27.

[1, 2, 2, 2, 3, 3, 3, 4, 5, 5, 5, 6, 6, 6, 6, 7, 8, 8, 9, $\boxed{27}$]

minimum = 1

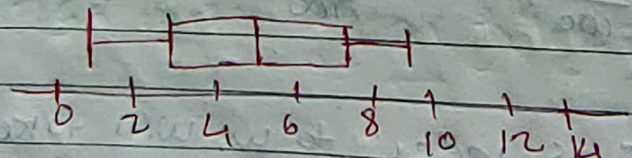
Q1 = 3

median = 5

Q3 = 7.5

max = 9

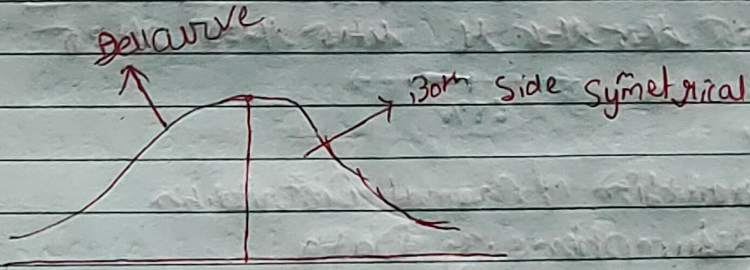
Creating Box plot to treat outliers



Topic

1. Normal Distribution
2. standard Normal distribution
3. Z - score
4. Standardization & Normalization

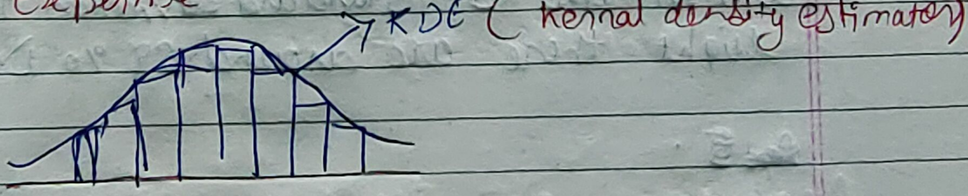
1. Normal Distribution / Gaussian

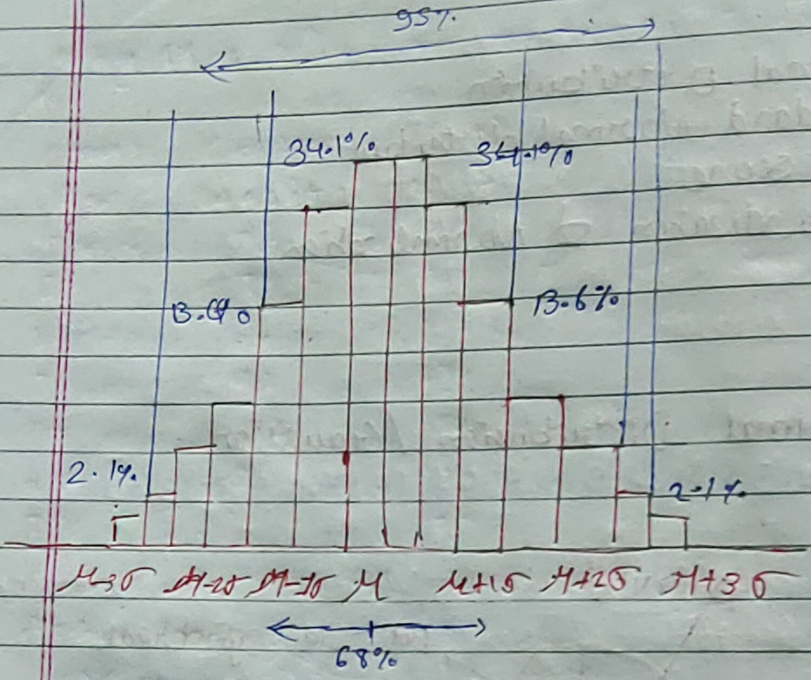


Age, weight, height ⟹ Distribution

↑

Domain Expertise





Gaussian / Normal Distribution
Assumptions of Data

Within the 1st standard deviation to left and right there are around 68 % Data

Age 8.

95% of the Data are falling in 2nd Standard deviation

Emperial Formula: Rule 68 - 95 - 99.7%

Note → $\boxed{\text{Q - Q plot}}$ Distribution is Gaussian or Not?

