Date :

1. Different Definations of Artificial Intelligence

Artificial Intelligence is a field of Computer Science focused on creating systems or machines that can perform tasks that typically require human intelligence.

Different ways of defining Artificial Intelligence

- Thinking humanly
- Thinking Rationally
- Acting Humanly
- Acting Rationally.

1. Thinking Humanly :

This refers to AI trying to mimic the way human thinks. The goal is to make machine thinks like humans by understanding human cognitive processes.

eg:- Cognitive AI tries to simulate human thought processes.

2. Thinking Rationally :

Thinking Rationally means making decisions based on logic and rules to always reach the correct or best outcome.

eg:- A chess playing AI would think rationally by analysing every possible move and choosing the ones.

3. Acting Humanly :

This focuses on AI behaving like humans. It doesn't matter how the AI gets the result.

eg:- Virtual Assistants like Siri or Alexa are designed to act like humans by understanding natural language.

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4. Acting Rationally :

This means acting in the most logical or optimal way to achieve a goal. AI here is concerned with making the best decisions.

eg : Self-driving Cars act rationally by making optimal decisions to get to the destination safely and efficiently.

Q Foundations of Artificial Intelligence

Artificial Intelligence is built upon several core disciplines and ideas from fields like mathematics, Computer Science, psychology, philosophy, and linguistics.

1. Mathematics :

Mathematics provides the tools and techniques for reasoning, problem Solving and understanding patterns.

- Logic : Used to develop algorithms for decision making and problem Solving.

2. Computer Science :

Computer Science enables the development of algorithms and Computational models that can mimic intelligent behaviour.

- Algorithms : Step-by-Step instructions to Solve problems.
- Data Structures : Efficient ways to organize and process information.

3. Psychology and Cognitive Science.

These fields offer insights into human intelligence and behaviour which AI tries to replicate.

AI uses machine learning to simulate how humans learn and store information.

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4. Philosophy :

Philosophy helps to define the goals and ethical consideration of AI

Logic : Philosophy introduced from formal logic, a foundation for reasoning AI.

3 Levels of ~~Agents~~ Artificial Intelligence

1. Artifical Narrow Intelligence (ANI) :

ANI, also known as weak AI, is specialized for specific tasks. It operates within a narrow range and cannot generalize beyond its programming.

Example : Siri, google search Algorithm.

2. Artificial General Intelligence (AGI).

AGI. also known as Strong AI refers to systems that have the ability to understand, learn, and apply intelligence across broad range of tasks much like human.

Example : There are No real examples of AGI

- Talk like human in any situation
- Cook any meal by watching video.

3. Artificial Super Intelligence (ASI)

ASI is a hypothetical level of AI where machines surpass human intelligence in every field, including Creativity, Problem-Solving and Social Intelligence

