Laboratory Nro. 5: Graphs

Camila Barona Cabrera
Universidad Eafit
Medellín, Colombia
cbaronac@eafit.edu.co

Mariana Gómez Piedrahita
Universidad Eafit
Medellín, Colombia
Mgomezp10@eafit.edu.co

3) Mock project support questions

a) The problem in general was done in two ways:
Implementation of a digit using adjacency matrices and with Array list:
With the use of matrices, we have a value; which in this case would be the "price" if they have a zero, then they are not connected. There are several methods: Create the matrix, show the price of the trip, add new destination and show the events of a certain text in the matrix. For the Array list, a Linked list with array is implemented, making use of the pairs in order to connect the origin and destination in the array.

b) For the numeral 1.3 about the representation the map of the city of the media is much better using the adjacency lists, since in the search of the relations between the city in the relationship in time it is much smaller than the matrices of the adjacency, will also occupy less space in the memory of the computer, making good use of memory. In addition, it allows us to easily find all the links that are directly connected to a particular city, being the case of a node that has several arcs.

c) The advantage of the implementation of an adjacency list is that it allows a graph to be represented compactly. The adjacency list allows you to easily find the links that are directly connected to a particular vertex. In the adjacency list, less memory is consumed, because if an adjacent vertex is added, the only thing added is a node, whereas the matrix of Adjacency must create a new nxn matrix. The adjacency list is usually added at the beginning, so it is disordered and accessing an adjacent vertex would be in order (n) in the worst case, whereas in the adjacency matrix it is of order (1).

d) Considering that the priority of the routing table is to find the shortest distance to go from one point to another, it would be better to use adjacency lists since it allows you to easily find the vertices that are connected.

e) The complexity of this exercise is: O(n^2)

f) In this exercise, we use adjacency matrix, for that we have to roam for each column an row, for that, n means the size of the graph.

2.

4) evaluation test

	0	1	2	3	4	5	6	7
0				1	1			
1	1		1			1		
2		1			1		1	
3								1
4			1					
5								
6			1					
7								

0→ [3,4]
1→ [0,2,5]
2→ [1,4,6]
3→ [7]
4→ [2]
5→ [ ]
6→ [2]
7→ [ ]

3. *O(n)*

5) recommended reading

Graphs

Graphs are data structures rather like trees, a graph is conformed by nodes and edges; for example: nodes in a graph represent cities, while edges represent airline fight routes between the cities.
Two methods are commonly used for graphs are: *The adjacency matrix* and *the adjacency list*. An adjacency matrix is a two-dimensional array in which the elements indicate whether an edge is represent between two vertices, if a graph has N vertices, the adjacency matrix is an NxN array. The list adjacency list refers to a linked list; each individual list shows what vertices a given vertex is adjacent to.
For represent a graph in a program is necessary to implement: *vertices*, (in a very abstract graph program you could simply number the vertices O to N-1 (where N is the number of vertices), and *edges* (Each vertex may be connected to an arbitrary number of other vertices).In general exists two principal kinds of graphs: Directed graphs: however, graphs are often used to model situations in which you can go in only ine direction along an edge; from A to B but not from B to A, as on a one-way street, and weighted graphs: in some graphs, edges are given a weight, a number that can represent the physical distance between two vertices, or the time it takes to get from one vertex.

UNIVERSIDAD EAFIT	UNIVERSIDAD EAFIT ESCUELA DE INGENIERÍA DEPARTAMENTO DE INFORMÁTICA Y SISTEMAS	Código: ST245 Estructura de Datos 1

Image took from:
https://naukas.com/2012/05/23/por-que-solo-cuatro-colores/

Image took from:
https://commons.wikimedia.org/wiki/File:Boruvka-example2.gif

DOCENTE MAURICIO TORO BERMÚDEZ
Teléfono: (+57) (4) 261 95 00 Ext. 9473. Oficina: 19 - 627
Correo: mtorobe@eafit.edu.co