創新 AI 碩一

111C71008

何哲平

Key Point：

A. Update Estimates
   If the calculated distance of a vertex is less than the known distance, update the shortest distance.

B. Choose Next Vertex
   The town we explore will always be the unexplored town with the smallest estimates.
   In other words, the next town we explore should be among all of the unexplored towns, the one we know we can get to the quickest.

思考方向：

A. 試著找出所有 One-To-All Shortest Path

B. 再從中選出到 Eforie 的最短路徑

1. A

Vertex	Shortest Distance From Arad	Previous Vertex	Path
Arad	0	X	A

Consider the start vertex, Arad.

Distance to Arad from Arad = 0.

Distance to all other vertices from Arad are unknown, therefore ∞ (infinity).

2. A→Z

Vertex	Shortest Distance From Arad	Previous Vertex	Path
Arad	0	X	A
Zerind	75	A	A→Z
Sibiu	140	A	A→S
Timisoara	118	A	A→T

Zerind: min(∞,75) = 75

Sibiu: min(∞,140) = 140

Timisoara: min(∞,118) = 118

Visit the unvisited vertex with the smallest known distance from the start vertex, Arad.

This time around, it is Zerind.

3. A→Z→O

Vertex	Shortest Distance From Arad	Previous Vertex	Path
Arad	0	X	A
Zerind	75	A	A→Z
Sibiu	140	A	A→S
Timisoara	118	A	A→T

Oradea	146	Z	A→Z→O

Oradea: min(∞,146) = 146

4. A→S

Vertex	Shortest Distance From Arad	Previous Vertex	Path
Arad	0	X	A
Zerind	75	A	A→Z
Sibiu	140	A	A→S
Timisoara	118	A	A→T
Oradea	146	Z	A→Z→O
Neamt	246	O	A→Z→O→N

Sibiu: min(140, 297) = 140, We do not need to update the distance to Sibiu.

Neamt: min(∞, 246) = 246

Visit the unvisited vertex with the smallest known distance. This time around, it is Sibiu.

5. A→S→R

Vertex	Shortest Distance From Arad	Previous Vertex	Path
Arad	0	X	A
Zerind	75	A	A→Z
Sibiu	140	A	A→S

Timisoara	118	A	A→T
Oradea	146	Z	A→Z→O
Neamt	246	O	A→Z→O→N
Fagaras	239	S	A→S→F
Rimnicu Vilcea	220	S	A→S→R

Fagaras: min(∞, 239) = 239

Rimnicu Vilcea: min(∞, 220) = 220

Visit the unvisited vertex with the smallest known distance. This time around, it is Rimnicu Vilcea.

6. A→S→R→P

Vertex	**Shortest Distance From Arad**	**Previous Vertex**	**Path**
Arad	0	X	A
Zerind	75	A	A→Z
Sibiu	140	A	A→S
Timisoara	118	A	A→T
Oradea	146	Z	A→Z→O
Neamt	246	O	A→Z→O→N
Fagaras	239	S	A→S→F
Rimnicu Vilcea	220	S	A→S→R
Pitesti	317	R	A→S→R→P

Craiova	366	R	A→S→R→C

Pitesti: min(∞, 317) = 317

Craiova: min(∞, 366) = 366

Visit the unvisited vertex with the smallest known distance. This time around, it is Pitesti.

7. A→S→R→C

Vertex	Shortest Distance From Arad	Previous Vertex	Path
Arad	0	X	A
Zerind	75	A	A→Z
Sibiu	140	A	A→S
Timisoara	118	A	A→T
Oradea	146	Z	A→Z→O
Neamt	246	O	A→Z→O→N
Fagaras	239	S	A→S→F
Rimnicu Vilcea	220	S	A→S→R
Pitesti	317	R	A→S→R→P
Craiova	366	R	A→S→R→C
Bucharest	418	P	A→S→R→P→B

Bucharest: min(∞, 418) = 418

Craiova: min(366, 455) = 366, We do not need to update the distance to Craiova.

Visit the unvisited vertex with the smallest known distance. This time around, it is Craiova.

※ 省略 Fagars，因為距離目標 Eforie 更遠。

8. A→S→R→C→G

Vertex	Shortest Distance From Arad	Previous Vertex	Path
Arad	0	X	A
Zerind	75	A	A→Z
Sibiu	140	A	A→S
Timisoara	118	A	A→T
Oradea	146	Z	A→Z→O
Neamt	246	O	A→Z→O→N
Fagaras	239	S	A→S→F
Rimnicu Vilcea	220	S	A→S→R
Pitesti	317	R	A→S→R→P
Craiova	366	R	A→S→R→C
Bucharest	418	P	A→S→R→P→B
Giurgiu	716	C	A→S→R→C→G

Giurgiu: min(∞, 716) = 716

9. A→S→R→P→B

Vertex	Shortest Distance From Arad	Previous Vertex	Path

Arad	0	X	A
Zerind	75	A	A→Z
Sibiu	140	A	A→S
Timisoara	118	A	A→T
Oradea	146	Z	A→Z→O
Neamt	246	O	A→Z→O→N
Fagaras	239	S	A→S→F
Rimnicu Vilcea	220	S	A→S→R
Pitesti	317	R	A→S→R→P
Craiova	366	R	A→S→R→C
Bucharest	418	P	A→S→R→P→B
Giurgiu	716	C	A→S→R→C→G
Eforie	1116	G	A→S→R→C→G→E

Eforie: min(∞, 1116) = 1116

Bucharest: min(418, 806) = 418, We do not need to update the distance to Bucharest.

Visit the unvisited vertex with the smallest known distance. This time around, it is Bucharest.

10. A→S→R→P→B→U→H→E

Vertex	**Shortest Distance From Arad**	**Previous Vertex**	**Path**
Arad	0	X	A

Zerind	75	A	A→Z
Sibiu	140	A	A→S
Timisoara	118	A	A→T
Oradea	146	Z	A→Z→O
Neamt	246	O	A→Z→O→N
Fagaras	239	S	A→S→F
Rimnicu Vilcea	220	S	A→S→R
Pitesti	317	R	A→S→R→P
Craiova	366	R	A→S→R→C
Bucharest	418	P	A→S→R→P→B
Giurgiu	716	C	A→S→R→C→G
Eforie	687	G	A→S→R→P→B→U→H→E
Urziceni	503	B	A→S→R→P→B→U
Hirsova	601	U	A→S→R→P→B→U→H

Eforie: min(1116, 687) = 687

※ 省略 Ureziceni→Vaslui，因為距離目標 Eforie 更遠。

we are done.

The Shortest path to Eforie is A→S→R→P→B→U→H→E.

Total Distance is 687KM.