



# **SAFEST PATH FINDING ALGORITHMS ON STREET HARASSMENT PREVENTION**

## Presentation of the team



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Literature review



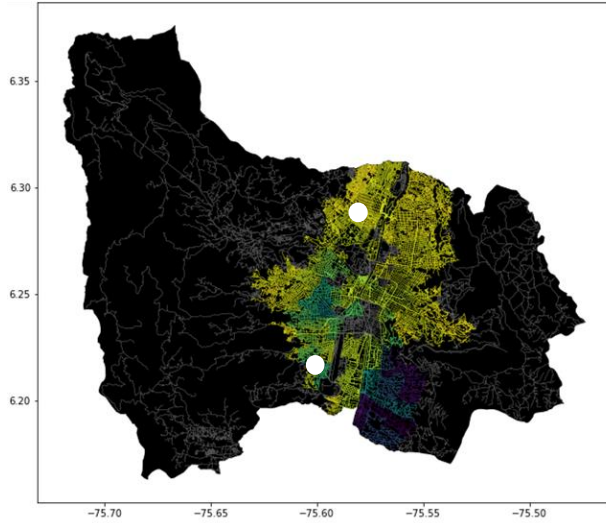
**Mauricio Toro**  
Data preparation



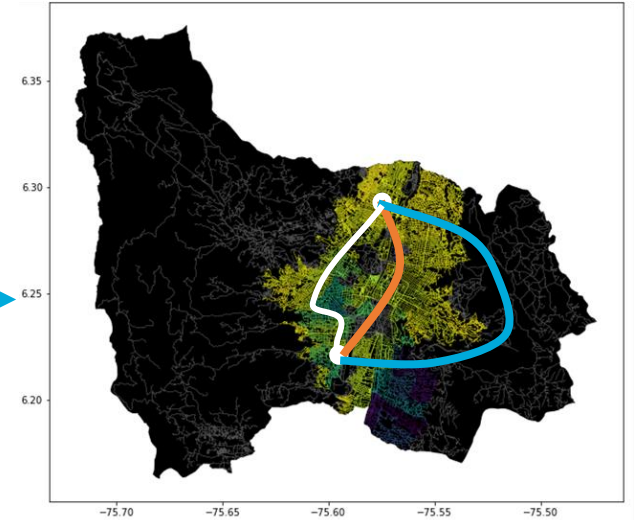
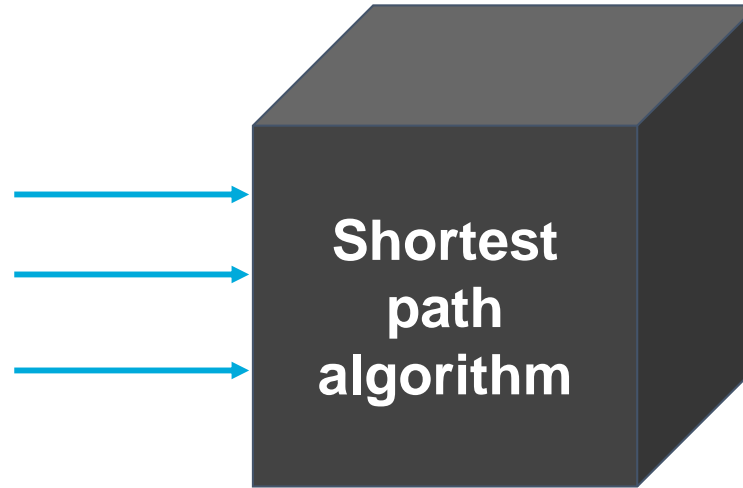
[https://github.com/linasofi13/StreetHarassmentProyect\\_2022-2](https://github.com/linasofi13/StreetHarassmentProyect_2022-2)



