DISCRETE STRUCTURES
Lab 6 & 7: Graph Theory (Part 1)

1   Introduction

In this series of tutorials, we'll concentrate on graph theory, which covers topics on: definition and properties of a graph, graph representation, path finding, cycle finding, and directed and undirected graph. We split our topics into two parts: first, we present how-to find a path between two nodes in a graph, then, in the next tutorial, we'll present algorithm to find a cycle in a graph.

2   Graph Theory

2.1   Definition and basic properties

Before we go deeper into graph theory, let's see an interesting example in Fig1. In small version of a social network, we define a diagram in which connects people who has relationship with the others.
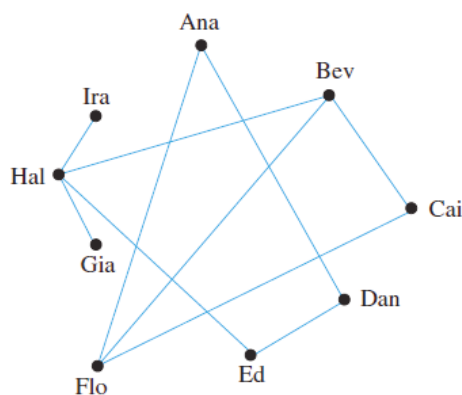

Figure 1 Social network diagram

From the above diagram, we can easily see that {Gia, Ira} are both friends of Hal, or {Flo, Cai} are friends of each other. Drawing such as **Figure 1** is illustration of a structure known as a ***graph***. The dots are called ***vertices*** (plural of ***vertex***) and the line segments joining vertices are called ***edges***. As you can see from the drawing, it is possible for two edges to cross at a point that is not a vertex.
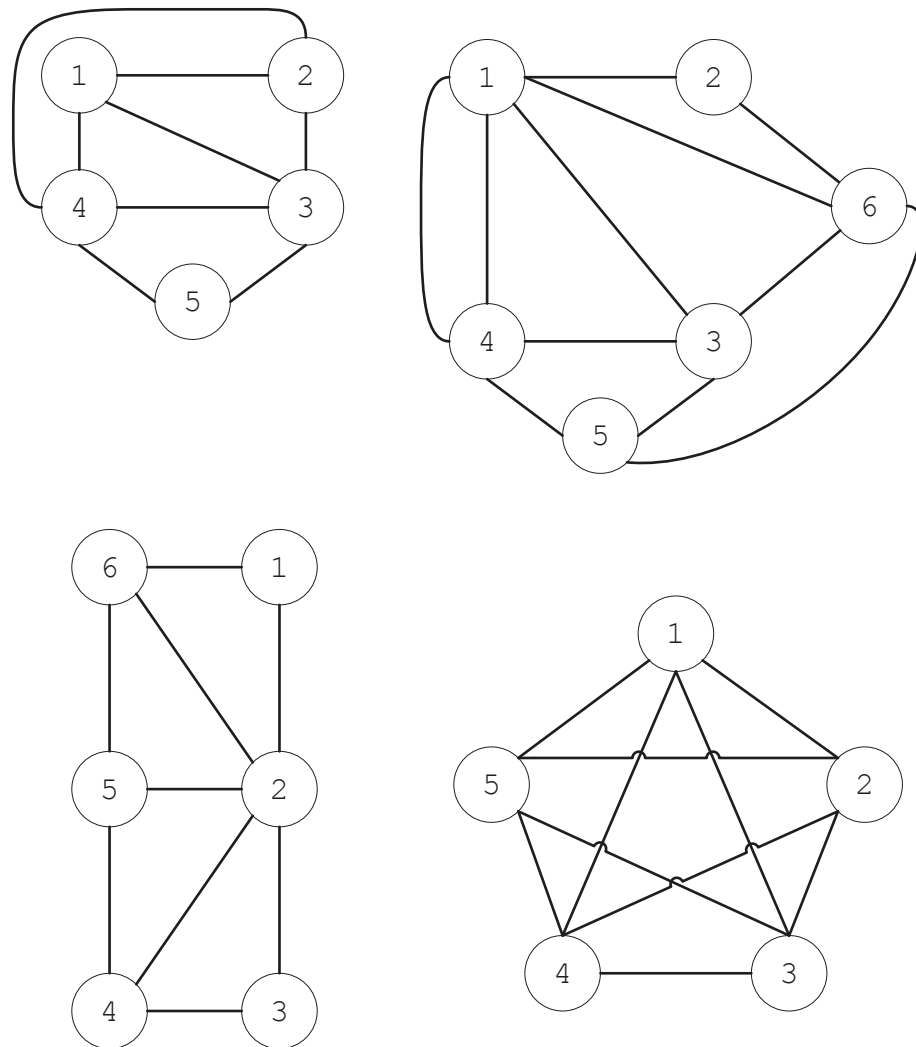
6. Implement the **DFS** algorithm, then test it on the adjacency matrixes in *Ex.5*.

7. Implement the **BFS** algorithm, then test it on the adjacency matrixes in *Ex.5*.

8. Given a graph *G*, find all connected components in *G*.

4   Reference

[1] Epp, S. S. (2011). *Discrete mathematics with applications*. Cengage Learning.

[2] https://en.wikipedia.org/wiki/Depth-first_search

[3] https://en.wikipedia.org/wiki/Breadth-first_search

[4] Tutorials Point - https://www.tutorialspoint.com/

[5] https://github.com/duonghuuphuc/cs501044-discrete-structures-graph-theory