Reduction of traffic time in Medellin city

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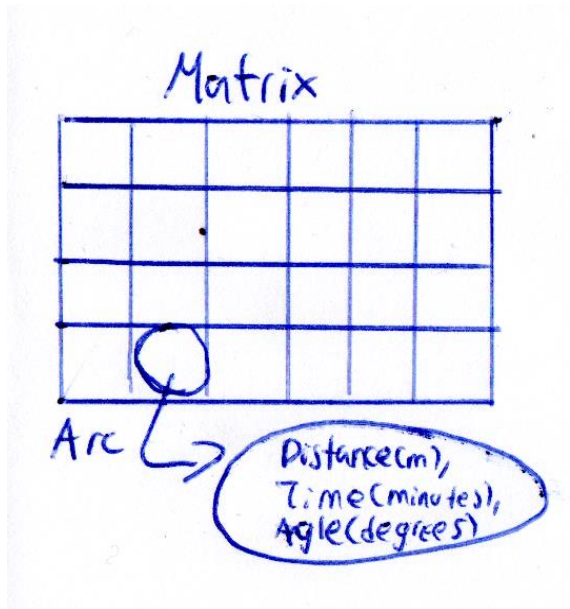**EAFIT**®

Data Structures

Figure 9: *Matrix of arcs. An Arc is a class that contains a time, distance and angle.*
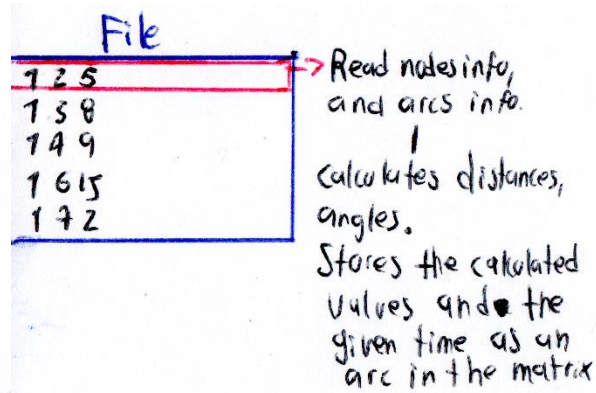
Figure 10: File reading
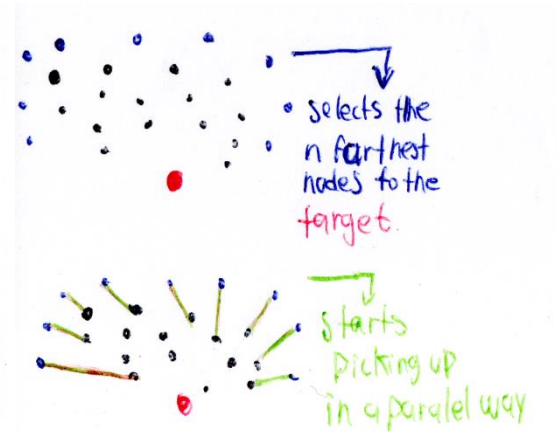

Figure 10.1: select order

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Algorithm and Complexity

Method	Complexity
Read file	O(n)
Distance between nodes	O(1)
Distance between latitudes	O(1)
Sort by distances	O(n*log (n))
Order finder	O(n^3)

Table 1: Table to report complexity analysis

Algorithm design criteria

We decided to use a matrix to store the graph since we have a complete graph. In the matrix we store an Arc. The arcs have the distance, the weight (time) and the angle with respect to the target node. This helps out with the ordering definition part of the algorithm because we can access the information in $O(1)$ complexity, and this is key because we have to access several times in the ordering part of the process.

Time and Memory Consumption

	Dataset 1 (4) ms	Dataset 2 (205) ms
Best case	0	563
Average case	0	693
Worst case	0	781

Table 2: Execution time of the operations of the data structure for each data set.

	Dataset 1 (4) mb	Dataset 2 (205) mb
Memory consumption	4	45

Table 3: Memory used for each operation of the data structure and for each data set data sets.

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