Algorithm Design and Analysis

Tutorial 3, 2024

Question 1. Implement the exploration algorithm in DFS as *explore(int i)* method in *Digraph* Class. The underlying data structure of the *Digraph Class* is an adjacency list which maintains a hash map *data*. All the nodes in a digraph are associated with integers which can be retrieved from hash map *nodelist*. To implement this method, you need to do the following steps:

1. Set i true in hash map *visited* to indicate that a node has been visited.
2. Retrieve the neighbours of node i from *data*.
3. Make recursive calls of the exploration algorithm to all the neighbours of node i. If a node has been visited already, return.

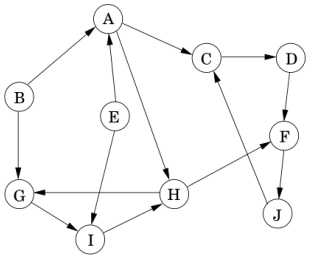
Question 2. Implement the *dfs()* method in *Digraph* Class by calling the *explore()* method developed in Question 1. This method should implement the DFS traversal of the digraph.

Question 3. Implement the *transpose()* method to reverse the edges of a digraph.

Question 4. Implement the Kosaraju-Sharir algorithm as a method *findSCC()* which prints the strongly connected components of a graph G.

You may test your algorithm using the graphs below:

(i)



(ii)