Algorithm research paper

[A survey of Algorithm to finding the shortest path/easiest way between Dijkstra and greedy Algorithm]

Submitted by

SIUM BIN NOOR (191-15-12516)

Abruna Afrin (191-15-12303)

Section O14

A survey of Algorithm to finding the shortest path/easiest way between Dijkstra and greedy Algorithm

Sium Bin Noor

Student of CSE (Batch 52)

Daffodil international University

Abruna Afrin

Student of CSE (Batch 52)

Daffodil international University

Abstract: This survey research paper is a simple university project to understand the easiest way between two algorithms. An analysis is an important function of university student and the shortest path analysis is the key issue of network analyses. In Most of university application, Dijkstra and greedy algorithm is useful. The functionality of Dijkstra's original algorithm can be extended with a variety of modifications. This paper represents the survey of two different algorithms dijkstra algorithm and greedy algorithm. The purpose of the paper is to select one best algorithm from the two and this algorithm can be used in government sector, emergency system, Business sector etc.

Keywords – Dijkstra, greedy algorithm, shortest path, quick path etc.

Introduction

In Bangladesh there are so many universities where students are studies the chapter ‘algorithm’. in case, we find most similar algorithm like dijkstra and greedy algorithm. It’s important to know the best or worst case or how those algorithm work and the purpose of those algorithm. in today’s section, we finding the easiest way to get result between this two.

There are so many factors of algorithm. In real life we also need those algorithms to find shortest path for transportation. By the way, the university education system on algorithm is the major part to know what algorithm actually is.

Dijkstra Algorithm: Dijkstra's algorithm (or Dijkstra's Shortest Path First algorithm, SPF algorithm) is an algorithm for finding the shortest paths between nodes.

Greedy Algorithm: Greedy is an algorithmic paradigm that builds up a solution piece by piece, always choosing the next piece that offers the most obvious and immediate benefit. So the problems where choosing locally optimal also leads to global solution are best fit for Greedy.

Similarity and Dissimilarity and time complexity of those Algorithm

Here is the programming body of those Algorithm:

I)Dijkstra Algorithm:

```
function Dijkstra (Graph, source):
      dist[source]  = 0
      for each vertex v in Graph
         if v ≠ source
            dist[v]  = infinity
            previous[v]  = undefined
         end if
         add v to Q
      end for

      while Q is not empty:
         u = vertex in Q with min dist[u]
         remove u from Q

         for each neighbor v of u:
            alt = dist[u] + length (u, v)
            if alt < dist[v]:
               dist[v]  = alt
               previous[v]  = u
            end if
         end for
      end while
      return dist [], previous []
   end function
```

II)Greedy Algorithm:

```
current_distance = 0
current_stop = 0
stops = []
while current! = Dhaka:
  next_stop = 0
  while distance(next_stop) -
current_distance <= m:
    next_stop = next_stop + 1
  next_stop = next_stop - 1

  current_stop = next_stop
  current_distance = distance(current_stop)
  add next_stop to stops
return stops
```

for greedy algorithm, we can see that if the greedy algorithm is the farthest it can be after the first stop, and after the nth stop it is the farthest it could be given stop n - 1, then the greedy algorithm must be the farthest it can be for all stops along the route.

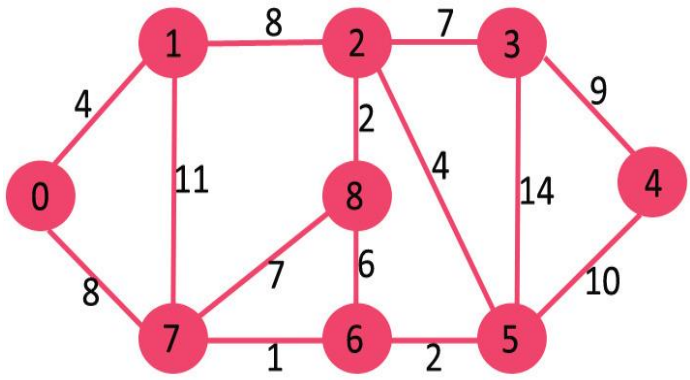
Although this algorithm has complexity O(n).

But the dijkstra algorithm has complexity O(n^2).

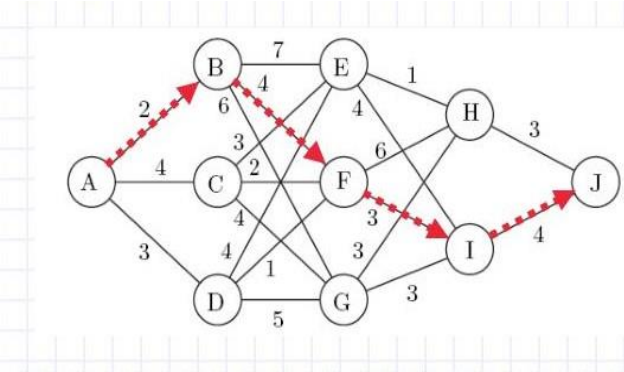
For those the time complexity of those Algorithm for greedy is constant but for dijkstra it is quadratic because of n^2.

Graphical Difference

Dijkstra Algorithm:



Greedy Algorithm:



In greedy algorithm, its only find the greedy approach but not take the all over shortest path like dijkstra. So it's quite comfortable to choose their way using greedy method.

Conclusion

Djikstra picks this sub-problem in a way which is greedy. So in some sense it has a greediness attached to it. The greedy picking ensures that once a vertex has been covered and all its outgoing edges relaxed, there is no need to come back to it.

So, we can say that greedy algorithm is a parent and dijkstra is their child. Dijkstra algorithm is a part of greedy Algorithm.

Based on the time complexity and graphical discussion we stand on a decision that the greedy algorithm is better than the dijkstra Algorithm.

REFERENCES

[1] Mr. Subroto Nag Pinku, Lecturer, Department of Computer Science and Engineering, Faculty of Science and Information Technology, Daffodil International University Former Student Tutor (September,2014 to April,2016) Department of Computer Science and Engineering, BRAC University.