B.Tech Project

Final Presentation

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Word Representable Graphs

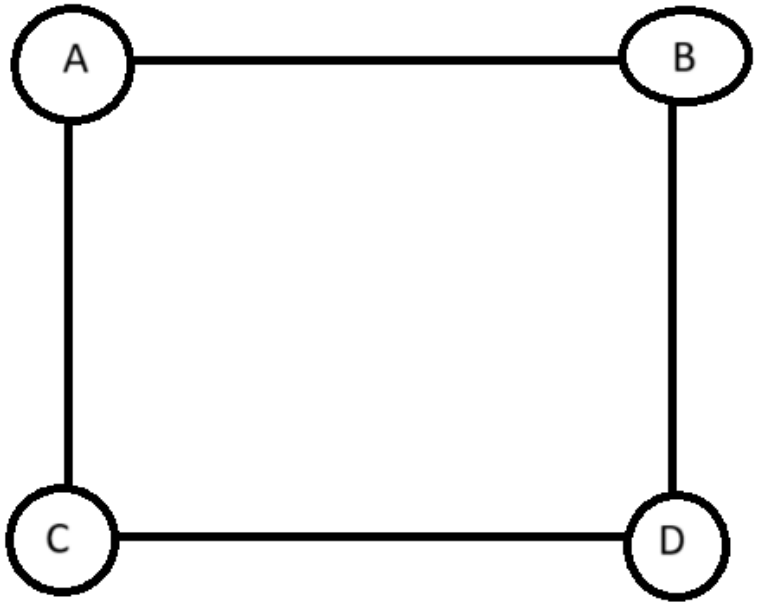
Introduction

The problem of determining if a graph is a word representable is NP-complete. But we wanted to develop a tool that can do so for smaller graphs.

Word Representable Graphs

Word-representable graphs can be represented by a word (or sequence) whose entries alternate in a prescribed way. In essence, each pair of vertices connected by an edge in the graph corresponds to an alternating pair of letters in the word.

Word Representable Graphs



- $W = abcadcbd$

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Word Representable Graphs

Importance of WRG

Contains these important classes of graph

- circle graphs
- 3-colorable graphs
- comparability graph

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Graph Isomorphism

Graph isomorphism refers to determining whether two graphs are structurally identical, meaning they have the same arrangement of vertices and edges, even with different labels.

