# California State University, Fresno

# DEPARTMENT OF COMPUTER SCIENCE

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| Class: | **Algorithms & Data Structures** | | | Semester: | **Fall 2021** |
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| Laboratory number: | **Laboratory 2** | | |
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**1. Statement of Objectives**

In this lab, we are to create a program that implements Dijkstra’s algorithm to find the shortest paths in a graph. The purpose and significance of this lab is to increase our knowledge of graphs and how to use them properly to find the shortest paths using the algorithm. This was accomplished in this lab. In this report, I will be discussing the experimental procedure, analysis of results encountered problems, and a conclusion.

**2. Experimental Procedure**

In this lab, we are to implement Dijkstra’s algorithms for finding the shortest distances from the source vertex to the rest of the vertices. To accomplish this, we used an adjacency matrix.

By using two functions, I was able to implement the algorithm. The first function is “int minDistance()” that takes in an integer array for the distance, a Boolean array, and an integer for iteration. This function is meant to find the vertex with minimum distance which is not yet included in the shortest path tree. The second function named “Dijkstra()” takes in the integers V, S, and the matrix of [50][50]. This function implements the actual Dijkstra algorithm.

A computer screen with white text

Description automatically generatedA screenshot of a computer program

Description automatically generated

**3. Analysis**

The results for this program matched what was expected in the instructions. When I insert 3 vertices, and the source vertex at 0, I enter the adjacency matrix to be (0,2,1) (INF INF INF) to achieve the result in the screenshot below. The results were successful from the testing I have done.

A screen shot of a computer

Description automatically generated

**4. Encountered Problems**

There were no encountered problems, the lab implementation was clear of errors so there is not anything to put into this section.

**5. Conclusions**

This lab was for us to learn how to successfully implement the Dijkstra shortest path algorithm. After completing this lab, the implementation was successfully done and had no errors when running. Overall, the lab was extremely successful in regard to the methods learned, strategies formed, and results found.

**6. References**

<https://www.geeksforgeeks.org/dijkstras-shortest-path-algorithm-greedy-algo-7/>