9. Minimum General Routing Problem

Given a graph $G = (V, E)$, length $l(e) \in N$ for each $e \in E$, subset $E' \subseteq E$, subset $V' \subseteq V$, the problem is to find a cycle in G that visits each vertex in V' exactly once and traverses each edge in E' such that the total length of the cycle is minimized.

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In all of the projects, your task is to implement a polynomial-time heuristic algorithm for the pertinent problem, which is in general NP-hard. You are required to make a comprehensive literature review and identify the existing approaches. You may then opt to implement an existing polynomial-time heuristic algorithm, if any, for the problem. If not and/or you prefer not to do so, then you need to propose your own polynomial-time heuristic algorithm and implement it. You are also required to present the computational complexity analysis of the algorithm you have implemented. In addition, you need to make a numerical comparative evaluation of your proposed algorithm via extensive simulations. You are also required to prepare a graphical user interface that demonstrates the execution of your algorithm.