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4 Applications of AI

1. Health Care
   - Medical diagnosis
   - Personalized Medicine

2. Finance :
   - Fraud Detection
   - Algorithmic Trading.

3. Transportation :
   - Self-driving Cars.
   - Traffic Management

4. Customer Service :
   - Chatbots
   - Recommendation Systems

5. Manufacturing
   - Predictive Maintenance
   - Quality Control

6. Entertainment
   - Content Recommendation
   - Game Development

7. Education :
   - Personalized Learning
   - Automated Grading.

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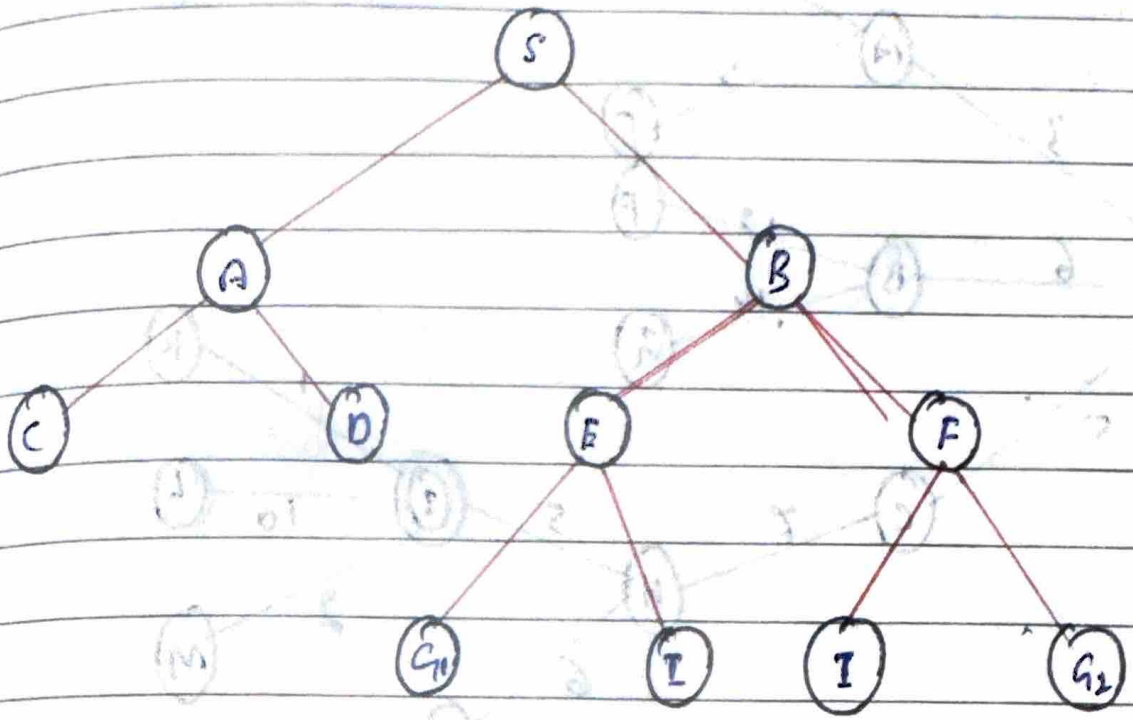
5 Breadth - First - Search



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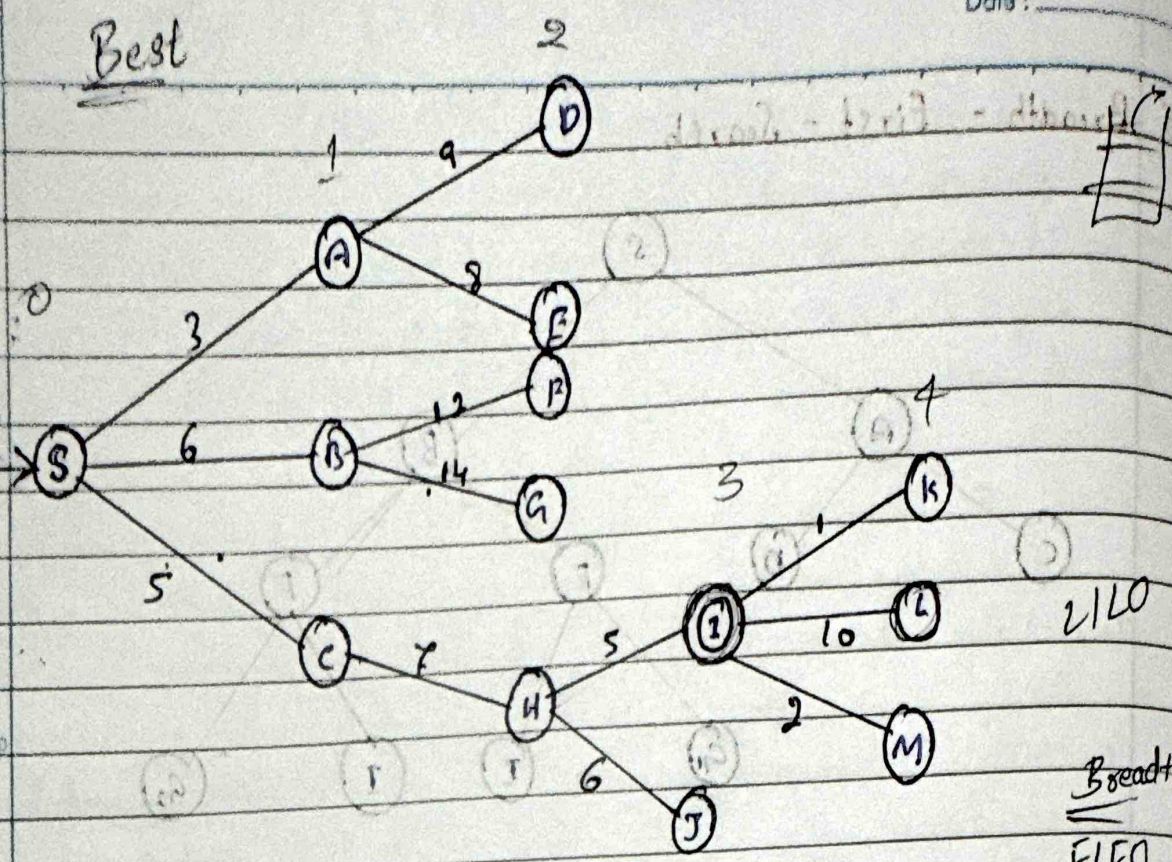
Best



