Compare BFS & DFS (Imp) (Short Trick)

(X) DLS → Depth Limited Search Algo

4|2|25 Iterative Deepening search:

Implemented by the all the positives of BFS, DFS, DLS.

Optimal: No

complete: Yes

Time = $o(b^d)$ space = $O(bd)$

Bidirectional search: Ex: Maze

(Advantage of This)

-> ~~Parallel~~ Parallel search

Branching factor = 4 Bredth = 5

Ad: Bidirectional search is fast & requires less mem space.

Disad: Should know the goal state in advance.

$b^{4/2} + b$

$4^{5/2} + 4^{5/2}$

$4^{2.5} + 4^{2.5}$

It is a concept of all search can be implemented

Comparison of Uninformed search strate (X)

Table.

Time

a is complete if b is finite

b complete if cost >= E

c optimal if & cost are identical

UNIT-2

Informed (Heuristic Search):

It is a smart search use helpful clues to find solution faster. They use extra info, like how far things are from the goal, to pick the best path to check first. Ex: A*, Greedy Alg

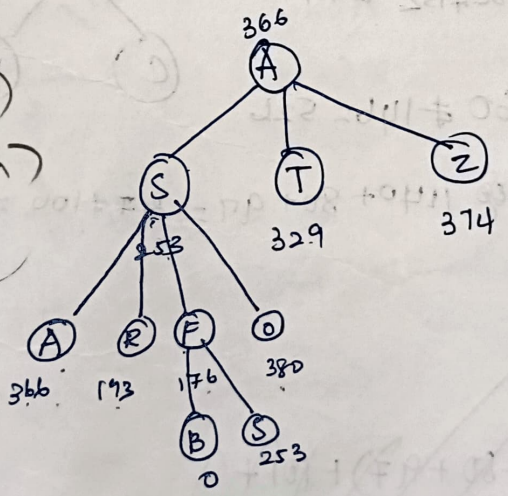
if both use bFS

Evaluation Best First Search

1) $f(n) = h(n)$ heuristic fun

Arad	366	Mehadia	241
Bucharest	0	Neamt	234
Craj	160	Oradea	380
Drobeta	242	Pitesti	100
Efforie	161	Rimnicu	193
Fagaras	176	Sibiu	253
Giurgiu	77	Timisoara	329
Hirsova	151	Urziceni	80
Iasi	226	Vaslui	199
Lugoj	244	Zerind	374

$G(n)$ = path cost Don't considered. $H(n) = H(A)$



← Greedy Best first search

Here we did'nt get the optimal best solution

C: No

TC: $O(b^m)$

SC: $O(b^m)$

O: No

Path is A-S-F-B = 450 Refer Romania map.

This is

—x— CIA 1 portion

Key Features of IS:

1) Encompasses goal Info
2) Enhance efficiency
3) Generally lower cost
4) Human knowledge for search Rmpl
5) Requires less time to search

(24) A* search

Minimizing the total estimated solution cost.

$$f(n) = g(n) + h(n)$$ (path cost, h(A), worst)

$f(A) = 0 + 366 = 366$

$f(S) = 140 + 253 = 393$ ✓

$f(T) = 118 + 329 = 447$

$f(Z) = 75 + 374 = 449$

Goto S (393 < 447 < 449)

