

A* Search (A star)

A* uses a heuristic function, which combines $g(n)$ and $h(n)$.

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

⇒ $g(n)$ is the exact cost to reach node n from the initial state.

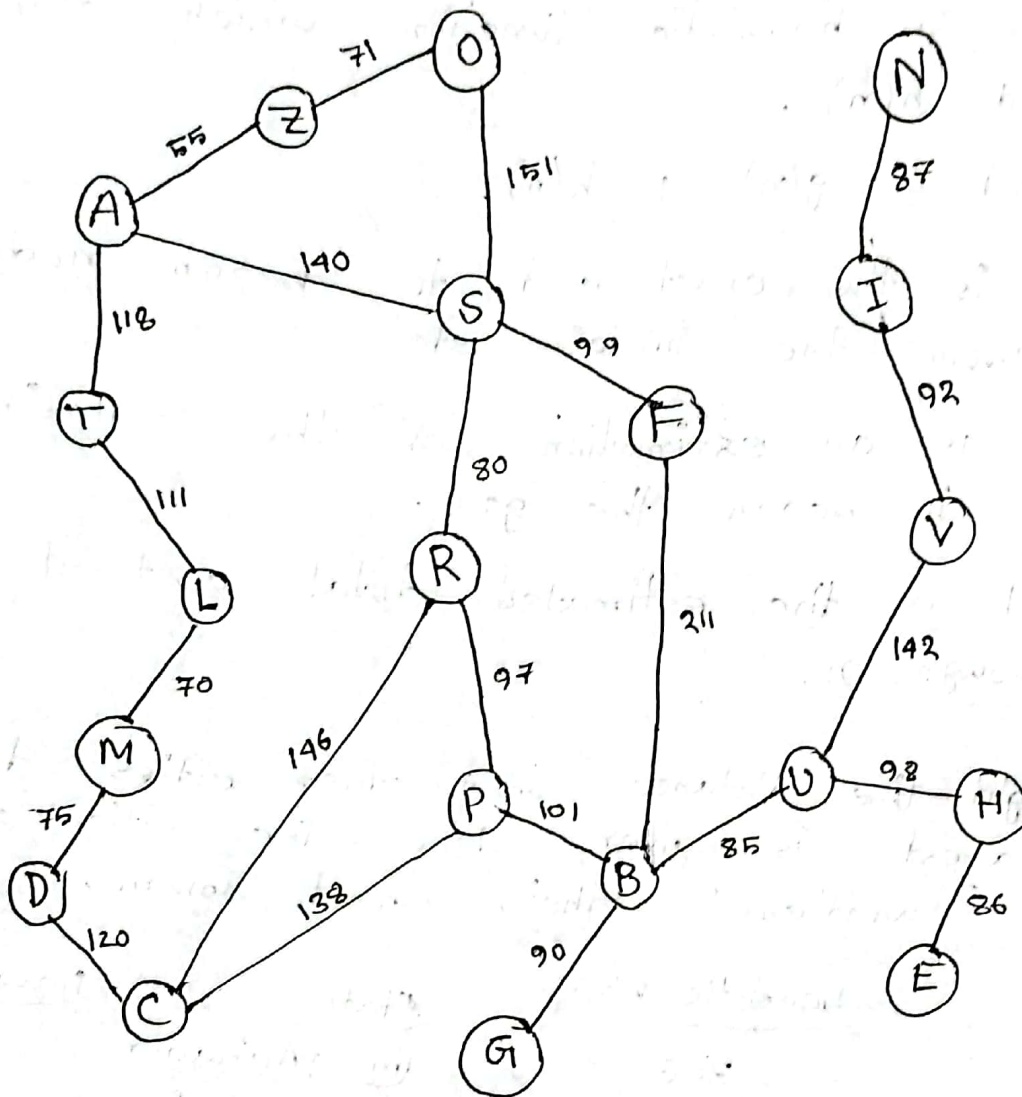
⇒ $h(n)$ is an estimation of the remaining cost to reach the goal.

⇒ $f(n)$ is the estimated total cost of path through n .

⚡ Straight-line distance from other cities to Bucharest is given. Here the cities' names are written in their short form.

| State | heuristic: $h(n)$ | State | heuristic: $h(n)$ |
|---------------|-------------------|--------------------|-------------------|
| (A) Anad | — 366 | (M) Mehadia | — 241 |
| (B) Bucharest | — 0 | (N) Neamt | — 234 |
| (C) Craiova | — 160 | (O) Oradea | — 380 |
| (D) Drobeta | — 242 | (P) Pitesti | — 98 |
| (E) Eforie | — 161 | (R) Rimnicu Vilcea | — 193 |
| (F) Fagaras | — 178 | (S) Sibiu | — 253 |
| (G) Giurgiu | — 77 | (T) Timisoara | — 329 |
| (H) Hirsova | — 151 | (V) Urziceni | — 80 |
| (I) Iasi | — 226 | (V) Vaslui | — 199 |
| (L) Lugoj | — 244 | (Z) Zerind | — 374 |

Graph



Steps to go Bucharest (B) from Arad (A)

Step 1:

$$0 + 366 = 366$$

Step 2: Expanding A, we get.

$$374 + 75 = 449$$

$$253 + 140 = 393$$

$$353 + 1 = 44$$

(minimum)

