Date
Page

2. n-Pacman Search

⇒ Controlling n pacman simultaneously.

⇒ Several pacmen can be in the same square at the same time.

⇒ At each time step, each pacman moves by at most one unit.

⇒ Goal: All the pacmen be at the same square in the minimum number of time steps.

Notation

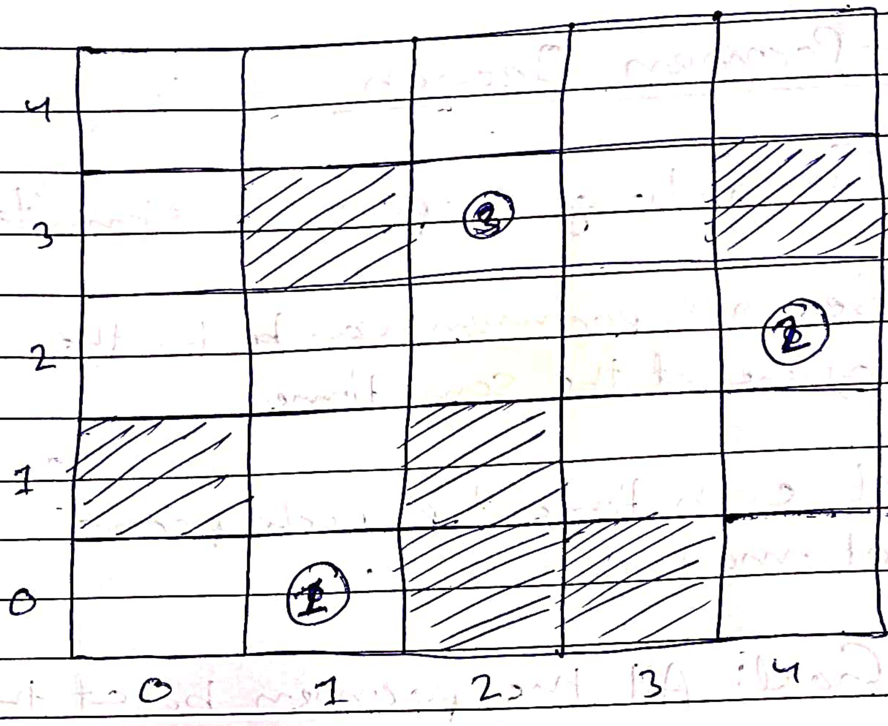
① M ⇒ Number of squares in the maze that are not walls.

② n ⇒ Number of pacmen

③ $P_i = (x_i, y_i)$ $\forall i = 1, \dots n$ the position of i^{th} pacman.

⇒ Assume that maze is connected.

(a)



$M = 19$

$n = 3$

$P_1 = (1, 0)$

$P_2 = (4, 2)$

$P_3 = (2, 3)$

State $\Rightarrow \{P_1, P_2 \cdots P_n\}$

StateSpace $\Rightarrow$ Set of all possible States

(b) M^n

(c) $b \leq 5^n$

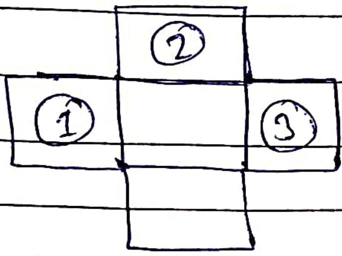
(d) b^D where b = branching factor
$D = {}^{max}$ depth of tree

$b \leq 5^n$

$D \leq M/2$

$\left(\begin{array}{c}\text{number of node expanded}\\ \text{by Uniform cost tree}\end{array}\right) \leq 5^{\frac{nM}{2}}$

(3) (i) Neither



$h^* = 1$ but $h = 3$

(ii) Admissible

↳ Imagine a relaxed problem where there are no walls & pacman can move diagonally.

Consistent

↳ Because each absolute value will change by at most 2 per step, meaning the h will decrease by at most 1 for each action.

(actions have cost 1)