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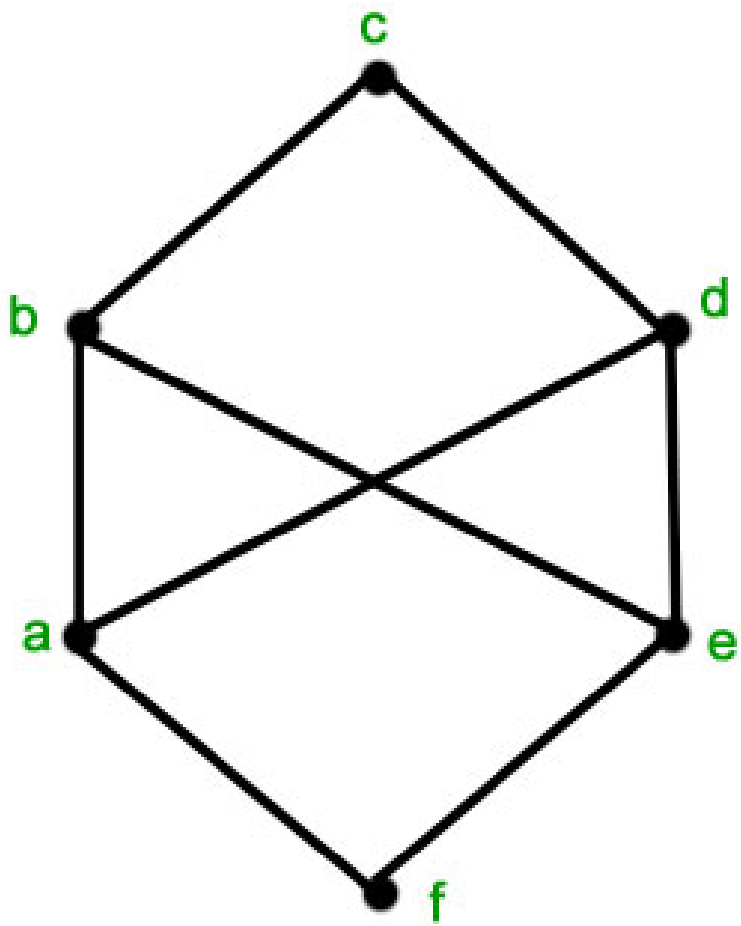
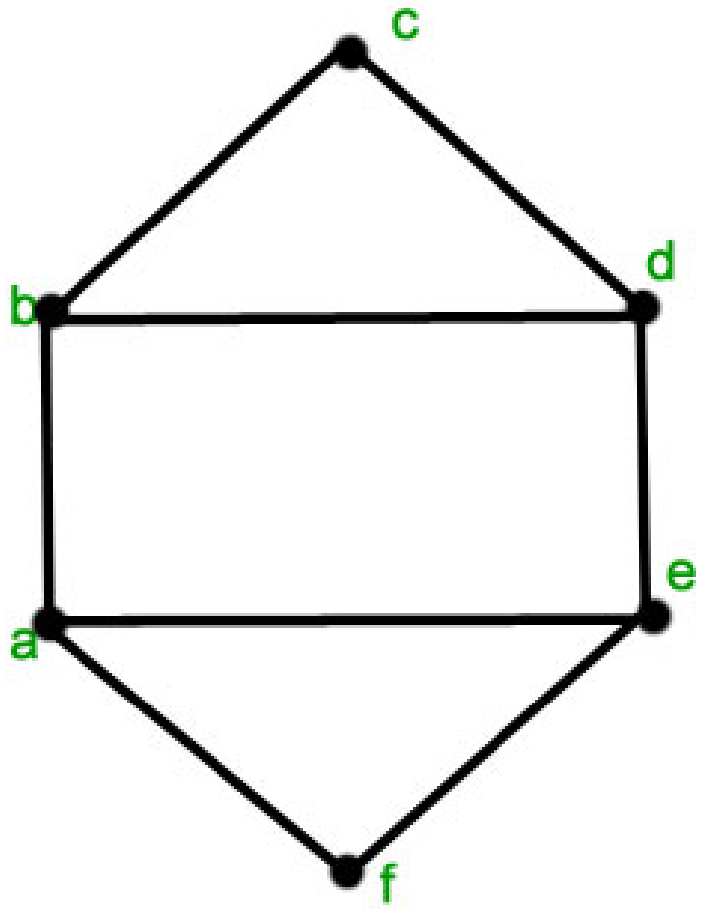
Graph Isomorphism





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Problem Statement

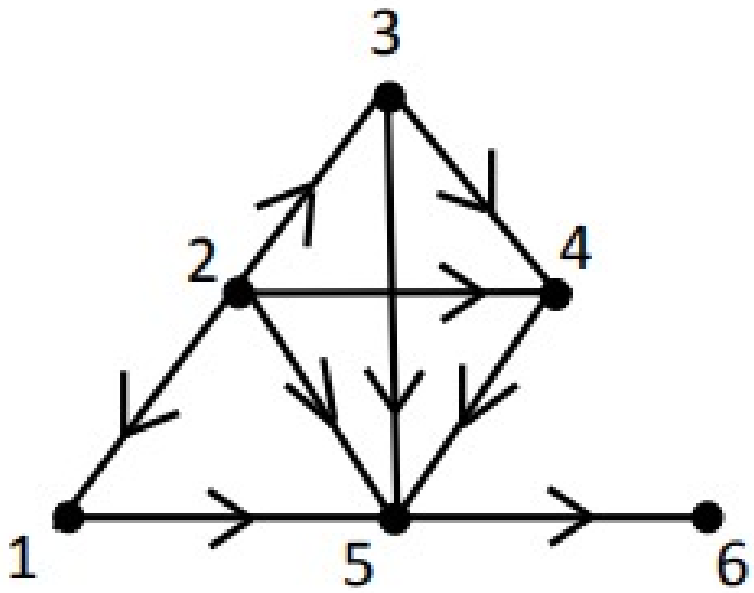
Designing an algorithm to determine whether a given graph is word-representable or not.

Methodology

Semi Transitive Orientation

Semi-transitive orientation refers to a directed arrangement of edges in a graph where certain directed paths exhibit a partial transitivity property, forming transitive cliques. It's a way of directing the edges such that paths either maintain transitivity or follow a specific pattern, aiding in graph analysis and characterization.

Semi Transitive Orientation



- Example of semi-transitive orientation

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Results

Time Complexity - $O(2^{n^2})$

Number of non-isomorphic non-word representable graphs

- 6 - W_5 out of 112 1 s
- 7 - 25 out of 853 10 s
- 8 - 929 out of 11117 1000 s

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