Advanced College of
Engineering and
Management

SHORTEST PATH FINDER

Project

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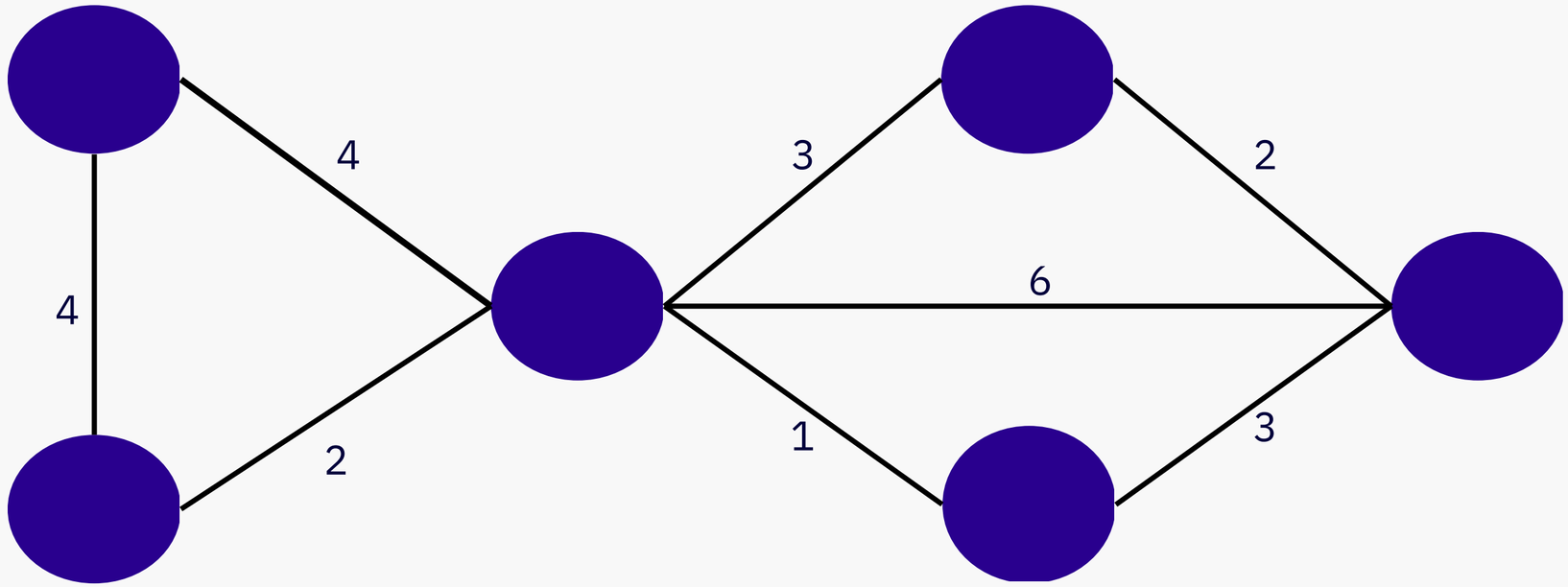
ACEM

Contents

Dijkstra’s Algorithm

Dijkstra's algorithm is an algorithm for finding the shortest paths between nodes in a weighted graph, which may represent, for example, road networks.

A weighted graph is a graph in which each branch is given a numerical weight.



