

CS2040C Semester 1 2018/19
Data Structures and Algorithms

Tutorial 09 - Graph Representation and Graph Traversal

For Week 11 (Week Starting 29 October 2018)

Document was last modified on: October 26, 2018

1 Introduction and Objective

This tutorial marks the beginning of our discussion on graphs. Firstly, this tutorial will discuss the various graph data structures needed to store and represent graphs. Then, some examples of real life scenarios that can be modelled as a graph will be discussed. The tutorial will then end off with a quick introduction/recap to Depth-First-Search or Breadth-First-Search.

Basic Stuff About Graph DSes

Q1). Tutor will draw just one random small graph on the **whiteboard** first and ask students to store that graph in either Adjacency Matrix (AM)/Adjacency List (AL)/Edge List (EL) data structure on the **whiteboard**. Then, the tutorial group can compare the answers by drawing the same small graph on <https://visualgo.net/en/graphds>.

Various Type of Graphs

Q2). Draw a Directed Acyclic Graph (DAG) with V vertices and $V \times (V - 1)/2$ directed edges.

Q3). Draw a Bipartite Graph with V vertices (assume that V is even) and $V^2/4$ undirected edges.

This question has been integrated in VisuAlgo Online Quiz :).

Graph Modeling Exercise Part 1

Q4). In tutorial, the tutor will randomly imagine a real life scenario (that can be modeled as a graph problem) and will ask random student to model that scenario into a graph. Students have to describe what the set of vertices represent, what the set of edges represent, are the graphs weighted/directed/connected?, what are the graph (for now, limit to graph traversal) problem being asked?, etc...

DFS/BFS Review

Q5). The tutor will end the tutorial by quickly reviewing DFS and BFS graph traversal algorithms using <https://visualgo.net/en/dfsbfbs> starting from a randomly drawn graph. We will discuss harder applications of these two graph traversal algorithms in the next tutorial.

Problem Set 4

That's the end of Tut09. You can ask your tutor about PS4 and Practical Exam if you encounter any difficulties with it.