A C B
C B E D
B H E D
H E D F G
I

TC = $O(b^d)$

b = branching factor

d = depth

= (2^3) = 8 //

$2^3 = 8$

Breadth

FIFO

A B C

B C D E

C D E F G

D E F G H

I J E D F G

J

K L M

L

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1 Adversarial Search.

Adversarial Search deals with situations where multiple agents compete against each other, typically in a game setting.

Minmax algorithm is a fundamental adversial search strategy used to determine the optimal move for a player, assuming that the opponent also plays optimally

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1. Agglomerative clustering.

{2, 7, 11, 20, 32}

		2	7	11	20	32
		P1	P2	P3	P4	P5
2	P1	0	5	9	18	30
7	P2	5	0	4	13	25
11	P3	9	4	0	9	21
20	P4	18	13	9.	0	12
32	P5	30	25	21	12	0

2. Measure for the distance between two clusters

i

	23	1	4	5
23	0	5	9	21
1	5	0	18	30
4	9	18	0	12
5	21	30	12	0

ii

	1 2 3	4	5
1 2 3	0	9	21
4	9	0	12
5	21	12	0

iv

	1 2 3 4	5
1 2 3 4	0	12
5	12	0

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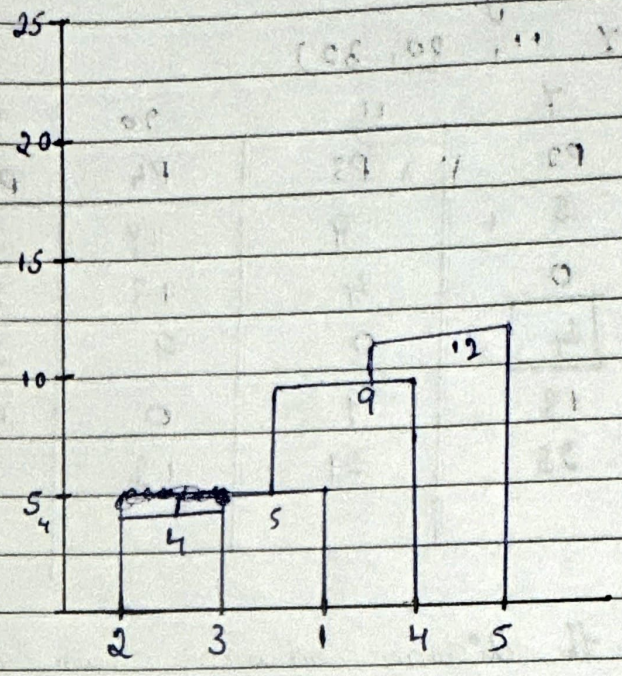