→ Standard Normal Distribution

$x =$ Gaussian distribution

$y = SND\ (\mu = 0, \sigma = 1)$

$x = (1, 2, 3, 4, 5)$

$\mu = 3 \quad , \sigma = 1.41$

$Z\ score = \dfrac{x_i - \cancel{\ }\mu}{\boxed{\frac{\sigma}{\sqrt{n}}}}$ ⇒ Standard Error use in Inferential (stats

$\boxed{n = 1}$

$x = [1, 2, 3, 4, 5)$

$\mu = 3 \quad \sigma = 1.414$

$y = [-1.414, -0.707, 0, 0.707, 1.414]$

Score $Z = \dfrac{x_i - \mu}{\sigma}$

$= \dfrac{1 - 3}{1.414}$ (-1.414)

$= \dfrac{2 - 3}{1.414} = -0.707$

why dl is 0?

(year) Age	(kg) Weight	(cm) Height
24	72	150
26	78	160
32	84	165
33	92	170
34	87	150
28	83	180
29	80	175

Machine learning

↓

Algorithm → Matheamatical Model

mathematical Calculation time

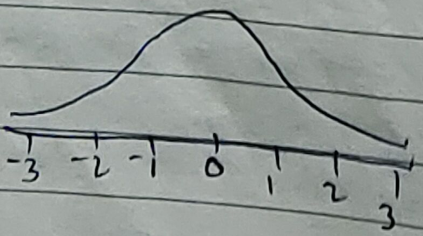
use Z-score formula to convert data into same scale

Normalization ⇒ Standardization [Z-score]

$\mu = 0, \sigma = 1$

$[-3 \leftrightarrow 3]$

99.7%



in normalization we will give the range like
(0 - 1), (0 - 4), (0 - 5)
(lower scale ⟷ Higher scale)

We will do with formula

min max formula [0-1]

