University Eafit

Systems Engineer

Matter:

Estructura de datos y algoritmos 2

Carpooling Eafit (Share your car, Save the world)

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Summary:

What is the problema?

The problem that arises is to minimize the number of cars that circulate to go to the same place, in this case we refer to going to the same company.

Why it is important?

this is important because it would decrease the time to go from one place to another, it would increase The quality of the air would increase the quality of production and when parking in the workplace would be much faster.

Related Problem

A problem that is related to this is the carpooling strategy, which is a non-systematized idea of students picking up others to take them to the university, the problem of this strategy is that it does not have a system or application that provides the information of students to know which person is closest to pick up first and who else could pick up how close they are.

The Solution

Create an algorithm that can receive the points in which the students of the Eafit university are and that the students that have a car can find an optimal way that allows them to pick up another 4 students and get to the university.

Results

We were able to create the algorithm that would allow a student with a car from the furthest point of the university to pick up 4 other students closer to the university while they were going to the university and everyone could arrive together.

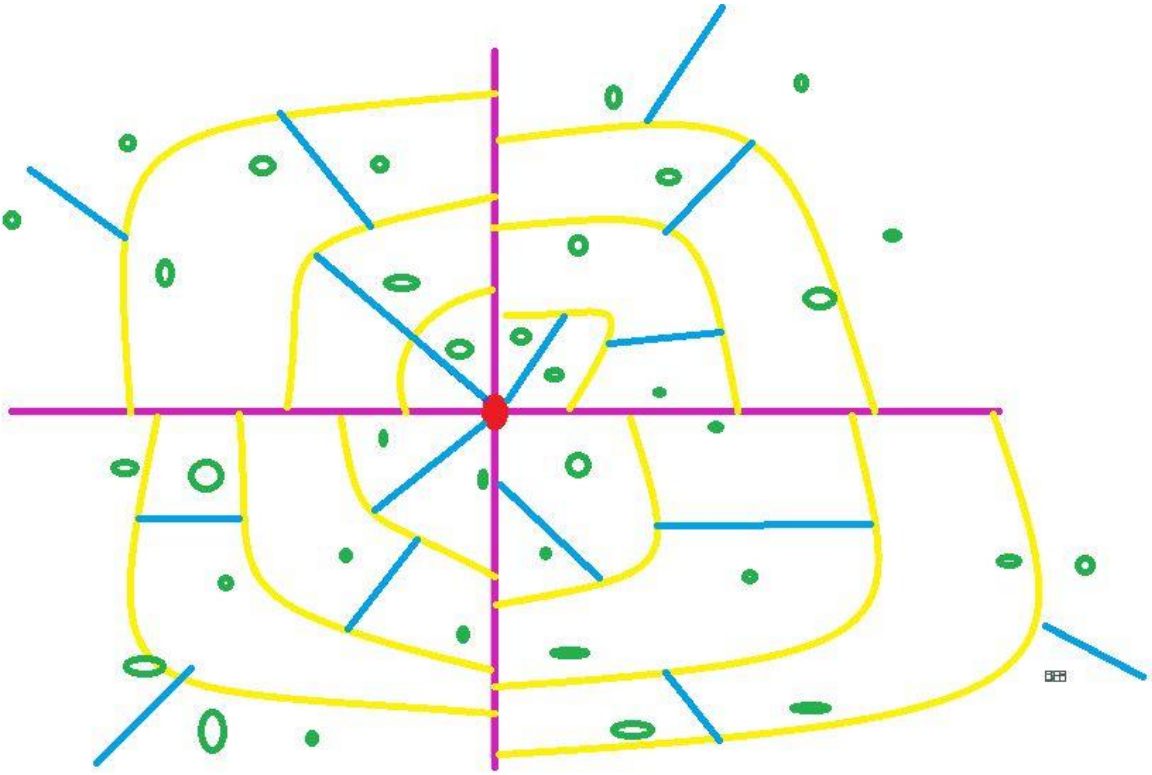
Conclusion

The algorithm helps to reduce traffic since fewer people would use cars because many more people would share the vehicle and this in turn would reduce environmental problems with respect to air, which will avoid health problems in all people and in turn will also increase the capacity of parking in the U because there will be fewer cars.

Previous deliveries

In the past deliveries we wanted to implement an algorithm by means of a quadtree since graphically they are very precise with the vertices and we thought it would have been optimal and quick to find the routes for students in this algorithm, but we realized that this is not the case , the quadtree is more complicated when handling files, apart from requiring a higher consumption of memory and the complexity of the algorithm did not meet the expected parameters. From this we learned in the first installment, for the second installment came the idea of using HashMap, in which Eafit university is taken as a point of reference, then divided into four quadrants, take the first quadrant and the vertex that this further away from the university Eafit starts making the radios and then it continues dividing into 3 so there are four sectors of radio and so the map continues dividing and when one radio finishes it takes two of the 3 then two of the 2 and so on until arrives at the point of reference that is the Eafit university.

Desing of the data structure



The blue dots are the radio, so each radius of each quadrant has the same distance between them, regardless of the radius distances of the other quadrants.

Remember that the red dot is the Eafit University.

Design criterio of the data structure

When developing the algorithm in this way we could not obtain a good complexity, in time we were not very fast either but the advantage we found in this development was that we saved a lot of memory, since it is doing ¼ of what the algorithm should do in its entirety if we would not have implemented the separation of quadrants and radios.

Conclusions

We are happy with the result obtained since we were able to provide a solution to the problem, achieving the objective of reducing traffic, thus improving the air and saving lives and the environment.

Although we do not comply with all the required parameters of time and complexity, we are happy for saving memory and for being able to provide a solution.

Future implementations would be to improve the algorithm so that it meets the complexity and time parameters without losing the essence of memory savings.

If this is achieved, it would be good to implement it in mobility applications such as Google maps or waze, among others.