$f(O) = 151 + 380 = 530 + 140 = 671$

$f(R) = 80 + 193 = 273 + 140 = 413$ ✓

$f(F) = 99 + 176 = 275 + 140 = 415$

Goto R (140+80) 413 < 415 < 671

$f(C) = 280 + 160 + 146 = 526$

$f(P) = (140 + 80 + 97) + 100 = 417$

Expand P

417 < 526

$f(B) = (140 + 80 + 97 + 101) + 0$

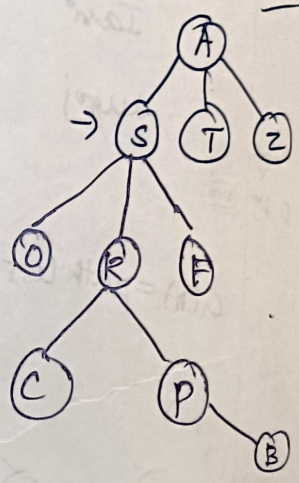
Goto F

415 < 417 < 447 < 449 < 526 < 671

$f(B) = (140 + 99 + 211) + 0 = 450$

417 < 447 < 449 < 450 < 526 < 671

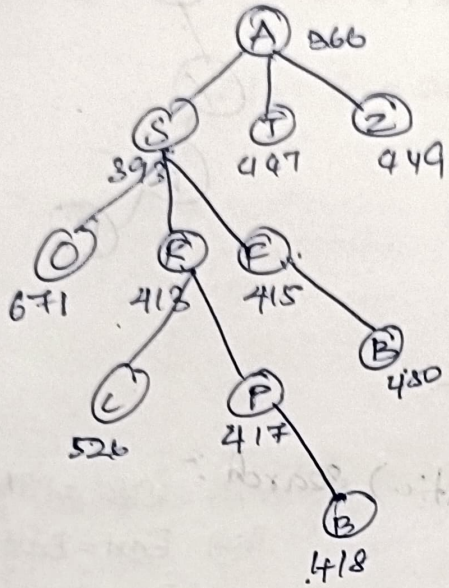
Expand P



$f(P) = (140 + 80 + 97) + 101$

$= 418$

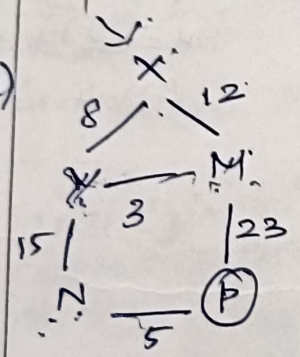
$418 < 447 < 449 < 450 < 526 < 671$



Goal reached with optimum path cost (since none of the alternate path cost is ≤ 418) so stop

sol path : A - S - P - B = 418

(Q)



$X \Rightarrow 20$

$Y \Rightarrow 15$

$M \Rightarrow 18$

$P \Rightarrow 0$

$N \Rightarrow 3$

$f(n) = g(n) + h(n)$

$f(X) = 0 + 20 = 20$

got

goto $(Y) = (0+8) + 15 \Rightarrow 23$

goto $(M) = (0+12) + 18 \Rightarrow 30$

$18 + 12 = 30$

goto Y $\quad 23 < 30$

$f(N) = (0+8) + 15 + 3 \Rightarrow 26$

$f(m) = (0+8+3+18) \Rightarrow 29$

expand N

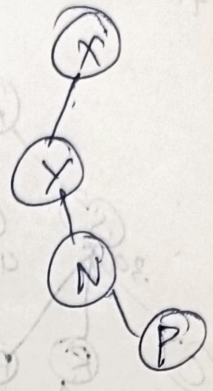
$26 < 29 < 30$

$f(P) = (8+15+5) + 0$

$= 28$

$28 < 29 < 30$

X-Y-N-P



DLS

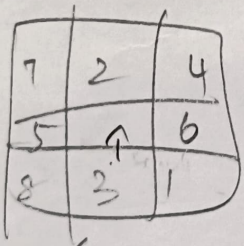
27/2/25

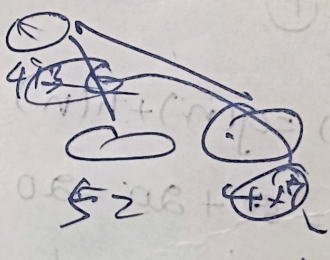
Informed (Heuristic) search :-

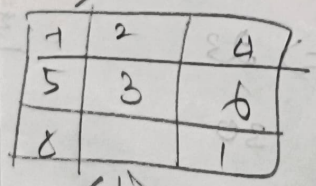
Recursive BFS

f_limit = initially ∞

Heuristic function

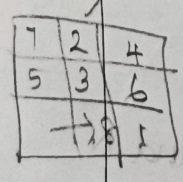


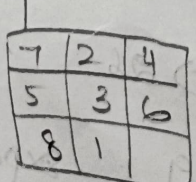


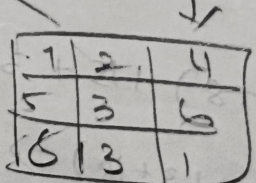


So remove.

Duplicate







h_1 = the no of misplaced tiles = 8

h_2 = position displaced from starting state + cit state

$h_2 = 3+1+2+2+2+3+3+2 = 18$

$\Rightarrow 18 + 8 = 26$

7	2	4
5		6
8	3	1

start state

	1	2
3	4	5
6	7	8

Goal state.

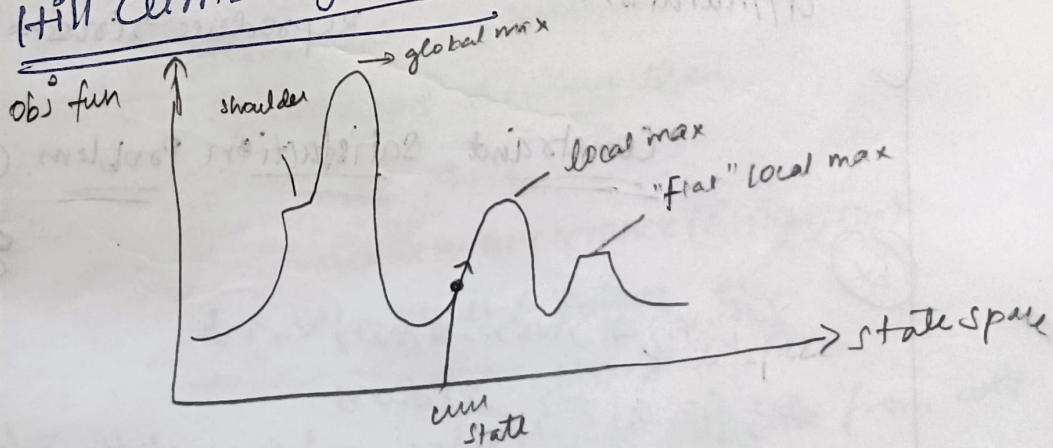
previous which is lesser in that node

→ change Best +/

Local search:

Focus on the curr node & coming node.

