



UNIVERSITY OF CALOOCAN CITY  
COMPUTER ENGINEERING DEPARTMENT



Data Structure and Algorithm

Laboratory Activity No. 10

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# Intro to Graphs

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# I. Objectives

## Introduction

A graph is a visual representation of a collection of things where some object pairs are linked together. Vertices are the points used to depict the interconnected items, while edges are the connections between them. In this course, we go into great detail on the many words and functions related to graphs.

An undirected graph, or simply a graph, is a set of points with lines connecting some of the points. The points are called nodes or vertices, and the lines are called edges.

A graph can be easily presented using the python dictionary data types. We represent the vertices as the keys of the dictionary and the connection between the vertices also called edges as the values in the dictionary.

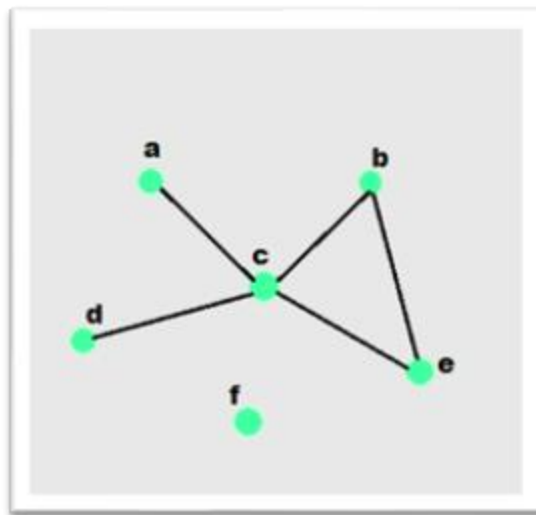


Figure 1. Sample graph with vertices and edges

This laboratory activity aims to implement the principles and techniques in:

- To introduce the Non-linear data structure – Graphs
- To discuss the importance of Graphs in programming

# II. Methods

A. Discuss the following terms related to graphs:

1. Undirected graph
2. Directed graph
3. Nodes
4. Vertex
5. Degree
6. Indegree
7. Outdegree
8. Path
9. Cycle
10. Simple Cycle

### III. Results

#### 1. **UNDIRECTED GRAPHS**

- Is a kind of graph in which two connected nodes (vertices) can be reached in either direction since the edges have no specific direction. They also depicted with simple lines indicating reciprocal links and also symbolize bidirectional relationships.

#### 2. **DIRECTED GRAPHS**

- Also called “digraph”, it is a collection of vertices (nodes) connected by edges with specific direction. This graph shows an arrow, indicating one-way relationship or flow from “tail” to “head.” It can be used to model system like transportation, networks, task dependencies, etc.

#### 3. **NODES**

- It refers to a connecting point or basic unit in a system. In a network, these can be used in sending, receiving, forwarding data, etc. In data structures, a node is fundamental unit contains data and links to another node used to build structures like linked list, trees, and graphs.

#### 4. **VERTEX**

- It is a point where two or more lines, edges, or curves intersect. In data structure is also called a “Node.” It represents an entity to a graph.

#### 5. **DEGREE**

- “Degree” is a term or context refers to either the number of edges connected to a node or the maximum number of children a node can have. In a directed graph, these degree can be broken down; in-degree and/or out-degree.

#### 6. **INDEGREE**

- Refers to the number of incoming edges to a node in a directed path.

#### 7. **OUTDEGREE**

- Out-degree is the number of edges that originate from a vertex (node), representing the number of connections (outgoing) from that specific node.

#### 8. **PATH**

- Path is a sequence of connected nodes, starting from one node to another. This concept is very crucial analyzing and understanding how the data is structured.

## 9. **CYCLE**

- A cycle is a path that start and ends at the same node. This can occur in linked list, graphs, or trees.

## 10. **SIMPLE CYCLE**

- Simple cycle in data structure is a path within a graph that start and ends at the same node without repeating any other vertices (node). This means that the first node and last node are the same while the other nodes visited only once.

# IV. Conclusion

In conclusion, understanding the key concepts of graphs – such as directed and undirected graphs, as well as knowing its components (i.e. nodes (vertices), degrees, paths, and cycles) are crucial in studying data structures and algorithms. These elements form a foundation for us to analyze and represent complex relationship and connections between networks, system, etc. Lastly, these concept is provides an understanding necessary for solving real-world problems.

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