UNIVERSITY OF CALOOCAN CITY
COMPUTER ENGINEERING DEPARTMENT

Data Structure and Algorithm

Laboratory Activity No. 10

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.

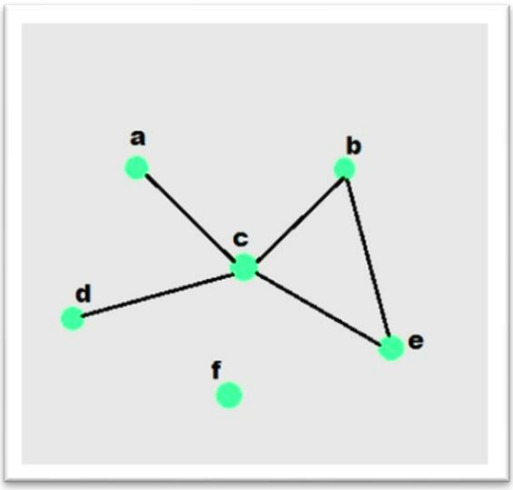

Figure 1. Sample graph with vertices and edges

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

- Undirected Graph

An undirected graph is a type of graph where the edges have no direction. This means the connection between two vertices goes both ways — if A is connected to B, then B is also connected to A.

- Directed Graph

A directed graph (or digraph) is a graph where edges have a direction, represented by arrows. In this case, if there is an edge from A to B, it doesn't necessarily mean there is also one from B to A.

- Nodes

Nodes, also called points or elements, are the individual objects in a graph that can represent data or entities such as cities, computers, or users.

- Vertex

A vertex (plural: vertices) is another term for a node. It represents a single point in the graph where edges meet.

- Degree

The degree of a vertex is the number of edges connected to it. In undirected graphs, it counts all connections, while in directed graphs, it is divided into indegree and outdegree.

- Indegree

Indegree refers to the number of edges directed into a vertex in a directed graph.

- Outdegree

Outdegree is the number of edges that originate from a vertex in a directed graph.

 Path

A path is a sequence of vertices connected by edges that shows a way to travel from one vertex to another.

- Cycle

A cycle occurs when a path starts and ends at the same vertex without repeating any edge or vertex (except the starting/ending point).

- Simple Cycle

A simple cycle is a cycle in which no vertex (except the starting and ending vertex) is repeated, and each edge is unique.

IV. Conclusion

This activity helped us understand the basic concepts of graphs, including their types and components. We learned how graphs represent relationships between data and how they are used in programming to solve real-world problems efficiently.

References

[1] Co Arthur O.. “University of Caloocan City Computer Engineering Department Honor Code,” UCC-CpE Departmental Policies, 2020.