	P1	P2	P3	P4	P5
P1	0	5	9	18	30
P2	5	0	4	13	25
P3	9	4	0	9	21
P4	18	13	9	0	12
P5	30	25	21	12	0

	P1	P2	P3	P4
P1				
P2				
P3				
P4				

	2 3	1	4	5
2 3	0	9	13	25
1	9	0	19	30
4	13	18	0	12
5	25	30	12	0

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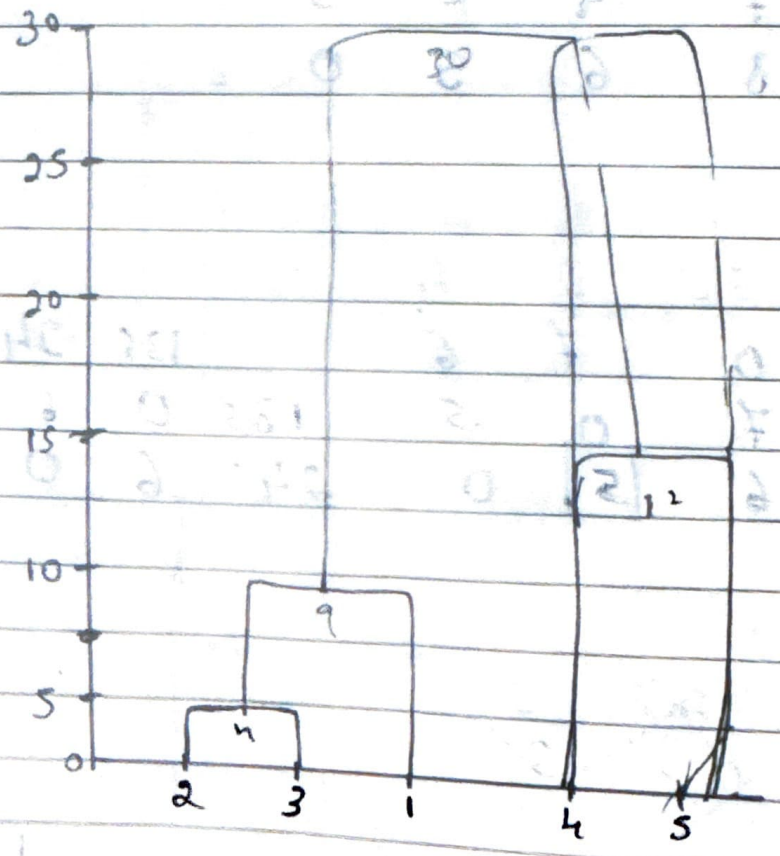
	1	2	3	4	5
123	0		18		30
4	18		0		12
5	30		12		0

	1	2	3	4	5
1235	0				30
4	30		0		



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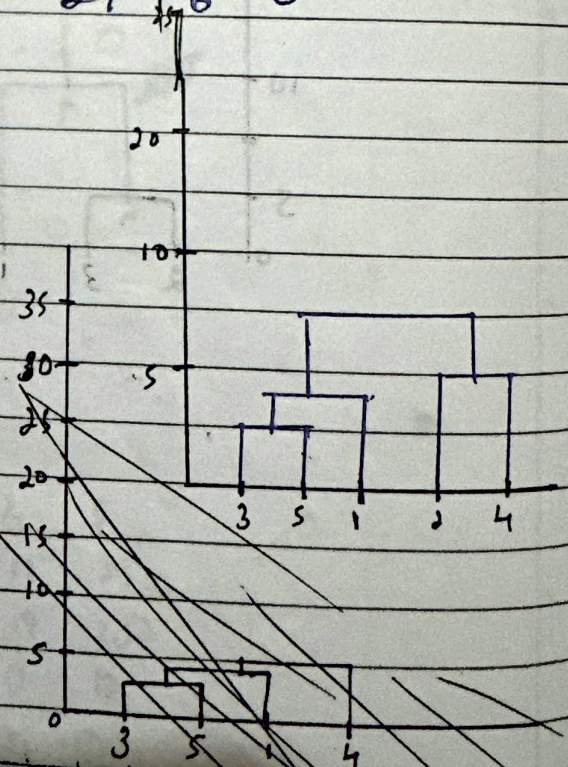
	P1	P2	P3	P4	P5
P1	0	9	3	6	11
P2	9	0	7	5	10
P3	3	7	0	9	2
P4	6	5	9	0	8
P5	11	10	2	8	0

	3 5	1	2	4
3 5	0	3	7	8
1	3	0	9	6
2	7	9	0	5
4	8	6	5	0

	1 3 5	2	4
1 3 5	0	7	6
2	7	0	5
4	6	5	0

	1 3 5	2 4
1 3 5	0	6
2 4	6	0

	1 3 5	2
1 3 5	0	5
2	5	0



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Subject	x Age	y Level.
1	43	99
2	21	65
3	25	79
4	42	75
5	57	87
6	59	81

x	y	x^2	xy
43	99	1849	4257
21	65	441	1365
25	79	625	1975
42	75	1764	3150
57	87	3249	4959
59	81	3481	4779
247	486	11409	20485

$$b_0 = \frac{(\Sigma y)(\Sigma x^2) - (\Sigma x)(\Sigma xy)}{n(\Sigma x^2) - (\Sigma x)^2}$$

