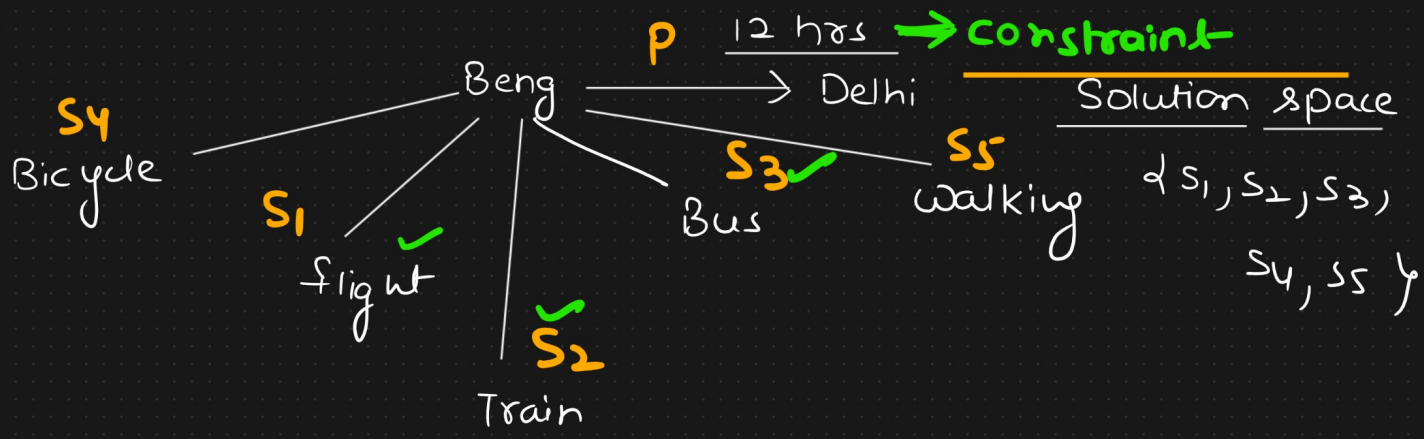
Greedy Algorithms



Solution space

{ S1, S2, S3, S4, S5 }

min. cost

feasible solution

{ S1, S2, S3 }

optimized solution

{ S1 } — AirIndia

Under a given constraint

Minimization / Maximation

↳ given constraint

↳ Optimized Problems

- Greedy Algorithms
- Dynamic Programming

Psuedocode

```
Greedy (arr, n):
    for i = 0 to n-1:
        x = select(arr)
        if feasible(x):
            solution = solution + x
```

Application

fractional Knapsack

Items	1	2	3	4	5	6	7
Profit	25	75	100	50	45	90	30
weight	5	10	12	4	7	9	3
P/w	5	7.5	8.33	12.5	6.42	10	10

M = 37

Optimization Problem

Sort Data (desc) P/w

Maximize the profit

Constraint $\leq M$

Item	4	6	7	3	2	5	1
Profit	50	90	30	100	75	45	25
wt	4	9	3	12	10	7	5
P/w	12.5	10	10	8.33	7.5	6.42	5

Net wt	Net Profit
$37-4=33$	50
$33-9=24$	$50+90=140$
$24-3=21$	$140+30=170$
$21-12=9$	$170+100=270$
↳ $9-\frac{9}{10}*10=0$	Profit $270+\frac{9}{10}*75=$
	337.5

Pseudocode

1) P_i/w_i —— $\Theta(n)$

2) Sort P_i/w_i Decr —— $\Theta(n \log n)$

3) for i = 0 to n-1:

$\Theta(n)$ { decrease net weight & increase the profit

$\Theta(n) + \Theta(n \log n) + \Theta(n) = \Theta(n \log n)$