Find the quickest and safest route to Medellin's streets

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Presentation of the team

Esteban Muriel
Research and coding

Manuel Villegas
Research and coding

Andrea Serna
Literature review

Mauricio Toro
Data preparation

https://github.com/VillegasMich/Project_Datos1.git

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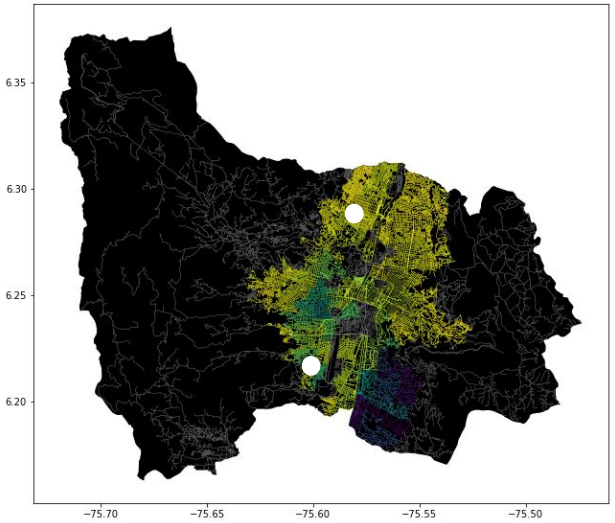
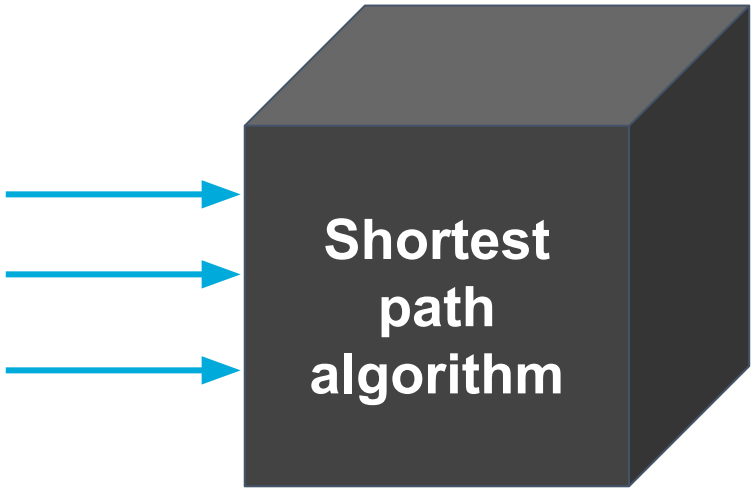
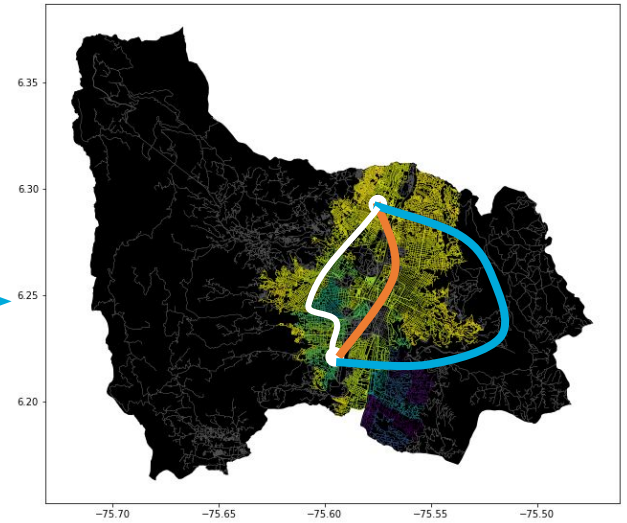
Problem Statement