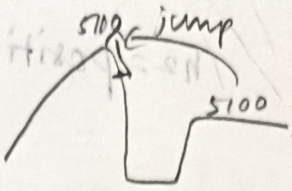
Hill climbing search (10m ✳) (7m or 8m)



Qers asking

→ write Algo, BD explain the components.

Versions of Hill climbing:-



uphill = greater than curr pos.

Stochastic - Randomly

Genetic Algorithm (20m) or (5m)

Algo (i)
Definition (ii) → How we are gonna take a next better state.
→ Explain every component and how to calculate it

selection → marking the particular position.

a) Initial population
b) Fitness fun
c) Selection
e) Crossover
a) Mutation.

OP ask u to cal fitfun.

c → selection point
Reproduce → Crossholder.

Constraint Satisfaction Problem (5m)

give Ex & Def

Ex

X = {WA, SA, NSW, Q, NT, V, T}

D = {R, G, B} → colors

C = Adjacent region shld have diff colors.

{ : } → relation
↓ scope

WA = {R, G, B}
SA = {R, G, B}

WA = R
Now in SA Red is removed ↪
constraint propagation

Constraint cannot be propogated to T cause it is disconnected

17-12

Node consistency? } 5m Q
Arc consistency? }

$Y = X^2$

Node

Values: Set of Real numbers

$(X, Y), \{(0,0)(1,1)(2,4),(3,9)\}$

Path consistency:

Q) Backtracking csr, Genetic Algorithm

function Backtracking(csp) return a solution, or failure
return {{}, csp}
fun Backtrack(ass, csp) return a solution,
If ass is complete then return assign
var ← SELECT-UNASSIGNED-VARS(csp)
for each value in ORDER-DOMAIN-VALUES(var, assig, csp) do
if value is consis with assign then
add {var = value} to assign
inference ← INFERENCE(csp, value)
If inference ≠ failure then
add inference
result ← BACKTRACK(assign, csp)
if result ≠ failure then
return result
remove {var = value} and inference from assign
return failure

Exam for mcoloring
diff
diff

3/3/25

→ can't use the same no to diff

Alldiff Constraint (GM) ✗ (Q) Illustrate
↳ Sym Explain

Alldiff(A1, A2, A3, A4, A5, A6, A8, A9)

Cols: (A, B, ---)

Crypto

Shift Arithmetic problem

constraint:

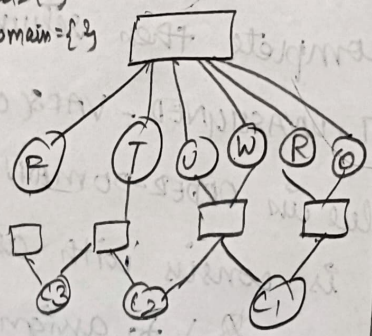
→ All of condition should be satisfy

→ Adding 2 should result on the eq ans

T W O
T W O
F O U R

T W O
T W O
F O U R

var={ }
domain={ }



SEND
MORE
MONEY

Equations hypergraphim

O+O = R + 10·C1
W+W+C10 = U + 10·C100
T+T+C100 = O + 10·C1000
C1000 = F

TWO
TWO
FOUR

→ F should be 1.