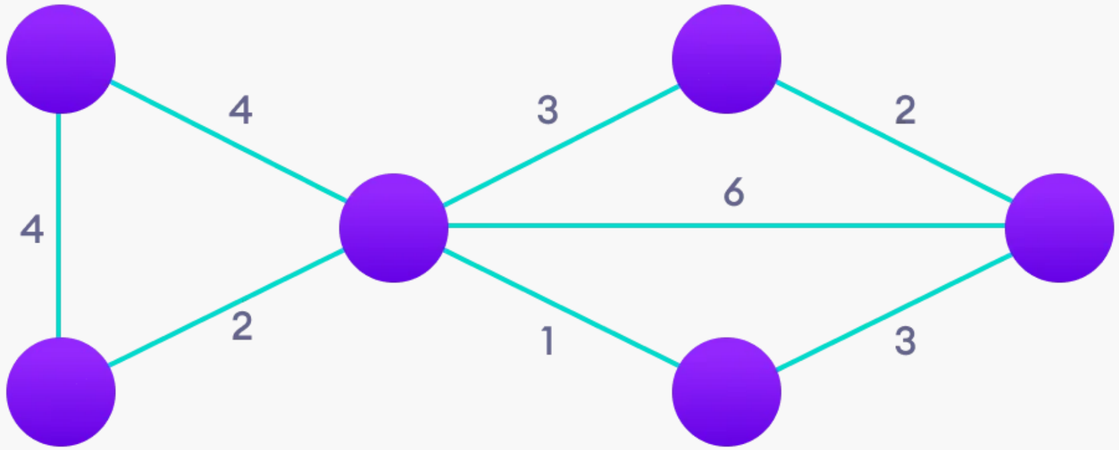
A weighted graph

How Does Dijkstra’s Algorithm Work?

Dijkstra's algorithm works on the basis that any subpath(B->D) of the shortest path(A->D) between the vertices A and D is also the shortest path between vertices B and D.

