Correlation between different kinds of neighborhoods and their traffic accidents in Medellín

1. Introduction

One of the world's leading causes of death and injuries is urban traffic accidents. According to the World Health Organization (WHO), traffic accidents was the leading cause of death for children and young adults aged 5-29 years, and the eight leading cause of death for all age groups surpassing HIV/ AIDS, tuberculosis and diarrheal diseases in 2018 [CITATION "WHO, 2018"]. In addition, more than a million people die each year on the world's roads, and 90% of those deaths occur in low- and middle-income countries that represent 82% of the world's population [CITATION "WHO, 2018"], [CITATION "Wegman, 2017"].

For this reason, the United Nations declared 2011-2020 as a decade of action for road safety [CITATION "United Nations, 2010"], with the aim of reducing the number of deaths of traffic accidents around the world through national and citywide plans, considering five key strategies [CITATION "United Nations, 2011"]:
- Road safety management
- Safer roads and mobility
- Safer vehicles
- Safer road users
- Post-crash response

These key strategies are focused on security and prevention, related to strategies in the medium and long term, where the commitment of nations is a key success factor to achieve the goal of the decade, through the design of management plans including investment, transfer and creation of knowledge to face the current problem and to implement sustainable actions in the future .

Colombia is a middle-income country with 13.8 deaths in traffic accidents per 100 000 inhabitants in 2018, where the rate for high-income countries is around 9. Besides, traffic accidents were the second largest cause of violent death in Colombia for the same year, with 26.7% of the total number of deaths [CITATION "Instituto Nacional de Medicina Legal y Ciencias Forenses, 2011"].

In Medellín, which is one of the largest cities in Colombia, with more than 2.5 million inhabitants (and almost 3.8 million inhabitants in its Metropolitan Area), there has been an increasing trend in the number of traffic accidents. According to 2014 statistics by the Municipality of Medellín [CITATION "Alcaldía de Medellín, 2014"], from 2008 to 2014, the number of accidents grew a 20.14%. One of the main causes of this problem is the growing number of vehicles, from 2008 to 2014, this figure increased from 767 548 to 1 234 946 (i.e., by 60.9%).

Looking for optimal strategies with the aim of reducing the traffic accidents in Medellín, it is necessary to analyze different characteristics in the traffic accidents in the city. Hence, in this project we want to analyze the trends in the traffic accidents in Medellín, and figure it out if there is a correlation between these traffic accidents and different classes of neighborhoods (neighborhoods with leisure services, or neighborhoods full of parks and plazas, for example).

To perform a clustering task of different neighborhoods in Medellín, we will use the foursquare API to understand how it is composed the different neighborhoods in Medellín.

The main contribution of this project is to perform a detailed analysis of the traffic accidents in Medellín and its correlation with different classes of neighborhoods in Medellín, and to get some useful insights for the Public Administration to conduct strategies, based on different classes of neighborhoods, to reduce these traffic accidents.

For achieving our goal, we have the following datasets from the municipality government:

a) Accidentalidad_georreferenciada_2014-2019.csv

This dataset contains details of the generalities related to the location of all the accidents occurred in Medellín from January 2014 to June 2019. Below we present a brief summary of the attributes contained in the dataset:

- Accident ID
- Address and location of the accident (<u>with coordinates</u>)
- Date and time of the accident
- Type of accident

b) Barrio_Vereda.geojson

This file contains the geographical information related to all neighborhoods and zones of Medellín. The attributes contained in this dataset are the following:

- neighborhood
- area of the neighborhood
- geometry of the neighborhood (a set of coordinates which surrounded the area of the neighborhood)

2. References

[CITATION "WHO, 2018"]
[CITATION "Wegman, 2017"]
[CITATION "United Nations, 2010"]
[CITATION "United Nations, 2011"]
[CITATION "Instituto Nacional de Medicina Legal y Ciencias Forenses, 2011"]
[CITATION "Alcaldía de Medellín, 2014"]