Cosc341 - Assignment 3

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Abstract

This report introduces the **Longest Path problem** and proves it is NP-complete.

1 Longest Path problem

The **Longest path problem** is a problem for finding the maximum length Simple-path in a graph, $G(V, E)$ with $|V| = n : n \in \mathbb{N}$. The graph is undirected and all edges weights are assumed to be 1.

1.1 Simple-path

Suppose in our graph, $G(V, E)$, we want the Simple-path between two vertices s and t. The Simplest-path is a path between any two nodes in the graph that does not go over the same node twice, and for two consecutive nodes there is a path between them.

As such a simple path between two nodes $s, t \in V$ is the sequence of vertices (v_1,v_2,v_3,....,v_k) that satifisy these conditions:

- $s = v_1$ and $t = v_k$
- Each consecutive nodes (v_i, v_{i+1}) there is an edge $e = (v_i, v_{i+1}) \in E$
- No node appears more than once in the sequence.