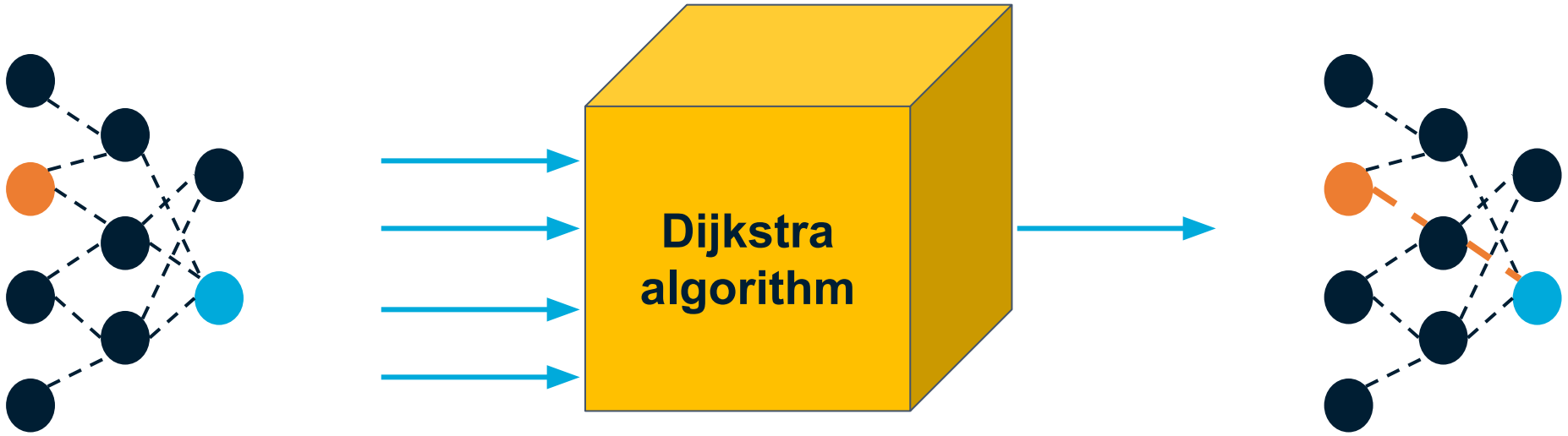
Streets of Medellín, Origin and Destination