Each subpath is the shortest path

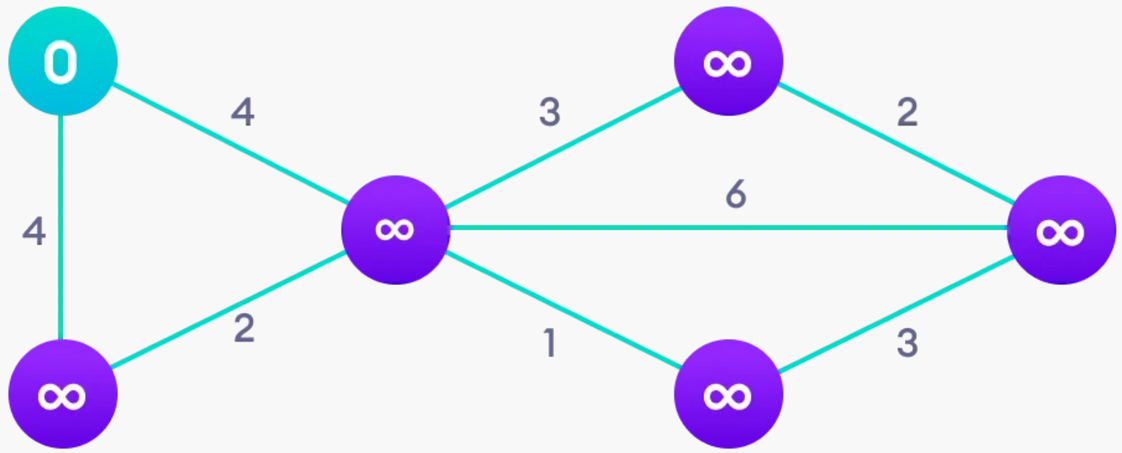
Algorithm



Step: 1

Start with a weighted graph

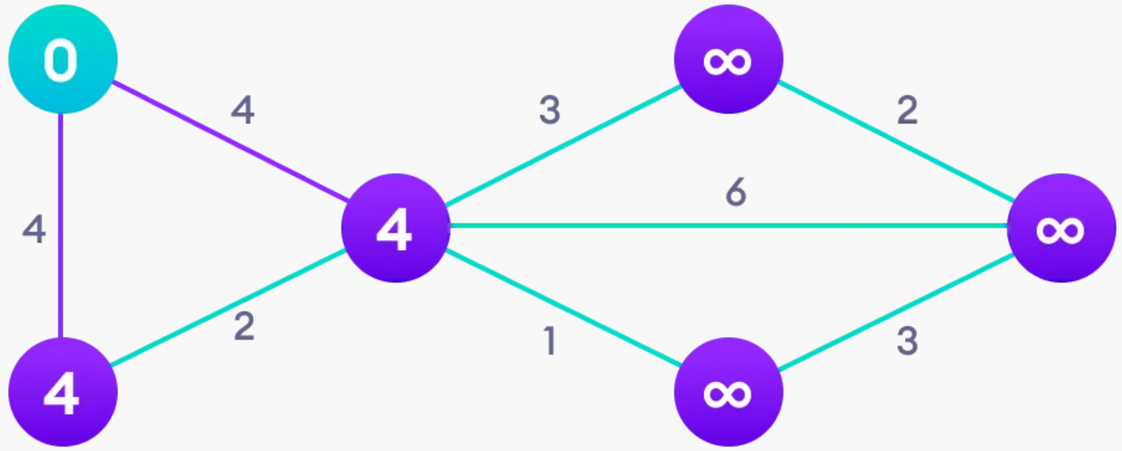
Algorithm



Step: 2

Choose a starting vertex and assign infinity path values to all other nodes

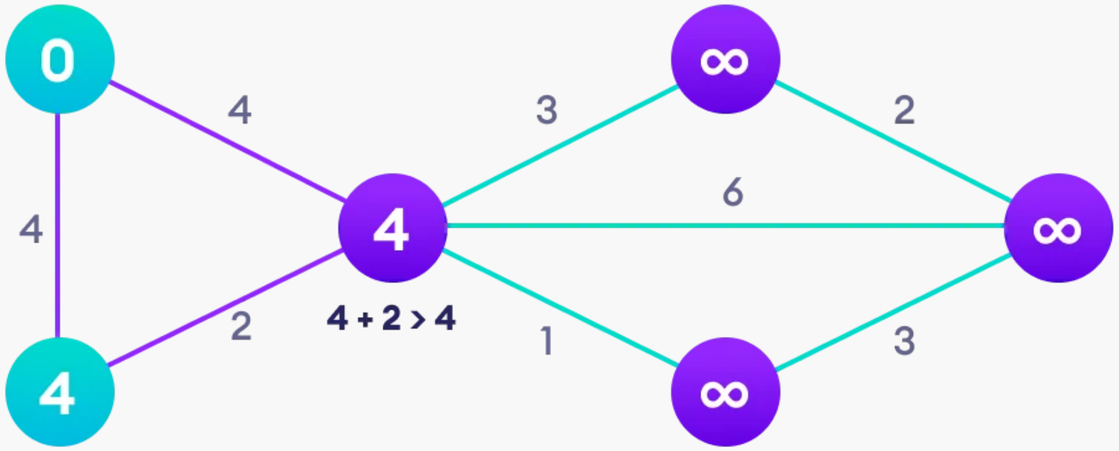
Algorithm



Step: 3

Go to each vertex and update its path length

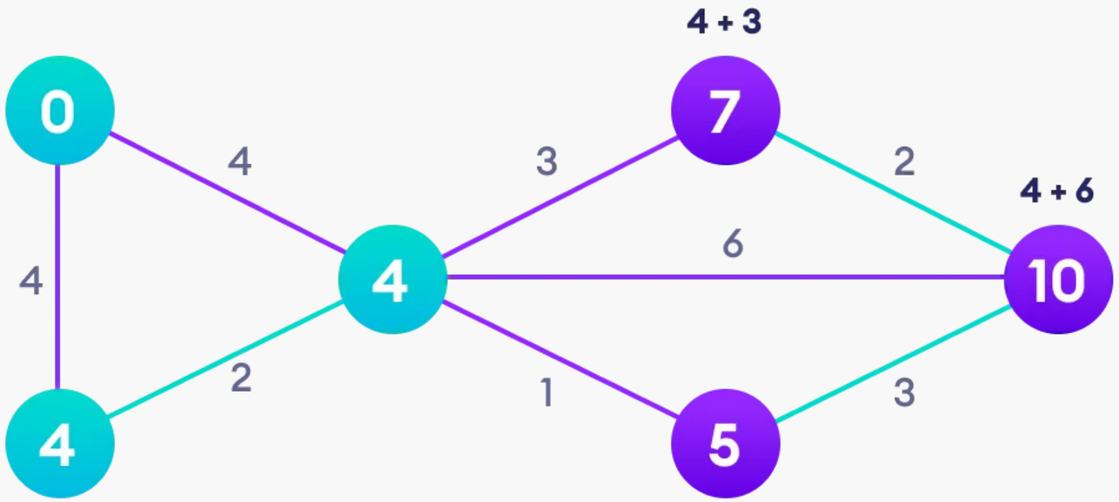
Algorithm



Step: 4

If the path length of the adjacent vertex is lesser then a new path length, don't update it

