EECS2301E

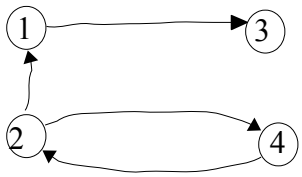
Lab 7
Fall 2018

Lab Objectives

Dealing with matrix operation and transitive closure problem

Problem 1

Given a graph with nodes (vertices) $1..n$, the adjacency matrix of a graph is a matrix of 1's and 0's such that if element $a_{i,j}$ = 1 then there is a link between nodes i and j where $i \le i, j \le n$ For example the djacency matrix of the following graph



$$\begin{bmatrix} 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 0, & 0 \end{bmatrix}$$ The transitive closure of this matrix is $$\begin{bmatrix} 0 & 0 & 1 & 0 \\ 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 0 \\ 1 & 1 & 1, & 1 \end{bmatrix}$$

Algorithm
Input: The adjacency matrix of a relation R on a set with n elements.
Output: The adjacency matrix T of the transitive closure of R.
Procedure: from https://www.cs.nmsu.edu/~ipivkina/TransClosure/

```
Start with T=A.
For each j from 1 to n
    For each i from 1 to n
       If T(i,j)=1, then form the Boolean or of row i and row j
                         and replace row i by it.
       Go on to the next i-value.
    Once you have processed each i-value, go on to the next j-value.
```

The input is the number of nodes in the graph n followed by the n^2 elements of the matrix

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