CE Directed Graphs

MISSING 10 Possible Points

| 11/21/2022

Attempt 1

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Graphs

CE: Directed Graphs

Learning Objectives

- Create a graph file based on an image of a directed graph
- Identify the topological order and draw it
- Identify the strong components of a directed graph

Overview

This CE consists of two parts.

In Part 1, you will identify strong components of a directed graph

In Part 2, you will create a graph file based on an image of a directed graph, write code that

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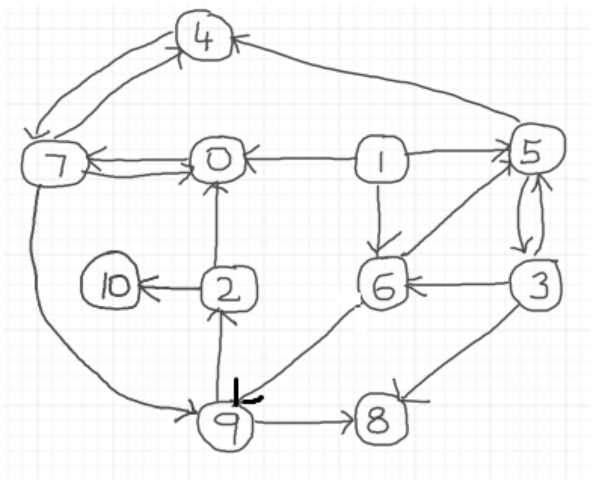
Instruction

Part 1

We say that two vertices v and w are strongly connected if they are mutually reachable. That means if there is a directed path from v to w and a directed path from w to v.

Identify the strong components of the following graph.
Then answer the questions below.



- How many strong components does the graph have?
  When you are done, ***compare.***

- List the strong components
  When you are done, ***compare.***

- Take a moment to consider DAGs (Directed Acyclic Graphs).
  What are the strong components of a DAG?
  When you are done, ***compare***.

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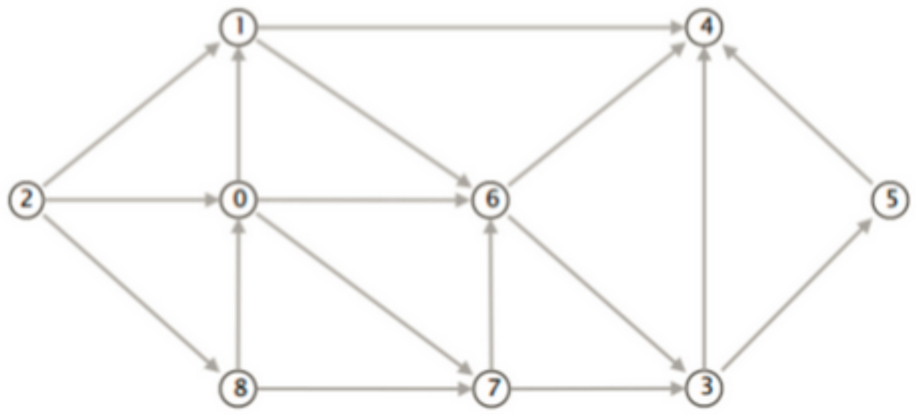

- Create a new package called **graphDirected**
  - Inside the package, create a class called **DirectedCE** that includes the main method.
    Also, create a resource directory that includes a graph file called **TopologicalOrderGraph.txt**
    The graph file should correspond to the graph above and it should use the input file format described by Prof. Sedgewick in tinyDG.txt (**https://algs4.cs.princeton.edu/42digraph/** **(https://algs4.cs.princeton.edu/42digraph/)**)

    Notice, that tinyDG.txt lists the edges in no specific order. This works well when you read in data from a file. However, when you create your own file from a graph image, it is easy to miss an edge or to list one twice. To avoid such mistakes, start by listing all outgoing edges from 0, then from 1, etc. Also, list all outgoing edges from a specific vertex in order.
    E.g. 0 to 1 before 0 to 6 then 0 to 7 followed by 1 to 4 then 1 to 6 etc.

    Create the file TopologicalOrderGraph.txt. When you are done, ***compare***.

  - Identify the class that is most helpful when you need to compute a topological order.
    In order to do so, look at the different graph classes that Prof. Sedgewick provides.

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- Draw the graph above in a way that all edges point in the same direction. This can be done electronically or on paper.
  Start by listing the vertices in the order identified by your program. Then add the edges. Try to minimize the crossing of edges.

  When you are done, count the edges you drew and ensure that they match the number of edges in the original graph. Then take a picture of your drawing and show it on your screen at the end of your video recording.

Submission

Create a screen recording following the **guidelines for lab recordings (https://slcc.instructure.com/courses/817632/pages/guidelines-for-ce-recordings)** .
The end of the video should include your picture of the graph that shows all the edges pointing in the same direction.
The video should be **25-50 seconds** long.
Post the video.

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