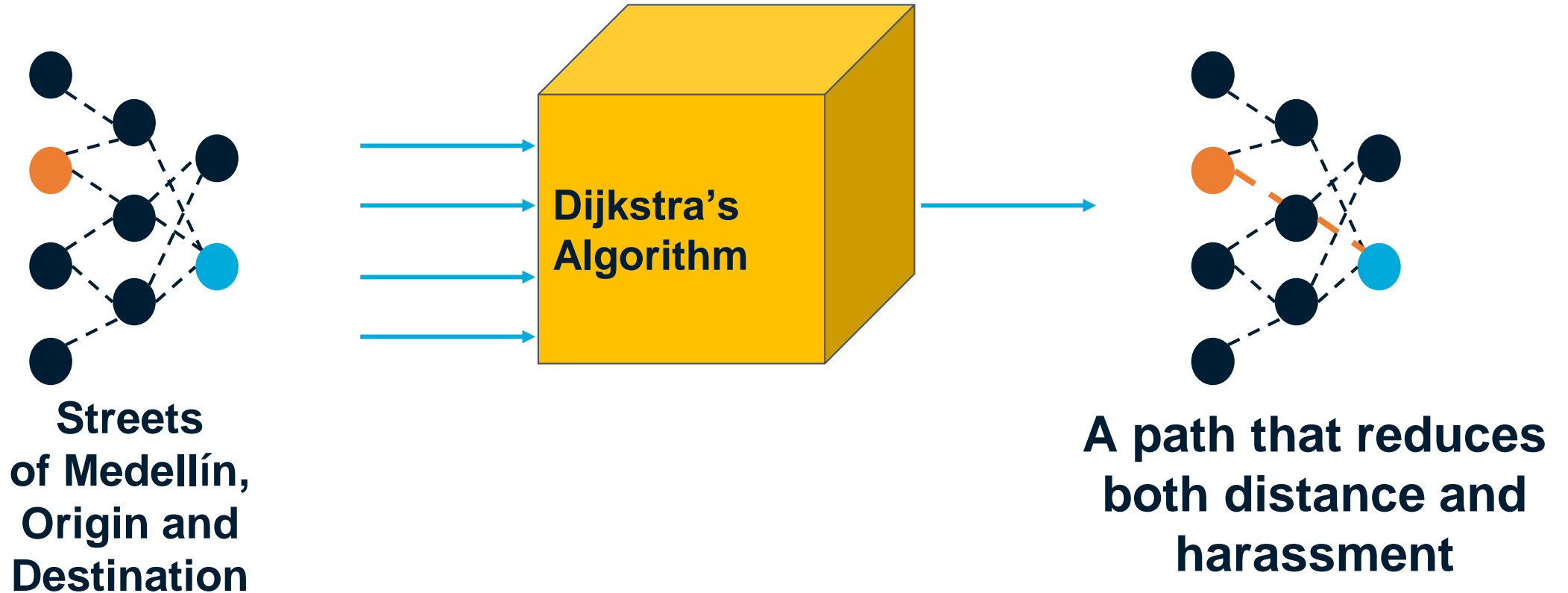
# Problem Statement



**Streets  
of Medellín,  
Origin and  
Destination**

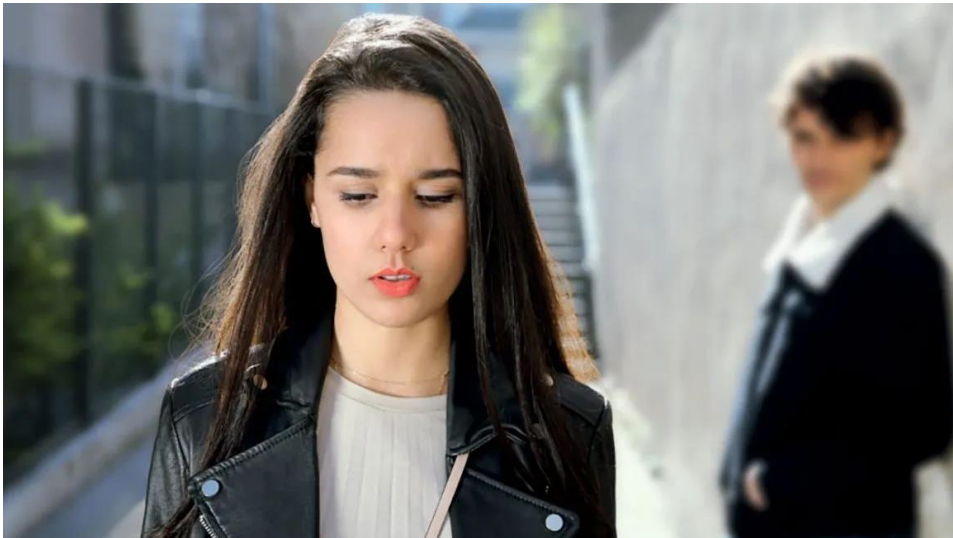
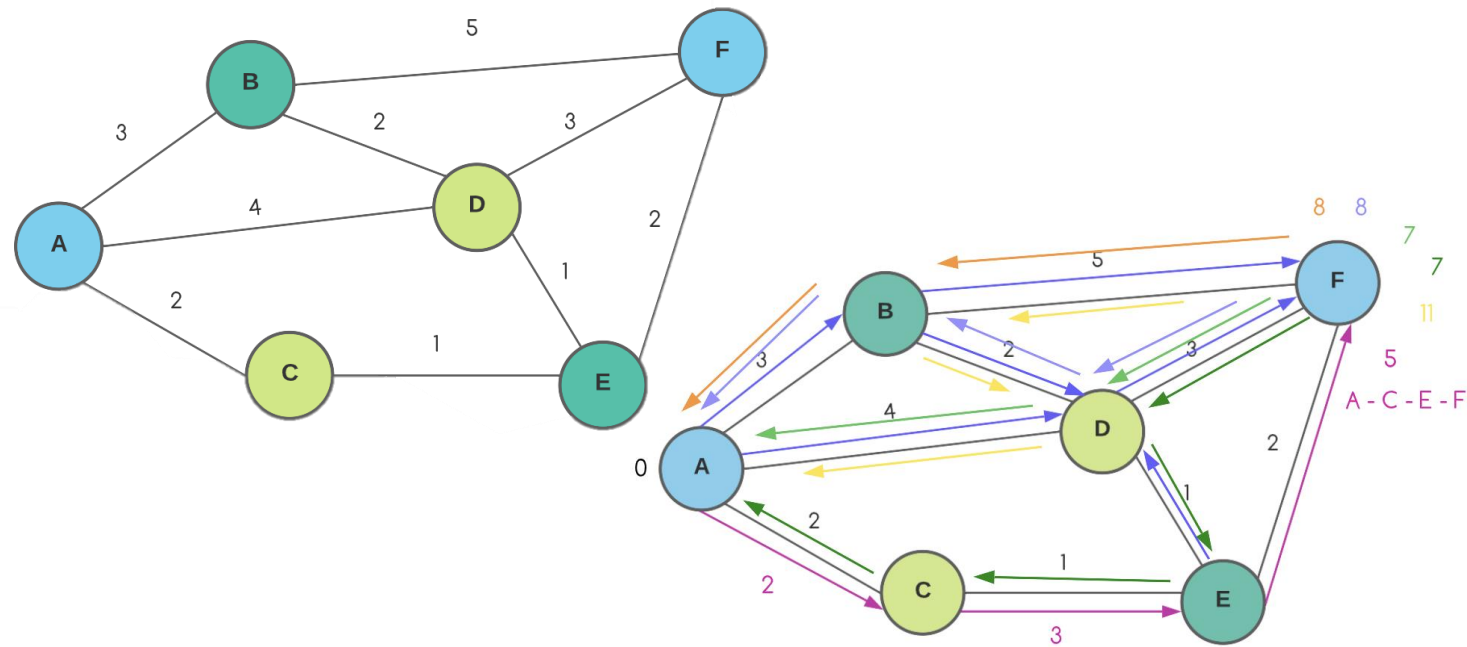


**Three paths that reduce  
both the risk of harassment  
and distance**





# Explanation of the algorithm



## Dijkstra's Algorithm

Dijkstra's Algorithm implementation for the shortest and safest path from A to F. The algorithm checks for the path with the minor total cost from the origin node to the final node. In this case is the path with a cost of 5.

