



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.

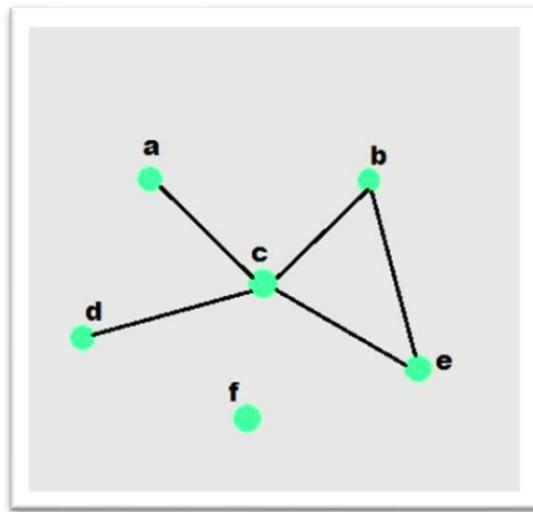


Figure 1. Sample graph with vertices and edges

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

Present the visualized procedures done. Also present the results with corresponding data visualizations such as graphs, charts, tables, or image . Please provide insights, commentaries, or explanations regarding the data. If an explanation requires the support of literature such as academic journals, books, magazines, reports, or web articles please cite and reference them using the IEEE format.

Please take note of the styles on the style ribbon as these would serve as the style format of this laboratory report. The body style is Times New Roman size 12, line spacing: 1.5. Body text should be in Justified alignment, while captions should be center-aligned. Images should be readable and include captions. Please refer to the sample below:

If an image is taken from another literature or intellectual property, please cite them accordingly in the caption. Always keep in mind the Honor Code [1] of our course to prevent failure due to academic dishonesty.

A **graph** is just a bunch of points connected by lines, like a map of cities and roads.

1. **Undirected Graph:** The connections have no direction. The line between two points works both ways, like a two-way street.
2. **Directed Graph:** The connections are one-way streets, shown with arrows. You can only go in the direction of the arrow.
3. **Nodes & 4. Vertex:** These are just the "points" or "dots" on the graph. They are the same thing.
4. **Degree:** How many connections a point has in an undirected graph.
5. **Indegree:** (For directed graphs) How many arrows are pointing *at* a point.
6. **Outdegree:** (For directed graphs) How many arrows are pointing *away from* a point.
7. **Path:** A route you can take from one point to another by following the connections.
8. **Cycle:** A path that starts and ends at the same point, making a loop.
9. **Simple Cycle:** A loop that doesn't cut through any other point more than once.

IV. Conclusion

In short, these terms are just the vocabulary for describing how things are connected. Knowing the difference between a two-way connection (undirected) and a one-way connection (directed) is the most important part.

References

- [1] Co Arthur O.. “University of Caloocan City Computer Engineering Department Honor Code,” UCC-CpE Departmental Policies, 2020.
- [2] Rosen, K. H. (2019). *Discrete mathematics and its applications* (8th ed.). McGraw-Hill Education.
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