$x = 1\,2\,3\,4\,5$

$$x_{scaled} = \frac{x - x_{min}}{x_{max} - x_{min}}$$

$y: [0, 0.25, 0.50, 0.75, 1]$

$$= \frac{1-1}{5-1} = 0$$

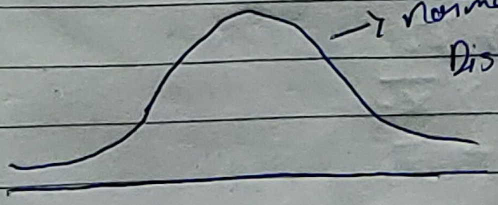
$$= \frac{2-1}{5-1} = \frac{1}{4}$$

$$= \frac{3-1}{5-1} = \frac{2}{4}$$

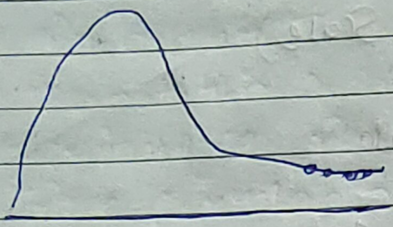
$$= \frac{4-1}{5-1} = \frac{3}{4}$$

we'll apply this in Deep learning

Log Normal Distribution

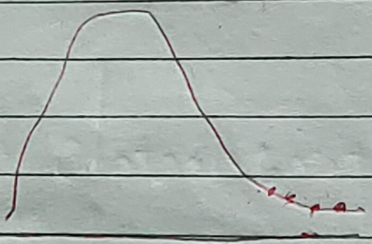


Log Normal Distribution / Right Skewed



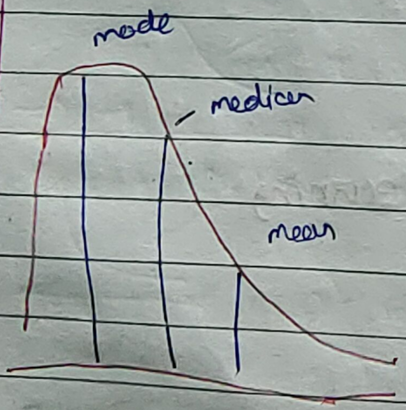
Richer maximum ~~wealth~~ wealth

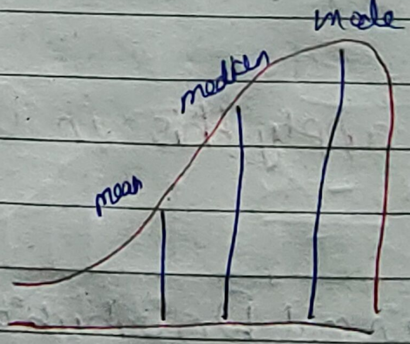
~~Wea~~ wealth Distribution

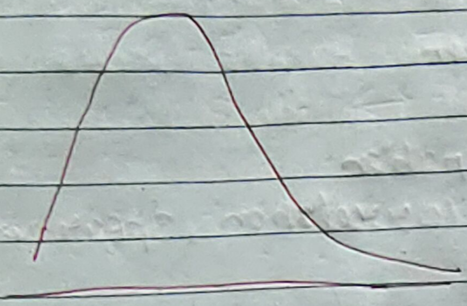


Longer comment

Relation of mean, median, mode



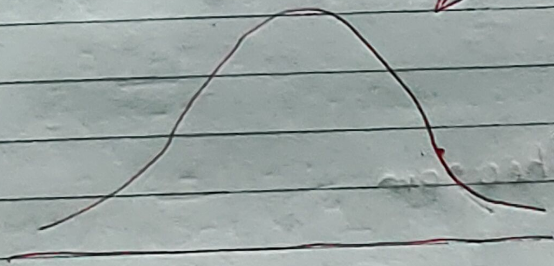




$x =$ Log Normal Distribution

If we apply : $y = \ln(x)$

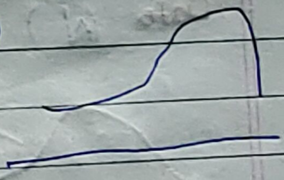
$\Downarrow$



$x = ND(\mu, \sigma)$ $\Rightarrow \exp(x)$

$\downarrow$

y

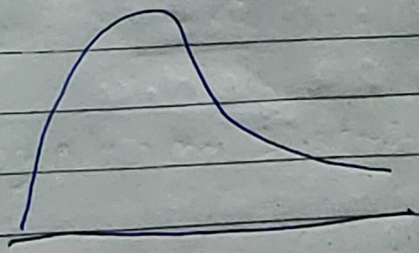


Native log

$\uparrow$

$\log_e$

$= y = \ln(x$



$x =$ log Normal Distribution

(μ, σ)

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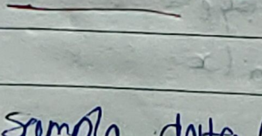
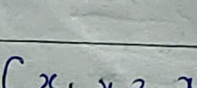
Day 4 - Stats

Topic
1. Central Limit Theorem
2. Probability
3. Permutation and combination
4. Covariance, Pearson correlation, Spearman Rank correlation.
5. Bernoulli distribution
6. Binomial Distribution
7. ~~Bino~~ Power law [Pareto Distribution

→ 1. Central Limit Theorem

Population Data (N)





sample data (n)

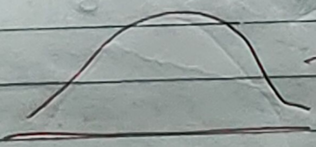
S_1 – $(x_1, x_2, x_3 \cdots x_n) \rightarrow \overline{x_1}$
S_2 – $(x_{11}, x_{12}, x_{13} \cdots x_n) \rightarrow \overline{x_2}$
S_3 – $(x_{20}, x_{22}, x_{23} \cdots x_n) \rightarrow \overline{x_3}$
Calculation mean of Sample data

n = size of sample , m No. of sample
↳ large the value better the result

~~size~~

At any distribution if we probably take M no. of sample and of sample size n
Then

$n \geq 30$ Whenever we take all the sample mean, when we plot this It will follow a gaussian distribution



→ Gaussian Distribution

→ The central limit theoram states that if you have a population with mean μ and standard deviation σ and take sufficiently large random samples from the population with replacement, then the distribution of the sample means will be approximately normally distributed.

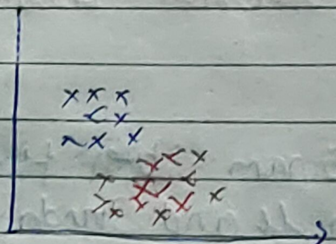
(2) Probability:

Probability is a measure of the likelihood of an event.