# Complexity of the algorithm



	Time complexity	Complexity of memory
Dijkstra's Algorithm	$O((V + E) \log V)$	$O(V + E)$

Time and memory complexity of Dijkstra's Algorithm using a priority queue, where  $V$  is the number of nodes and  $E$  is the number of edges in the graph.



## First path with variable $v = d * r$



Origin	Destination	Distance (meters)	Risk of harassment (between 0 and 1)
EAFIT University	National University	15399.647 m	0.33579

Distance in meters and risk of sexual street harassment (between 0 and 1) to walk from EAFIT University to the National University with variable  $v = d * r$ . Execution time of 0.082 seconds.

## First path with variable $v = d^{2r}$



Origin	Destination	Distance (meters)	Risk of harassment (between 0 and 1)
EAFIT University	National University	12228.437 m	0.6787

Distance in meters and risk of sexual street harassment (between 0 and 1) to walk from EAFIT University to the National University with variable  $v = d^{2r}$ . Execution time of 0.110 seconds.



## First path minimizing with variable $v = d + 80r$



Origin	Destination	Distance (meters)	Risk of harassment (between 0 and 1)
EAFIT University	National University	5422.5 m	0.5470

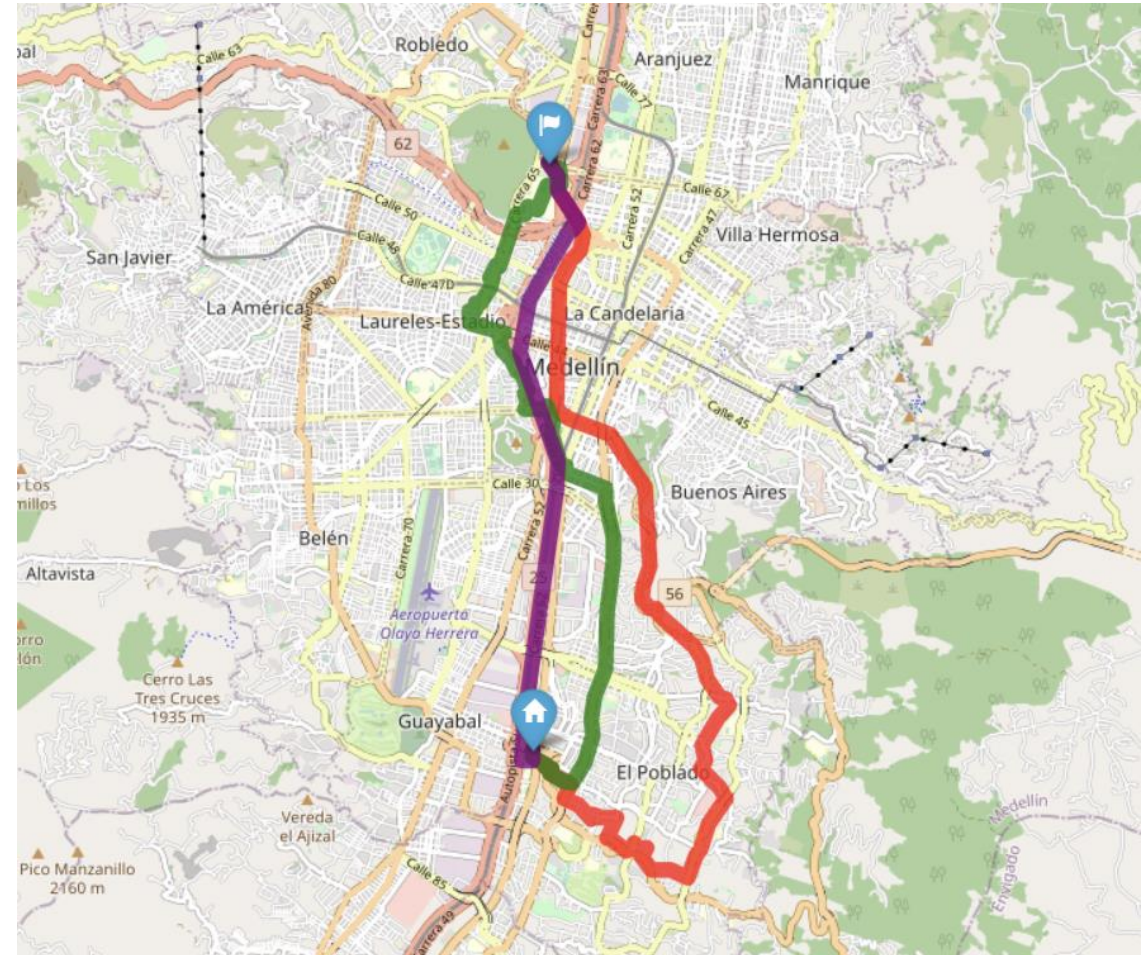
Distance in meters and risk of sexual street harassment (between 0 and 1) to walk from EAFIT University to the National University with variable  $v = d + 80r$ . Execution time of 0.077 seconds.

