CSCI 102 assignment 8 – Graph Traversals

April 21, 2024

The traveling salesman problems asks for the shortest path in an undirected graph that visits every node **at most once**.

- Implement a method `static <V> GoodList<Edge<Double>> travellingSalesman(Graph<V, Double> graph, Vertex<V> start)` that solves the travelling salesman problem, considering all paths starting at `vertex<V>`. This method should use recursive backtracking.

- Assuming `outgoingEdges` is $O(1)$, what is the worst case asymptotic computational complexity of this method in terms of the number of vertices n, number of edges m, and maximum degree d? Hint: it's large.

- Using any graph implementation you like, create a graph with 5 vertices labelled 1 through five such that all vertices are connected by forward and backward edges except there is no edge between 3 and 5 and between 1 and 4. Weight all edges by the average of the opposite vertices – i.e. the weight of the edge from 3 to 5 should be 4 – except the edge between 1 and 2 should have weight 1. Apply your method to solve the travelling salesman problem to this graph. Print the path and total weight of the path.

Please submit your code and answers to the questions in a zipped folder on Brightspace by April 29.