S E N D
M O R E
M O N E Y

9 5 6 7
S E N D
M O R E
M O N E Y

7 4 8 3
B A S E
7 4 5 5
B A L L
GAMES

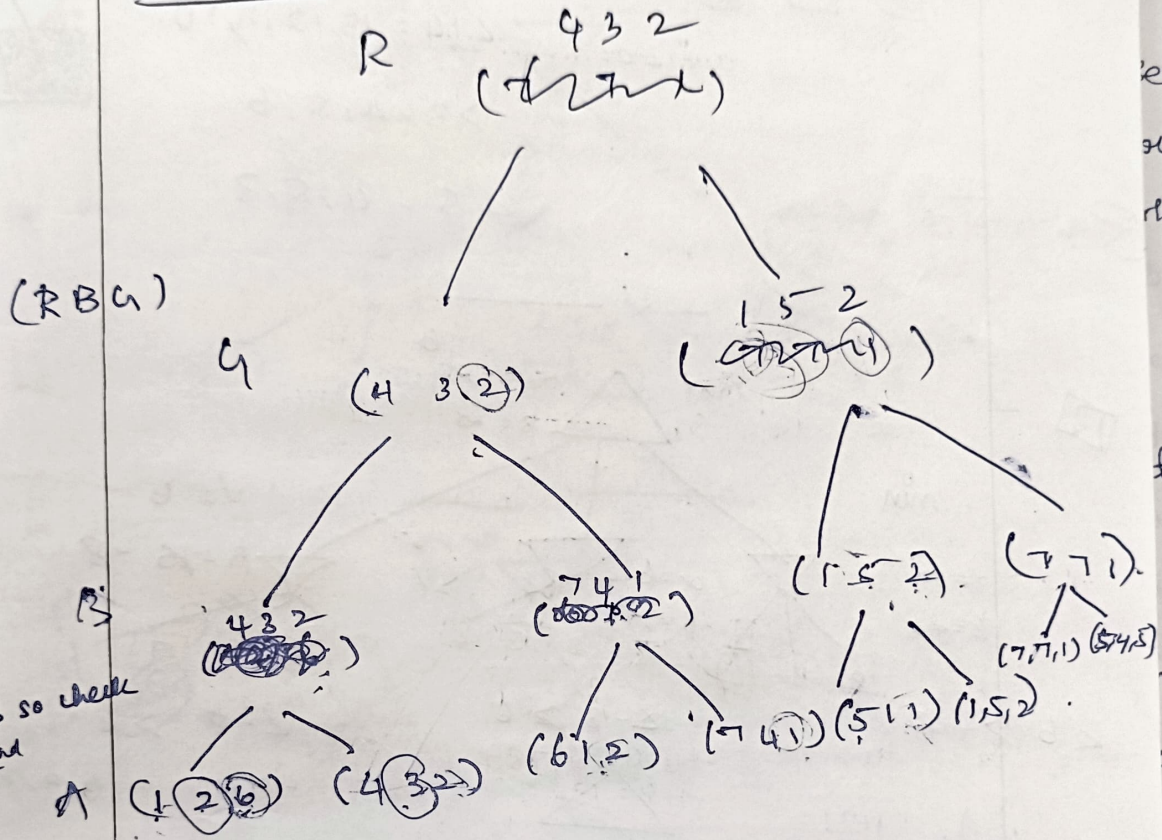
Mini & Max problem Adversedling Search

Algorithm

what if

Instead of 2 player, 3 player plays the game

problem



Alpha Beta pruning algorithm

-> No algo imp

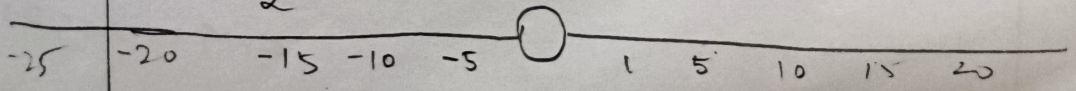
-> Only problem imp.

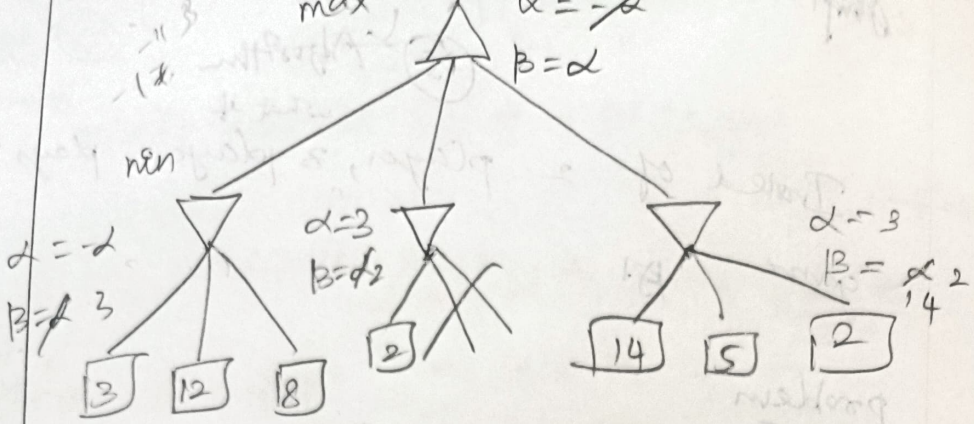
pruning

$\alpha = -\infty$

$\beta = \infty$

min value should compare with min value & max.