Eg: Tossing a fair coin

$P(H) = 0.5$ $\quad$ $P(T) = 0.5$

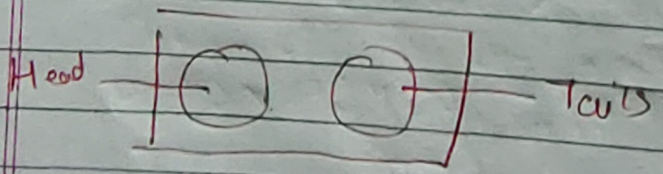
Rolling a Dice : $P(1) = \frac{1}{6}$ $\quad$ $P(2) = \frac{1}{6}$ $\quad$ $P3 = \frac{1}{6}$



(4) Mutual Exclusive Event

→ Two Events are mutually exclusive if they cannot occur at the same time

Ex: (1) Tossing a coin (2) Rolling a dice



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(b) Non Mutual Exclusive Events
-> Two event can occur at the same time

Ex: Picking randomly a card from a deck of cards two events "heart" and "king" can be selected

Addition Rule for mutual exclusive events

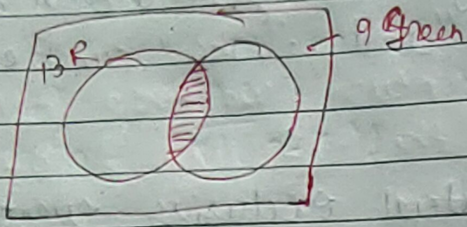
(1.) what is the Probability of coin landing on heads or tails
-> $P(A \text{ or } B) = P(A) + P(B)$
$= \frac{1}{2} + \frac{1}{2} = 1$

(2) What is the probability of getting 1 or 6 or 3 while rolling a dice?
-> $P(1 \text{ or } 6 \text{ or } 3) = P(1) + P(6) + P(3)$
$= \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{1}{2}$

Non mutual Exclusive Events: Addition Rule
Bag of marbles: 10 Red, 6 green, 3 (R & G)

When picking Randomly from Bag of marbles. what is the Probability of choosing a marble that is red or green?

$\rightarrow P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$



$\frac{13}{19} + \frac{9}{19} - \frac{3}{19} = \frac{19}{19} = 1$

→ ~~AAA~~ multiplication Rule

(1) Dependents Events : Two events are dependents if they affect on another

→ a Bag of marble [0000 000]

$P(W) = \frac{4}{7} \rightarrow P(Y) = \frac{3}{6}$

one marble is out

$P(W) \times P(Y/W)$

$= \frac{4}{7} \times \frac{3}{6} = \frac{12}{42} = \frac{2}{7}$

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Independent Events

what's the propability of rolling a '5' and then a '3' with a normal 6 size dice?

$\rightarrow$ $P(1) = \frac{1}{6}$ $P(2) = \frac{1}{6}$ $P(3) = \frac{1}{6}$ $P(4) = \frac{1}{6}$

multiplication Rule for Independent Events

$P(A \text{ and } B) = P(A) * P(B)$

$= \frac{1}{6} \times \frac{1}{6} = \boxed{\frac{1}{36}}$

> permutation :-

School of children

[Dairy milk, kit kat, milky B
Sneakers, Star]

$5 \times 4 \times 3$

= 6 ways = permutation

with permutation order matter.

all the possible arrangement

NPR

n = Total no. of object

r = # of selection

$= \frac{n!}{(n-r)!} = \frac{5!}{[5-3]!}$

$= \frac{5 \times 4 \times 3 \times 2!}{2!} = \boxed{60}$

$\Rightarrow$ Combination

Repeation will not occur

[DM KR MB] unique Combination

[MB KR DM] — x

$$^nC_r = \frac{n!}{r!(n-r)!} = \frac{5!}{3!(2)!}$$

$$= \frac{5\times 4^{2}\times \cancel{3\times 2\times 1}}{\cancel{3!}\times 2}$$

$$\boxed{10}$$

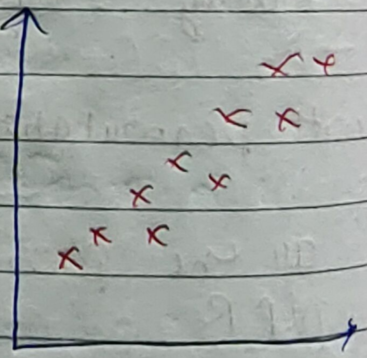
Covariance

Age Weight [Feature Selection]