# Visual comparison of the three paths



Map of the city of Medellín showing three pedestrian paths that reduce both the risk of sexual harassment and the distance in meters between the EAFIT University and the National University.

Red path represents the variable  $v=d*r$ , green path represents the variable  $v=d^{2r}$  and the purple path represents the variable  $v=d+(80r)$ .



## Databases



**Taking into consideration Other variables, such as time and robbery risk. And naming the coordinates**

## Project 1



**Implementing the program as Web application with user-friendly interface**

## Software Engineering



**Develop an interactive user-friendly mobile application to find the path**

## Project 2



**Improve our program with the help of machine learning, constantly updating data**



Merchán, L. S. B., Toro, M., Bedoya, C. C., & Serna, A. (2022, November 8). Safest Path Finding Algorithms On Street Harassment Prevention.

<https://doi.org/10.31219/osf.io/3a28q>

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## Safest Path Finding Algorithms On Street Harassment Prevention

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**AUTHOR ASSERTIONS**  
Conflict of Interest: No ▼ Public Data: Available ▼ Preregistration: No

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**ABSTRACT**  
Street harassment is one of the main reasons why not everyone feels comfortable going out on the street, it is a form of intimidation by a stranger that occurs in public spaces. The way it has become normalized is frightening once you realize that it is expected when going out, especially by women. Causing fear of using public transportation or being alone outside, in addition to anxiety and stress affecting their lives.

**Keywords**  
Constrained shortest path, street sexual harassment, secure-path identification, crime prevention.

**1. INTRODUCTION**  
The present work aims to generate an alternative solution to the current problem of street harassment, a form of sexual harassment that generally occurs in a public space and in which women are mainly affected. According to Billi [1] (2015), "street sexual harassment corresponds to any practice with an explicit or implicit sexual connotation, which comes from a stranger [...] and has the potential to cause discomfort in the harassed person". In Medellín, it is a situation that puts

from one place to another. Therefore, the real challenge is to offer a balance between both needs in three different ways and, likewise, to determine the calculation of the risk of harassment in a coherent manner according to the map of the city of Medellín.

**1.2 Solution**  
To prevent street harassment, the idea is to design a program capable of showing the best route from one point to another in terms of avoiding street harassment and considering the distance between the two points, this two term multiplied are the weights in our graph since all the weights in our graph are positive, Dijkstra was considered the best fit for our project. It is an algorithm specifically designed to find the shortest path between two vertices in a weighted graph. Not only it does what we need but also it is well known as a fairly low time complexity algorithm.

**1.3 Article structure**  
In what follows, in Section 2, we present related work to the problem. Later, in Section 3, we present the data sets and methods used in this research. In Section 4, we

**Abstract**  
The present work aims to solve the current problem of street harassment that generally occurs in a public space and in which women are mainly affected. To prevent this problem, we propose a program capable of showing the best route from one point to another in terms of avoiding street harassment and considering the distance between the two points, this two term multiplied are the weights in our graph since all the weights in our graph are positive, Dijkstra was considered the best fit for our project. It is an algorithm specifically designed to find the shortest path between two vertices in a weighted graph. Not only it does what we need but also it is well known as a fairly low time complexity algorithm.

**See more**





# THANK YOU!

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