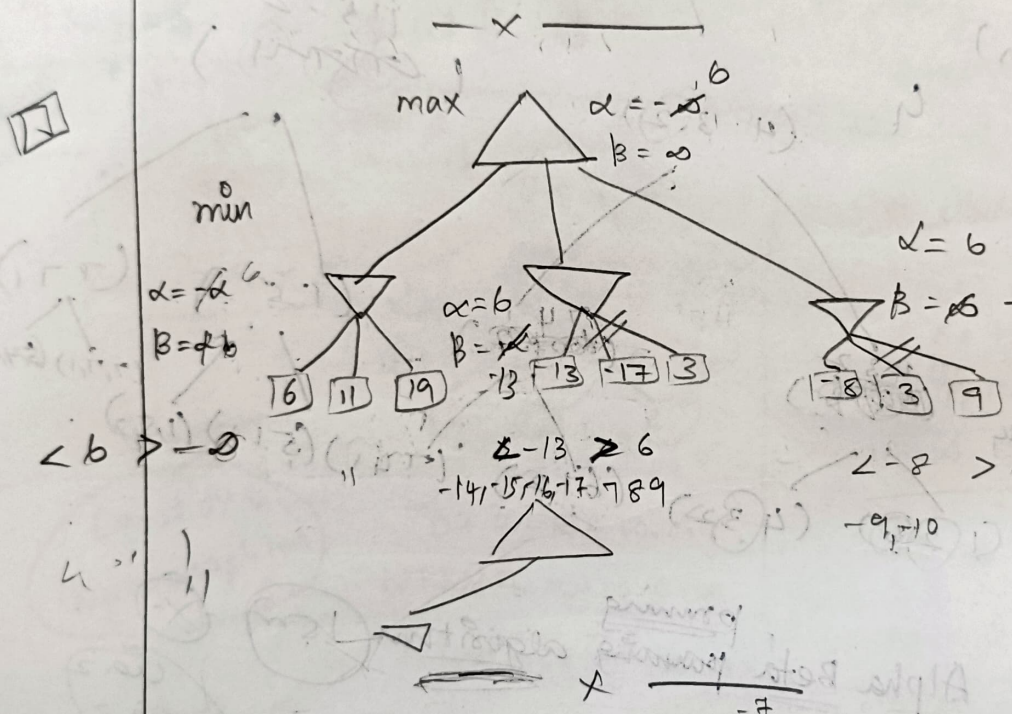




< 14 = 13, 12, 11, 10.

> 3 : 4, 5, 6

< 5 : 4, 5, 3



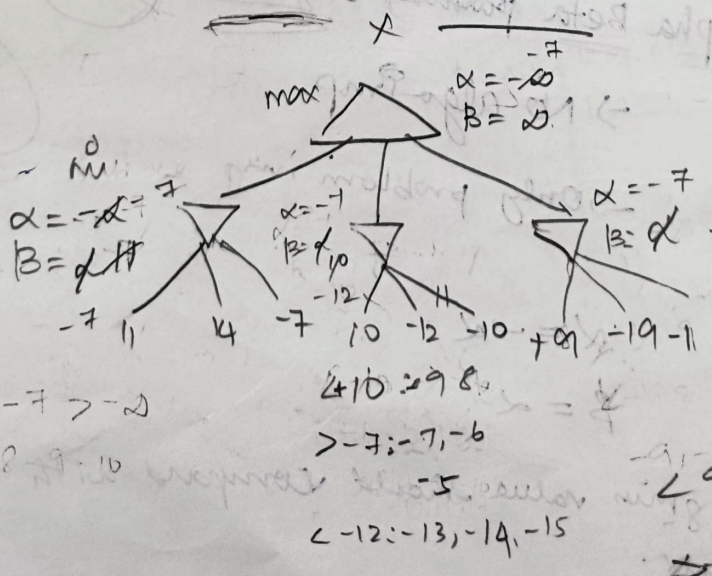
< 6 > -∞

α = 13 ≥ 6

-14, -15, -16, -17, 7, 8, 9

< -8 > 6

-9, -10 : 6, 7, 8



< -7 > -∞

< 10 : 9, 8, ...

> -7 : -7, -6, -5

< -12 : -13, -14, -15

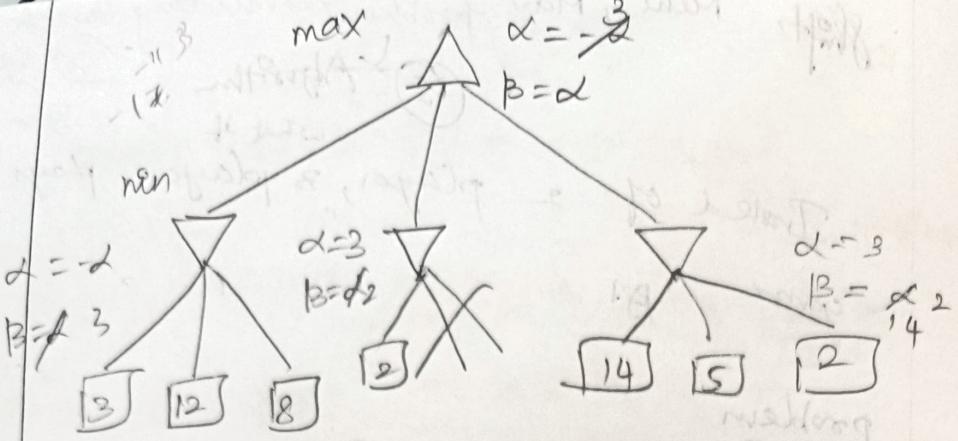
> -7 : -7, -6, ...