Three paths that reduce both the risk of harassment and distance

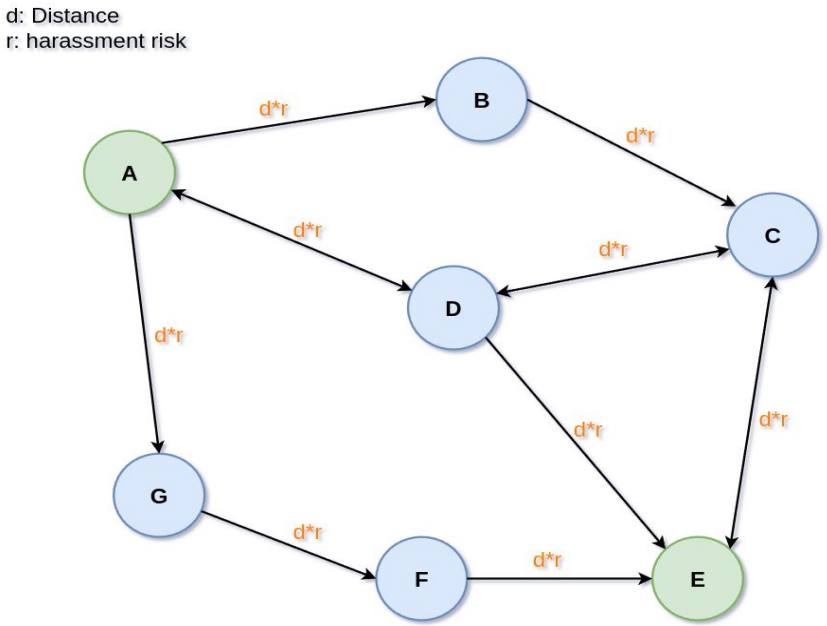
Solution Algorithm

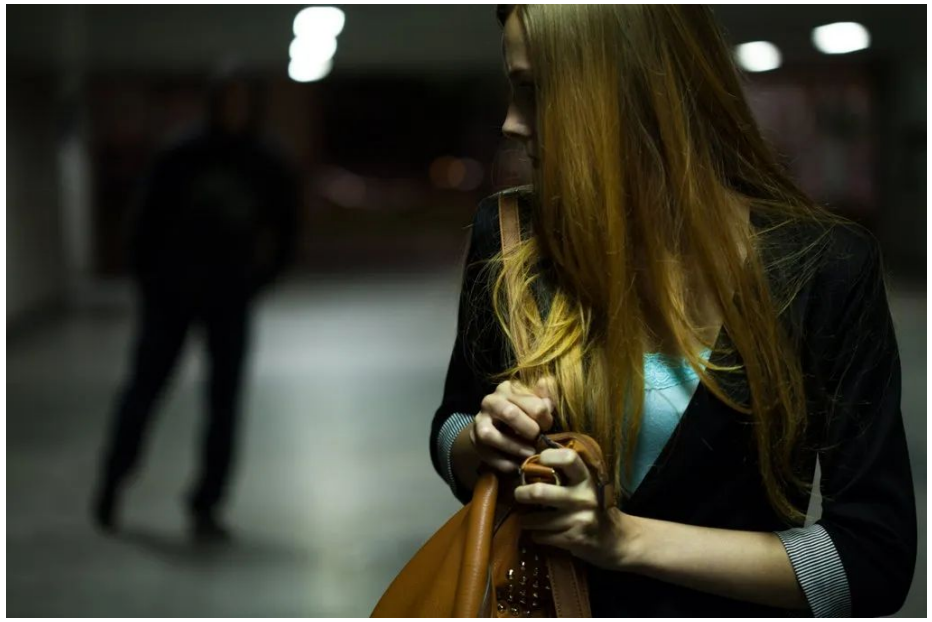


Streets of Medellín, Origin and Destination

A path that reduces both distance and harassment

Explanation of the algorithm





The nodes are the map locations and the edges have a weight equal to the distance*risk (for our first option).

Complexity of the algorithm

Algorithm name	Time complexity	Complexity of memory
Dijkstra's Algorithm	O(E * logV)	O(V)

Complexity of Dijkstra’s algorithm using a priority queue where V represents the number of vertices and E represents the number of edges.

Tomada de:
https://www.elcolombiano.com/antioquia/como-es-vivir-el-espacio-publico-de-medellin-cuando-se-es-mujer-CB13654035

First path minimizing d = length * HRisk




Origin	Destination	Distance (meters)	Risk of harassment (between 0 and 1)
EAFIT University	National University	14571.9	0.0019

Second path minimizing d = length + (80 * HRisk)




Origin	Destination	Distance (meters)	Risk of harassment (between 0 and 1)
EAFIT University	National University	8098.18	0.5566

Third path minimizing d = length ^ (10 * HRisk)




Origin	Destination	Distance (meters)	Risk of harassment (between 0 and 1)
EAFIT University	National University	25527.69	0.73476

Visual comparison of the three paths

Source: EAFIT

Destination: UNAL

Paths	Equation	Time (s)
Red:	length * HRisk	0,0937
Yellow:	length + (80 * HRisk)	0,0748
Blue:	length ^ (10 * HRisk)	0,1588

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Future work directions

DS&A II

- Use other algorithms
- Implement more variables

Project 1

- Build a web application
- Make it a real time app

Software Engineering

- build a mobile application
- Get a bigger database

Project 2

- Implement machine learning
- make the app standalone

Tomada de: https://www.agenciaocote.com/blog/2020/04/24/el-acoso-sexual-sigue-sin-estar-tipificado-como-delito/

THANK YOU!

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