$$= \frac{(486)(11409) - (247)(20485)}{6(11409) - (247)^2}$$

$$= \frac{55,44,774 - 50599795}{68454 - 61009}$$

$$= \frac{4849795}{7445}$$

$$= 65.141$$

$$\frac{(\Sigma y)(\Sigma x^2) - (\Sigma x)(\Sigma xy)}{n(\Sigma x^2) - (\Sigma x)^2}$$

$$\frac{(486)(11409) - (247)(20485)}{6(11409) - (247)^2}$$

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$$b_1 = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{n(\Sigma x^2) - (\Sigma x)^2}$$

$$b_1 = \frac{6(20485) - (247)(486)}{7445}$$

$$\frac{1,22,910 - 120042}{7445}$$

$$\frac{2868}{7445}$$

$$0.385$$

$$y = b_0 + b_1 x$$

$$= 65.141 + 0.385(55)$$

$$1379.3606$$

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	a	b	
	Brightness	Saturation	class
d0	40	20	Red
d1	50	50	Blue
d2	60	90	Blue
d4	10	25	Red
d5	70	70	Blue
d6	60	10	Red
d7	25	80	Blue

	x	4	
	Brightness	Saturation	class
	20	35	?

formula : $\sqrt{(x-a)^2+(4-b)^2}$

$d1 = \sqrt{(20-40)^2+(35-20)^2}$

$= \sqrt{(20)+(15)^2}$

$= \sqrt{400+225}$

$= \sqrt{662}$

$= 25.$

$d2 = \sqrt{(20-50)^2+(35-50)^2}$

$= \sqrt{(30)^2+(15)^2}$

$\sqrt{900+225}$

$\sqrt{1125}$

$= 33.54$

$d3 = 68.007$

$d6 = 47.17$

$d4 = 14.1$

$d1 = 25$

$d5 = 61.03$

Date :

	a	b	
	Brightness	Saturation	class
d1	40	20	Red
d2	50	50	Blue
d3	60	90	Blue
d4	10	25	Red
d5	70	70	Blue
d6	60	10	Red
d7	25	80	Blue

	x	y	
	Brightness	Saturation	class
	20	35	?

Formula : $\sqrt{(x-a)^2+(y-b)^2}$

$d1 = \sqrt{(20-40)^2+(35-20)^2}$

$= \sqrt{(20)+(15)^2}$

$= \sqrt{400+225}$

$= \sqrt{662}$

$= 25$

$d2 = \sqrt{(20-50)^2+(35-50)^2}$

$= \sqrt{(30)^2+(15)^2}$

$\sqrt{900+225}$

$\sqrt{1125}$

$= 33.54$

$d3 = 68.007$

$d6 = 47.17$

$d4 = 14.1$

$d1 = 25$

$d5 = 61.03$

Brightness	Saturation	class	Distance	New Class	Rank
40	20	Red	25	Red	10
50	50	Blue	33.54	Red	25
60	90	Blue	69.01	Blue	33.54
10	25	Red	10	Blue	45
70	70	Blue	61.03	Red	47.17
60	10	Red	47.17		61.03
25	80	Blue	45		69.01

The new entry is classified as

Naive Bayes :

Apply Bayes Theorem :

1. P(yes | sunny) = P(sunny | yes) * P(yes)
2. P(no | sunny) = P(sunny | no) * P(no)

	Yes	NO	
Sunny	3	2	5
Rainy	2	2	4
Overcast	5	0	5
	10	4	14

P(sunny | yes) = 3/10

P(yes) = 10/14 =

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Outlook	Play	
Rainy	Yes	R0
Sunny	Yes	
Overcast	Yes	
Overcast	Yes	
Sunny	No	
Rainy	Yes.	
Sunny	Yes	
Overcast	Yes	
Rainy	No	
Sunny	No	
Sunny	Yes	
Rainy	No	
Overcast	Yes	
Overcast	Yes.	

$P(\text{sunny}/\text{Yes}) = 3/10 = 0.3$

$P(\text{Yes}) = 10/14 = 0.71$

$P(\text{sunny}/\text{No}) = 2/4 = 0.5$

$P(\text{No}) = 4/14 = 0.28$

Step-4: Apply Bayes theroom.

1) $P(\text{Yes}/\text{Sunny}) = P(\text{Sunny}/\text{Yes}) \times (P(\text{Yes}))$

$= 0.3 \times 0.71 = 0.2131$

$P(\text{No}/\text{sunny}) = P(\text{sunny}/\text{No}) \times P(\text{No})$

0.5×0.28

0.14

→

Play