< 9 : 8, 7, 6

> -7 : -6, -15

< -19 : -20, 21

Ir Summer



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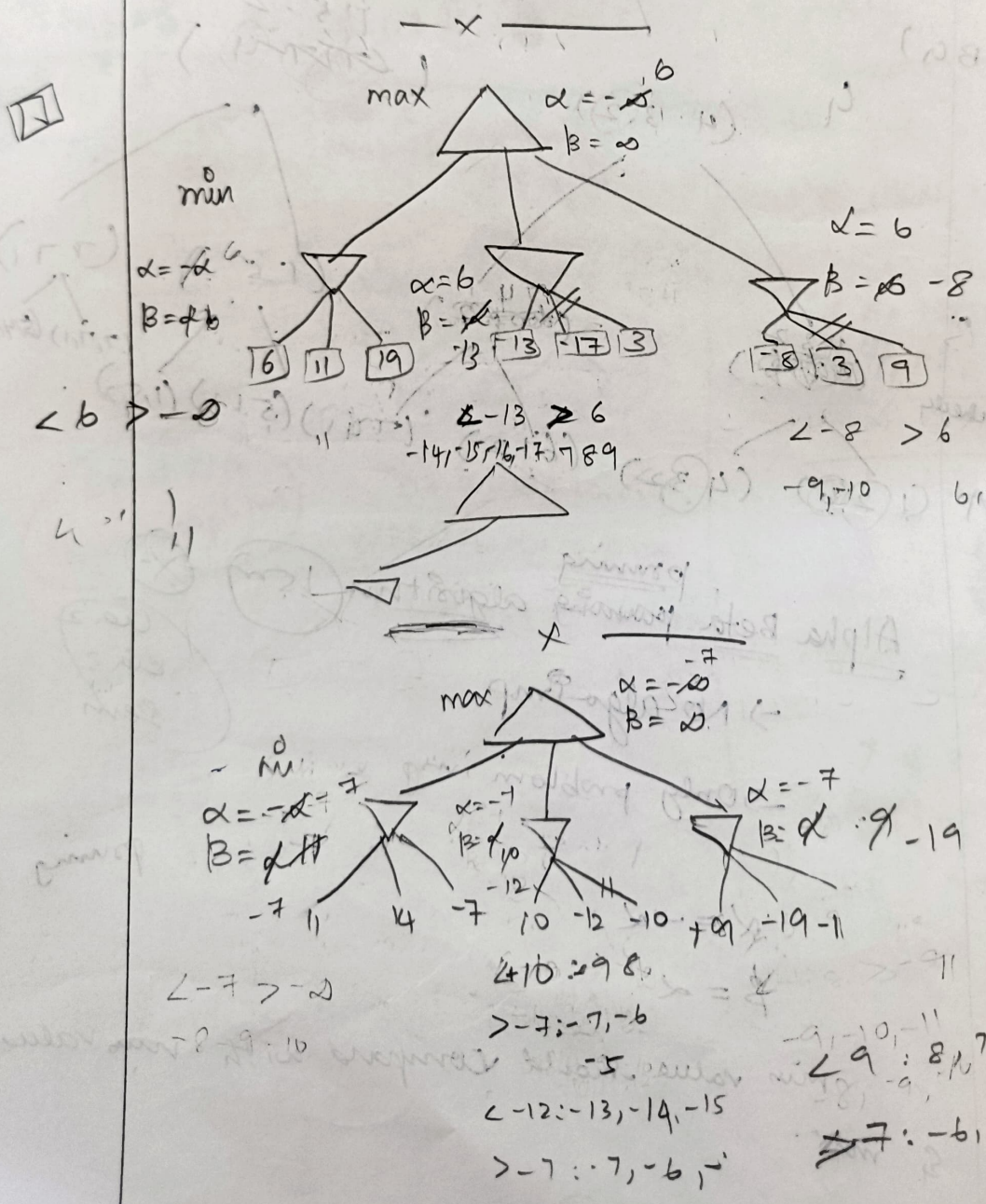


< 6 > -∞

< -13 > 6

-14, -15, 16, 17, 7, 8, 9

< -8 > 6

-9, -10 : 6, 7, 8

< 10 : 9, 8, ...

> -7 : -7, -6, ...

-5

< -12 : -13, -14, -15

> -7 : -7, -6, ...

