

# Implementation of graph theory to analyze routes in Texas

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**Abstract**—The problem I’m going to analyze will be the routes of the state of Texas, using an algorithm to calculate the shortest time between routes from a point  $i$  to a point  $j$ , to analyze the data in this problem I will rely on the database snab .standford.

## I. INTRODUCTION

Data structures open doors in our research and data analysis, to implement an algorithm that analyzes routes between two points in the state of Texas, when we talk about data structures, we are talking about graphs, graphs are structures defined by arcs and nodes, the nodes are those that store network data, and use an algorithm to calculate the easiest route between two points.

## II. CONCEPTS

Let’s look at important concepts for the project

### A. Data Structures

Data structures is a branch of computer science that studies and applies different ways of organizing information within an application to manipulate, search, and insert this data efficiently.

### B. Graphos

For computer science and mathematics, a graph is a graphical representation of various points known as nodes or vertices, which are joined together by lines called edges. By analyzing the graphs, the experts get to know how the reciprocal relations develop between those units that maintain some kind of interaction.

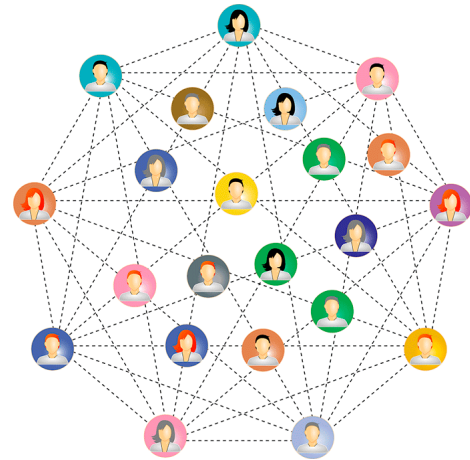


FIG 1:(a) Graph of a social network

### C. Connectivity (graph theory)

Whether the graph  $G=(V,A)$ , where  $V$  is the set of nodes or vertices and  $A$  is the collection of their arcs or edges depending on whether it is a oriented or not oriented graph, it is said that  $G$  is related if and only if between any pair of vertices  $x$ , and  $V$  there is a path starting at  $x$  and ending at  $y$ .

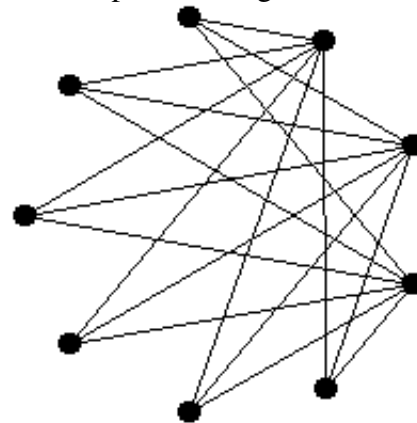


FIG 2: (a) Graph that between any pair of its vertexes there is a path that unites them.

### D. Algorithm

Algorithm is a series of finite steps to solve a problem

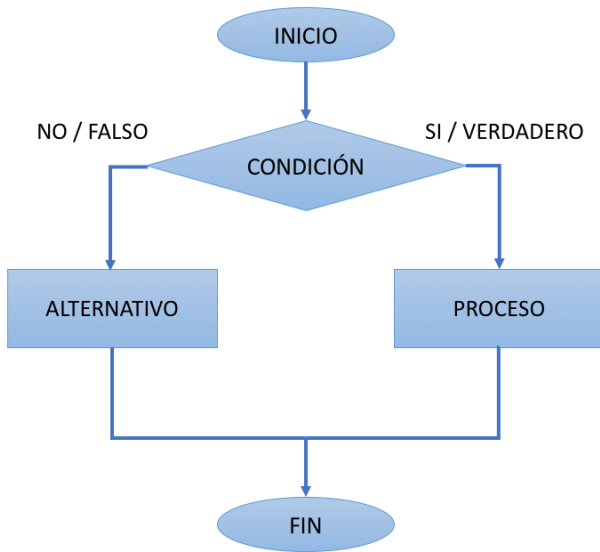


FIG 3: (a) Structure of an Algorithm

#### E. Dijkstra

Dijkstra algorithm also called minimum path algorithm, it is an algorithm for the determination of the shortest path given a vertex origin to the rest of vertices in a graph with weights in each corner. Its name refers to Edsger Dijkstra, who first described it in 1959.

### III. PROPOSED APPROACH

The objectives of this project are focused especially on the state of Texas, in which we want to find out how best route to get from one point to another point, and to solve this problem use the algorithm dijkstra, this makes choose the shortest path between two points. I will use the algorithm of dijkstra since this is also called as the algorithm of the minimum roads, and what I look for in my project is to look for the shortest roads, from two points (origin and destination), in this case I will handle it in the state of Texas looking for the shortest roads between two points, when using this algorithm, this will help us to calculate the shortest roads between two points.

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### IV. PROJECT DESCRIPTION

This is a road network of Texas. Intersections and endpoints are represented by nodes, and the roads connecting these intersections or endpoints are represented by undirected edges. After seeing the description of the project given by the database, we will use the Dijkstra algorithm to analyze which is the best way between two points passing through the shortest roads in the shortest time, if we analyze the routes we can see that from a point i to a point j, there are several roads but there is only a shorter way, then what the algorithm does is to find that shorter way with the minimum cost of time.

### V. CONCLUSION

To be filled

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