Age	Weight
12	40
13	45
15	48
17	60
19	62

Age ↑ weight ↑

Age ↓ Weight ↓



Quantify the relationship x & y using mathematical Question

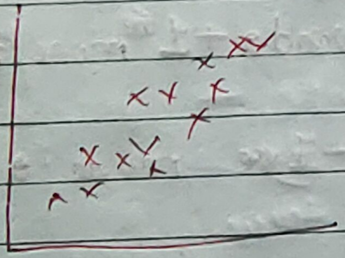
$$Cov(x,y) = \frac{\sum (x_i - \bar{x}) \times (y_i - \bar{y})}{n-1}$$

$$\sigma^2 = \frac{\sum (x_i - \bar{x})^2}{n-1}$$

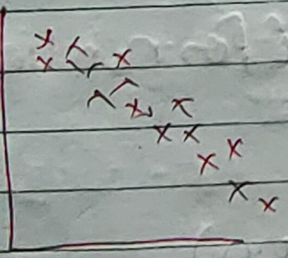
$$\sigma^2 = \frac{\sum (x_i - \bar{x}) \times (x_i - \bar{x})}{n-1}$$

$$\boxed{Cov(x,y) = Var(x}$$

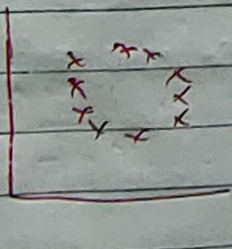
Cov = 0 [No relation between x & y]



→ +ve relation / Cov



⇒ −ve Cov / relation



⇒ No relation.

x	y
10	5
8	4
7	3.2
6	3
7.75	3.8

→ Pearson Correlation Coefficient (−1 to 1)

$$\rho(x,y) = \frac{Cov(x,y)}{\sigma x, \sigma y}$$

more the value ~~towar~~ towards +1 more +ve correlation.
more the value towards −1 more −ve correlation.

→ Spearman Rank correlation (for non linear

$$r_s = \frac{Cov(R(x), R(y))}{\sigma(R(x)) \times \sigma(R(y))}$$

Why this correlation will be used?

x y z → o/p   +ve
               -ve } good

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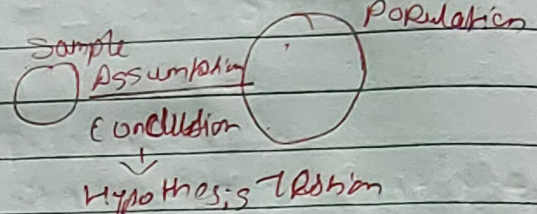
Day - 5 Stats

Inferential Statistics

1) Hypothesis Testing
2) P-Value
3) Confidence Interval
4) Significance value

Z test
t test
Chi Square test
Annova test (F-test)

Inferential Stat



(3) Distribution
(1) Bernoulli
(2) Binomial
(3) Power Law

→ Hypothesis testing :-

Steps of Hypothesis testing:

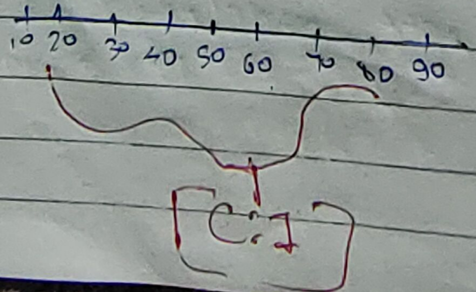
(1) Null Hypothesis: [default one]
Null Hypothesis is always true.

2) Alternate Hypothesis : Opposite one of Null Hypothesis

3) Perform Experiments:

coin toss 100 time
↓ 50 times Head

We define Some range and that is Confidence Interval



C I = [20 - 80]
coin is fair

10 time head (Null Hypothesis is Rejected.

↳ We fail to Reject the Null Hypothesis (within C.I)

↳ we Reject the Null Hypothesis (outside C.I)

(Conclusions)

② Person is Criminal or not (murder case)

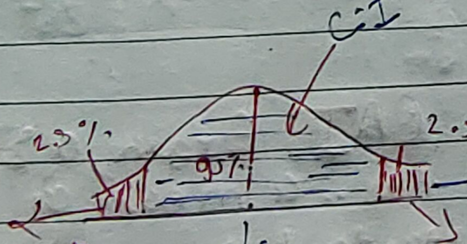
① Null hypothesis :- Person is not Criminal
② ~~Hyp~~ Alternate Hypothesis :- Person is Criminal
③ Experiment / Proof : DNA, weapons, eye witness footage.

Based on Proof we go on conclusions.

→ Confidence Interval :-

Significance Value
1 - 0.95
[5%] or 0.05

95%



→ Reject the Null hypothesis (Alternate Hypothesis win)

Significance value

Significance value

✓ (within the Null hypothesis)