Step 3: Expanding S, we get:

$$449$$

$$393$$

$$447$$

$$366 + 140 + 140 = 646$$

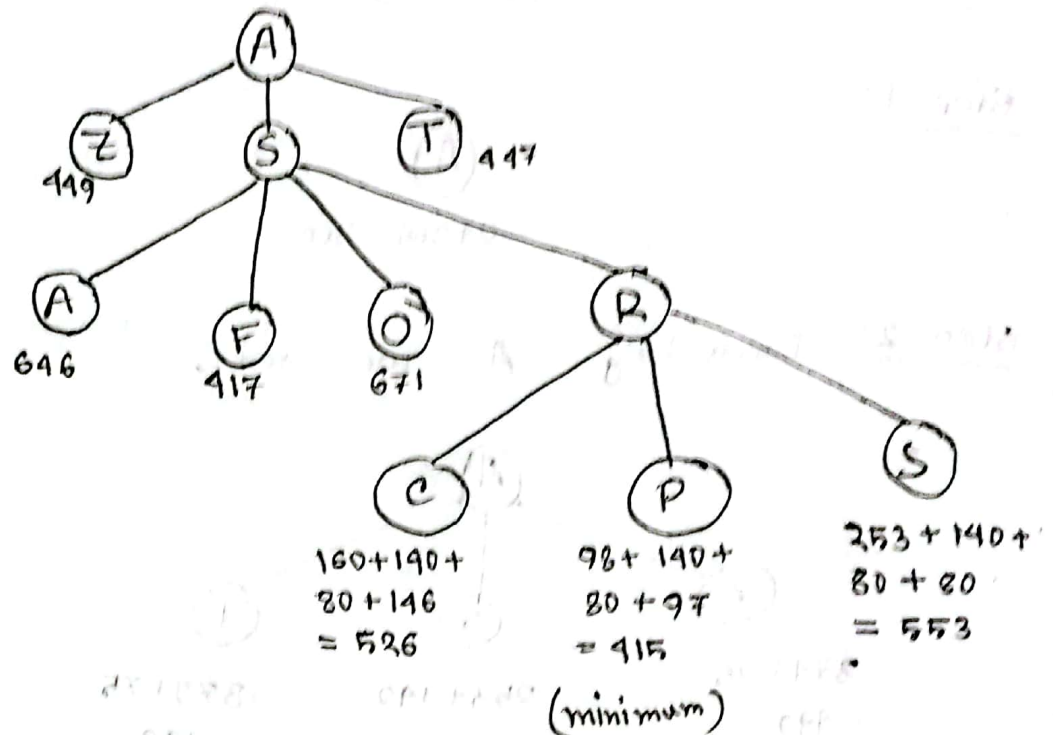
$$178 + 140 + 99 = 417$$

$$380 + 140 + 151 = 671$$

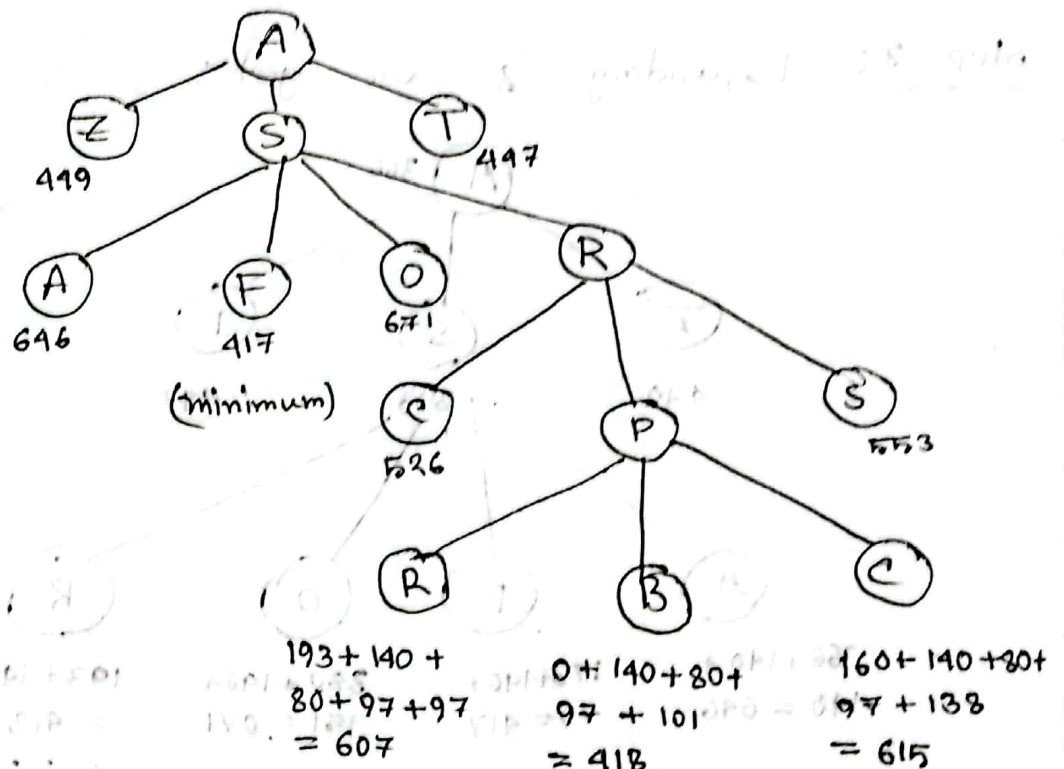
$$193 + 140 + 80 = 413$$

(minimum)

Step 4: Expanding R, we get :



Step 5: Expanding P, we get :



Step 6: Expanding F, we get :