< 9 : 8, 7, 6

< -7 : -6, -15

< -19 : -20, -21

< -7 > -∞

-8, -9, -10

IrSummer

Alpha: highest value I.V. $\alpha = -\infty$

Beta: lowest value I.V. $\beta = +\infty$

Condition

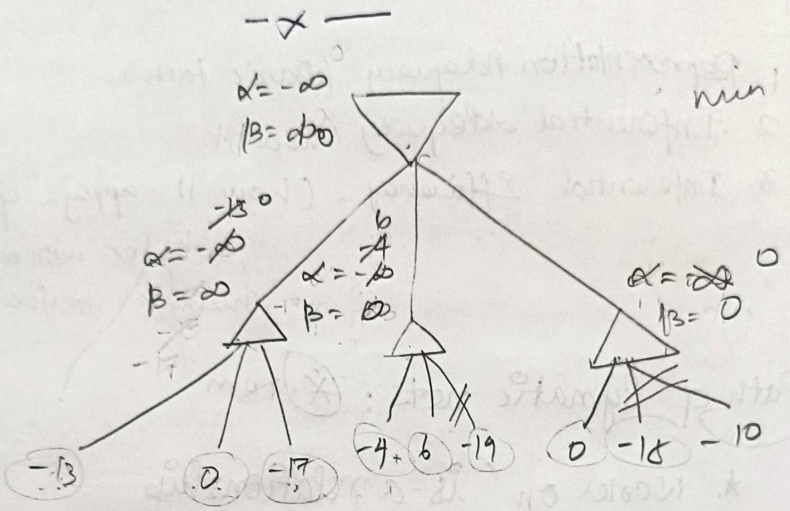
$\alpha >= \beta$

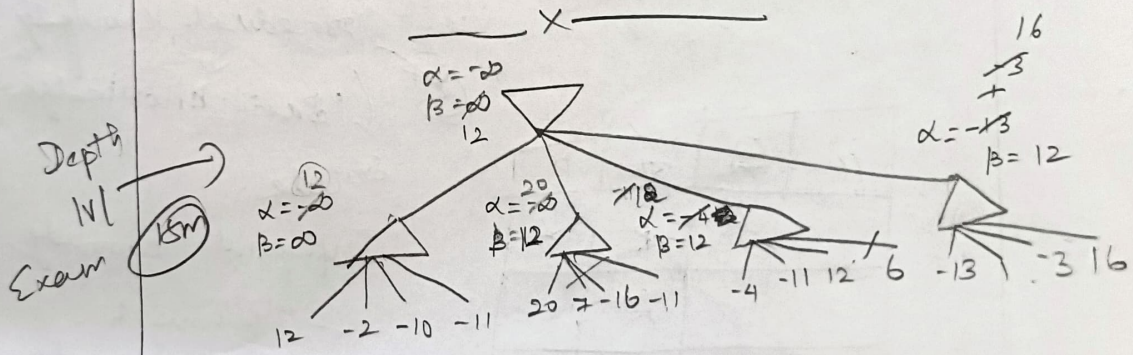
Utube SX

→ Max α

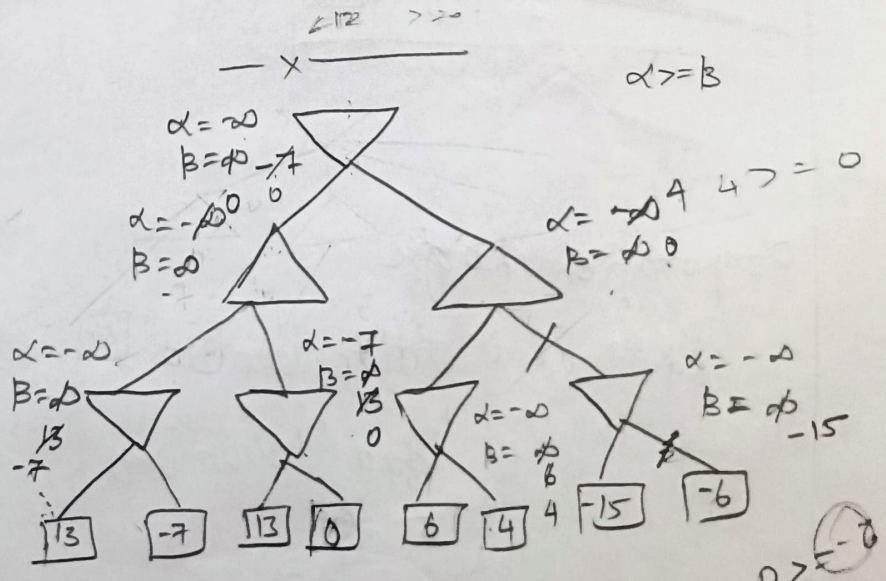
→ Min β

→ Max α





Depth IVL Exam KSM



α >= β

Knowledge Representation Framework

Tacit — Explicit — properties

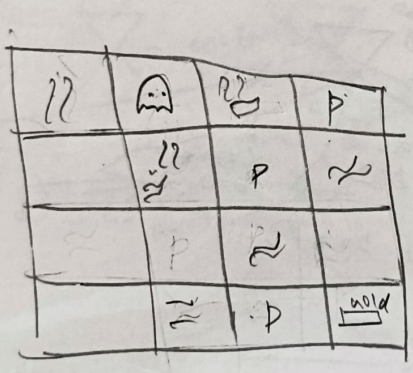
Informal (or) implicit

Properties of Knowledge Representation

1. Representation Adequacy (Basic facts)
2. Inferential Adequacy (how it
3. Inferential Efficiency. (how it applys efficiently with or without human interferances

Path of Symatic nets:

* Works on is-a relationship



Procedural Knowledge
↓
Basic Knowledge
Ex: Code

Inferential knowledge
Ex: Running & getting o/p.

12/3/25

Proporation Logic

If it is a action then No

If it is a fact return yes

Inatomic we cannot split it into more than 1.