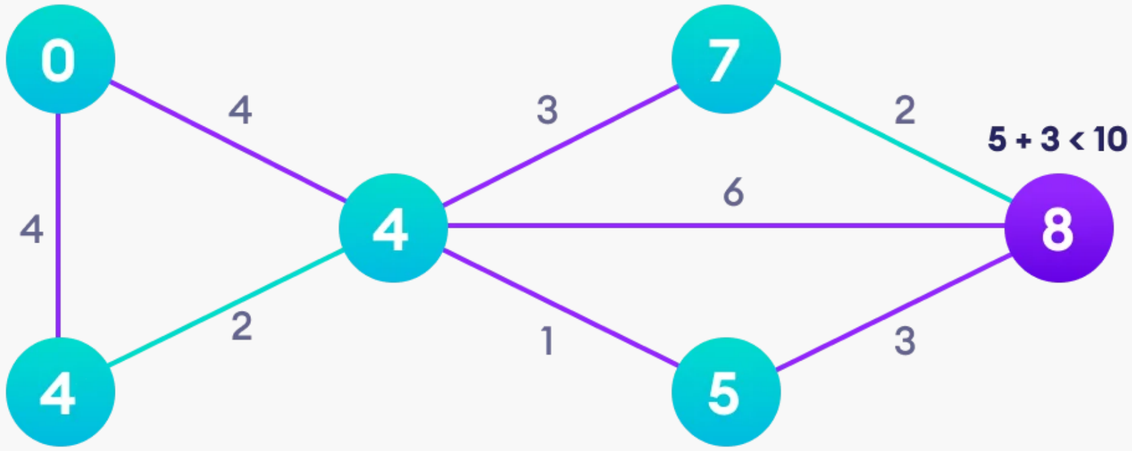
Algorithm



Step: 5

Avoid updating path lengths of already visited vertices

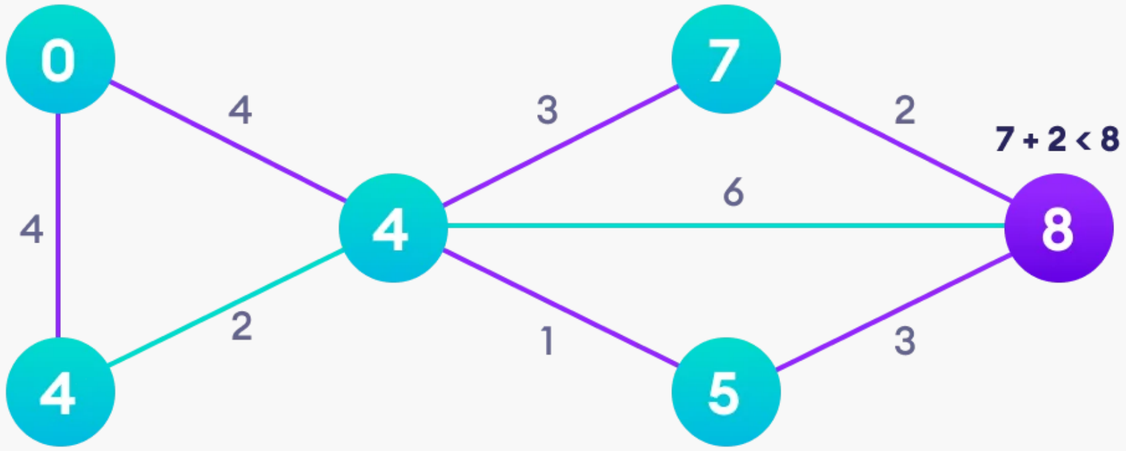
Algorithm



Step: 6

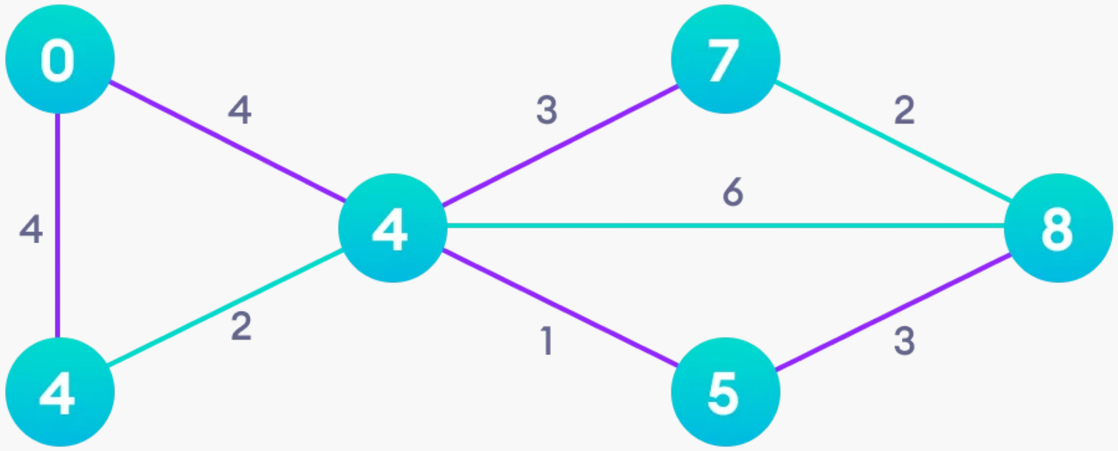
After each iteration, we pick the unvisited vertex with the least path length. So we choose 5 before 7

Algorithm



Notice how the rightmost vertex has its path length updated twice

Algorithm



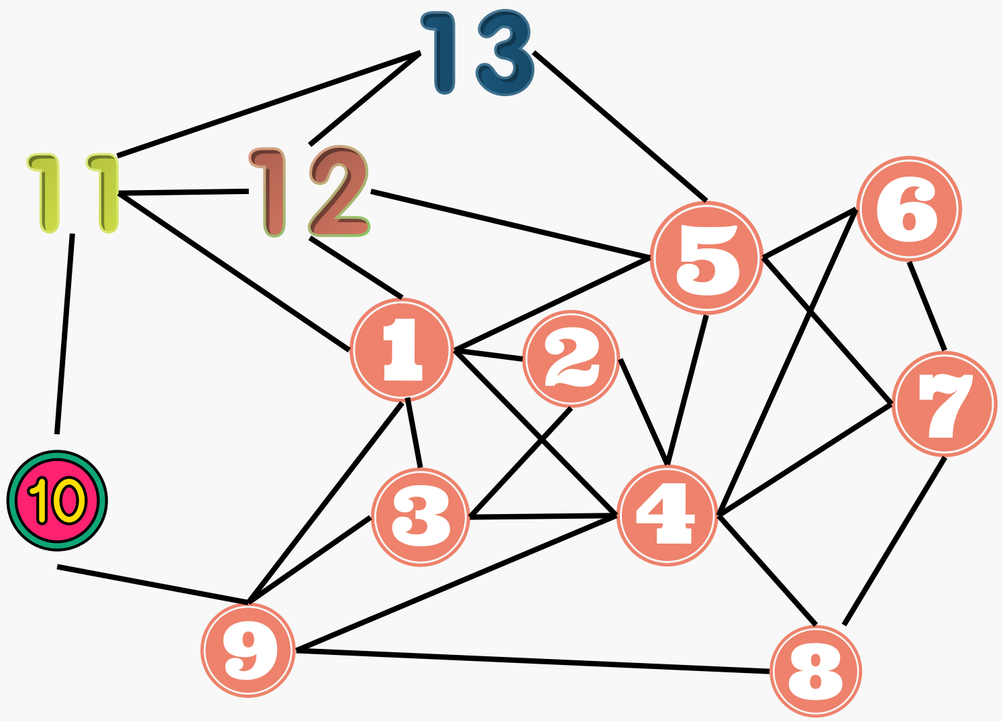
Step: 8

Repeat until all the vertices have been visited

Applications of Dijkstra Algorithm

- Digital Mapping service in Google Map
- Social Networking Applications
- IP routing to find Open shortest Path First
- Telephone Network
- Robotic Path

Districts of Province 3 represented in Graph



Where,

1 > Kathmandu
2 > Bhaktapur
3 > Lalitpur
4 > Kabhrepalanchowk
5 > Sindhupalchowk
6 > Dolakha
7 > Ramechhap
8 > Sindhuli
9 > Makwanpur
10 > Chitwan
11 > Dhading
12 > Nuwakot
13 > Rasuwa

NOW LETS MOVE TO PROJECT