Connection & Symbols:

$P \rightarrow Q$

If P then Q

Tautologies: Always true eg: $(P \vee \neg P)$

contradiction: always false $\exists x (P \wedge \neg P)$

Contingencies: If the propo

eg $(P \vee Q)$

Antecendent,

eg: $P \rightarrow Q$

* Sentences is gn convert into first order logics

$\forall$ ⇒ forall quantifier

$\exists$ ⇒ There exist (few, some)

1) All students are smart

Variable = small

Const capital letter

S. name

$\forall x$ student$(x) \Rightarrow$ smart(x)

$\forall x$ student$(x) \wedge$ smart(x)

2) There exist a smart student.

$\exists x$ (Student$(x) \wedge$ Smart(x))

3) Bill is a student = Student(Bill)

↳ constant in capital letters.

4) Bill takes either Analysis or Geomentry.

Analysis(Bill)

Takes(Bill, Analysis) $\Leftrightarrow \neg$ Takes(Bill, Geomentry)

5) Bill takes Analysis or Geomentry

$\vee$

Takes(Bill, Analysis) $\Leftrightarrow$ Takes(Bill, Geomentry)

6) No Students loves Bill. $\Rightarrow \neg \exists x (\text{Student}(x) \wedge \text{Loves}(x, \text{Bill}))$

$\forall x \neg \text{Student}(\text{Bill})$

7) Bill has atleast 1 sister

$\exists x \; \text{Sisterof}(x, \text{Bill})$

Bill has no sis

$\forall x \neg \text{Sisterof}(x, \text{Bill})$

8) Bill has atmost 1 sister → Take another variable and make them equal

$\forall x, y (\text{sisterof}(x, \text{Bill}) \wedge \text{sisterof}(y, \text{Bill})) \Rightarrow (x = y)$

atmost/exactly

9) Bill has ~~atleast~~ 2 sister

$\exists x, y (\text{Sister}(x, \text{Bill}) \wedge \text{Sister}(y, \text{Bill})) \Rightarrow \neg (x = y)$

10) Every student how is taking AI is cool

$\forall x (\text{Student}(x) \wedge \text{Is taking}(x, \text{AI})) \Rightarrow$

$\text{Is cool}(x)$

11) All Bunnies are cute

$\forall x \; \text{Bunnies}(x) \Rightarrow \text{cute}(x)$

12) Every Bunnies who is a student taking AI is cute and cool

$\forall x \; \text{bunny}(x) \wedge \text{student}(x) \wedge \text{Is taking}(x, \text{AI}) \Rightarrow$

$\text{Iscute}(x) \wedge \text{Iscoole}(x)$

13) $2 + 2 = 4 \Rightarrow +(2, 2) \Rightarrow 4$

constant

14) There is a Mushroom that is purple & poisonous

6) No Students loves Bill. $\Rightarrow \neg \exists x$ (Student(x) $\wedge$ Loves(x, Bill))

$\forall x \neg$ Student(Bill)

7) Bill has atleast 1 sister

$\neg \exists x$ $\exists x$ Sisterof(x, Bill)

Bill has no sis

$\neg \exists x$ Sisterof(x, Bill)

8) Bill has atmost 1 sister → Take another variable and make them equal

$\forall x, y$ (Sisterof(x, Bill) $\wedge$ Sisterof(y, Bill)) $\Rightarrow (x = y)$

atmost/exactly

9) Bill has ~~atleast~~ 2 sister

$\exists x, y$ (Sister(x, Bill) $\wedge$ Sister(y, Bill)) $\Rightarrow \neg (x = y)$

10) Every student who is taking AI is cool

$\forall x$ (Student(x) $\wedge$ Is taking(x, AI)) $\Rightarrow$

Is cool(x)

11) All Bunnies are cute

$\forall x$ (Bunnies(x) $\Rightarrow$ cute(x)

who

12) Every Bunnies ~~that~~ is a student taking AI is cute and cool

$\forall x$ bunny(x) $\wedge$ student(x) $\wedge$ Is taking(x, AI) $\Rightarrow$

Iscute(x) $\wedge$ Iscoole(x)

constant

13) 2 + 4 $\Rightarrow$ +(2, 2) $\Rightarrow$ 4

14) There is a Mushroom that is purple & poisonous

$\exists x$ Mushroom(x) $\wedge$ purple(x) $\wedge$ poisonous(x)

There is no mushroom that is purple & poisonous

$\forall x$ Mushroom(x) $\Rightarrow \neg$ (purple(x) $\wedge$ poisonous(x))

Represent the Relationship:

If x is sister-law-of y.

6. Dep Equity [illegible] proprietors Fund

Unit - 2

17/2/25

Fixed cost: Amt of cost fixed during throughout the period Ex: Salary

Variable cost: Depends on the lvl of output

Ex: Electricity Bill

Costing: Cost Incurred for selling the product

penil = ₹2

production of costing

after adding some profit like 10% = $2 \times \frac{10}{100}$

$= 0.02$

₹2 Rupee 2 paise

18/2/25

Cost Accounting

Objective

- → control of cost
- → Reduction of cost
- → Find out the cost
- → Fixation of selling price

Diff btw Financial & Cost Accounting

Classification of Cost:

Material — Direct
\ Indirect