

Data Science in Crime Data Analysis

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Fundação Getúlio Vargas





& Collaborators ...



Ônibus é sequestrado na ponte Rio-Niterói por homem armado



Types of Crimes

Street crime

Corporate crime

Organized crime

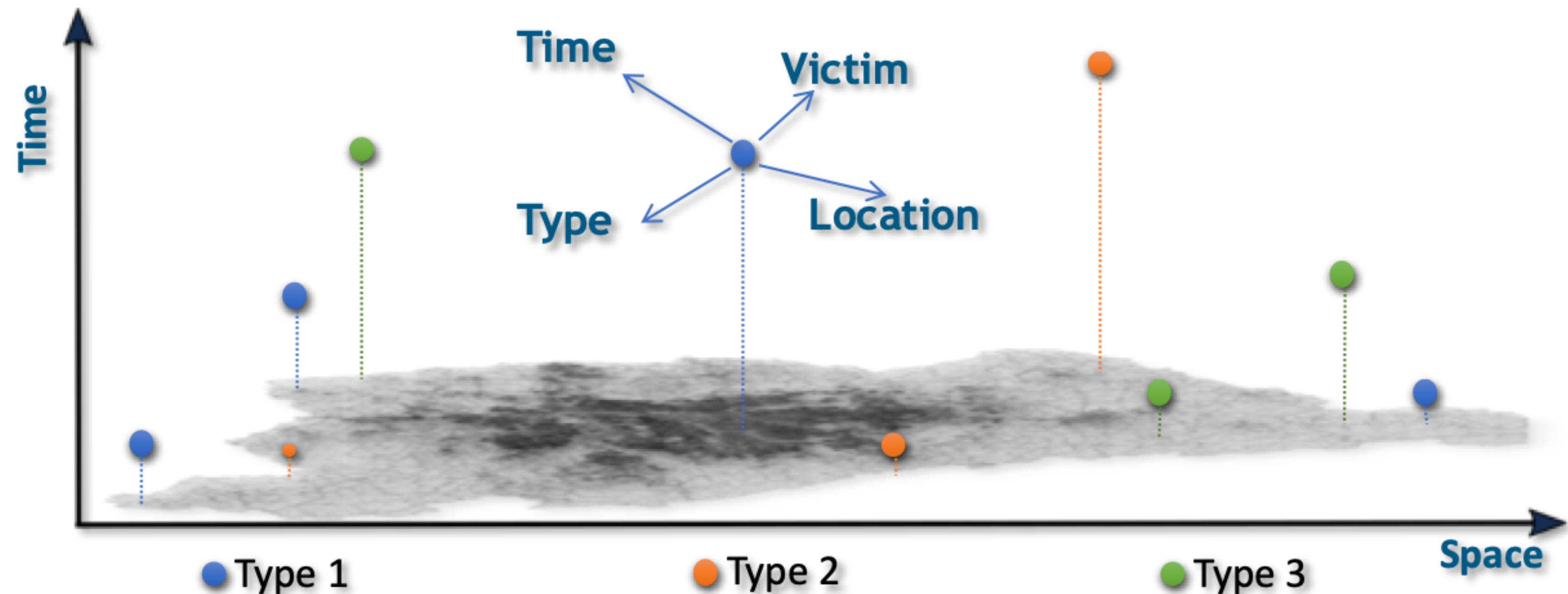
White collar crime

Political crime

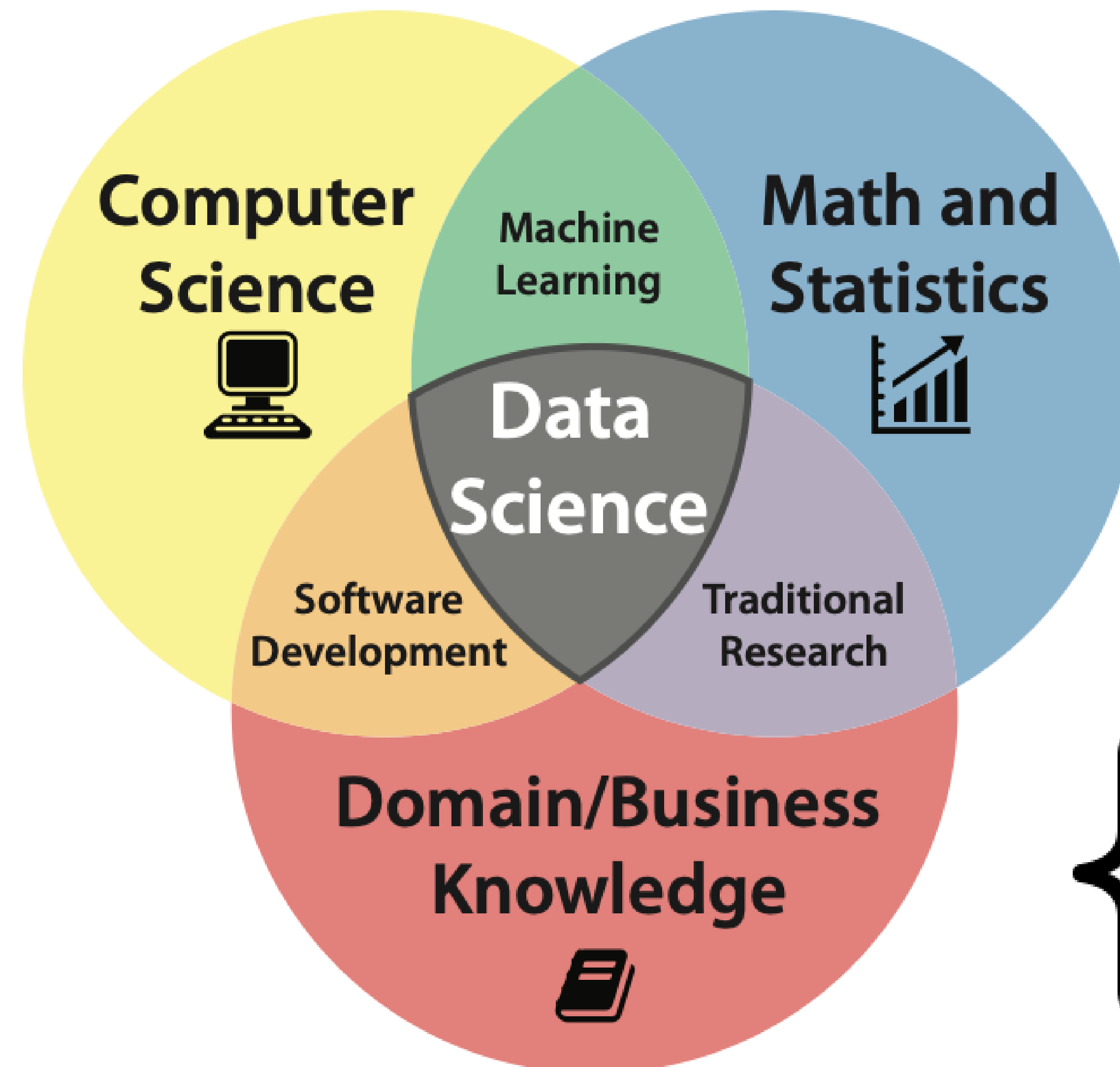
Cyber crime

...

Crime Mapping



Data Science



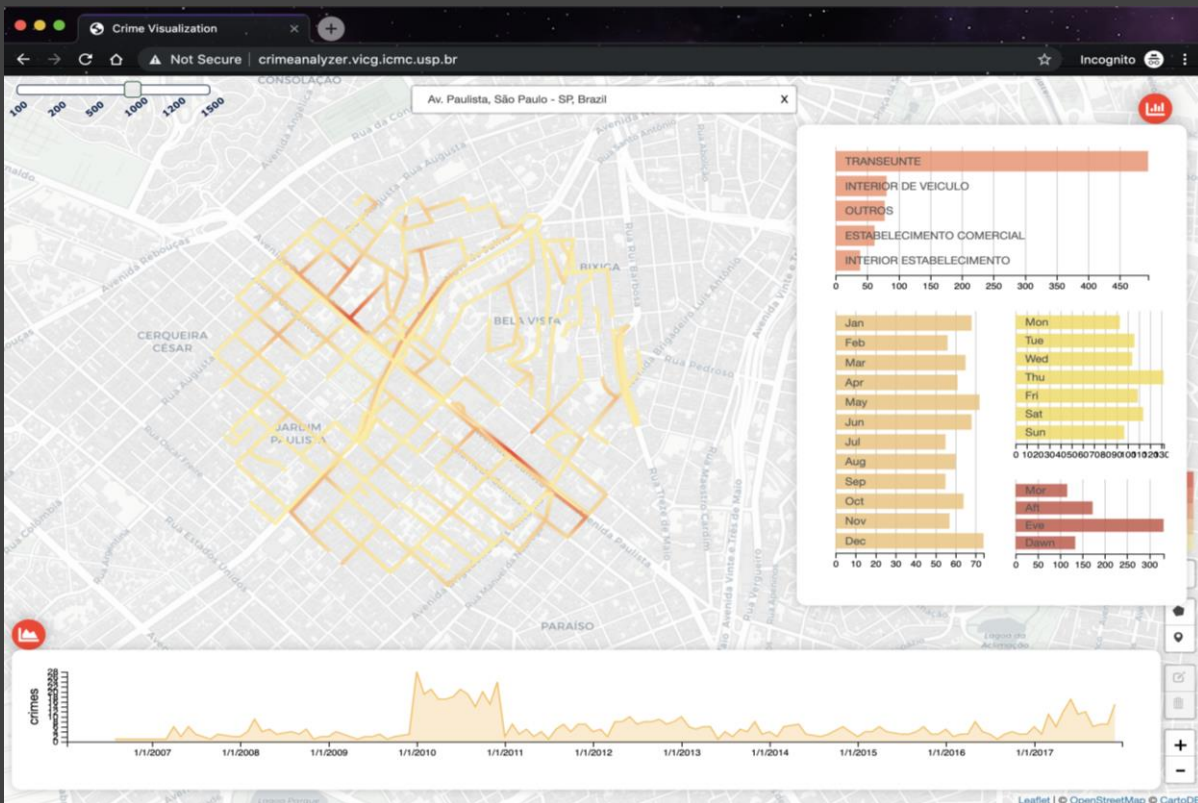
{ Security Agents
Criminologists
Police
...

Data Science and Crime Analytics

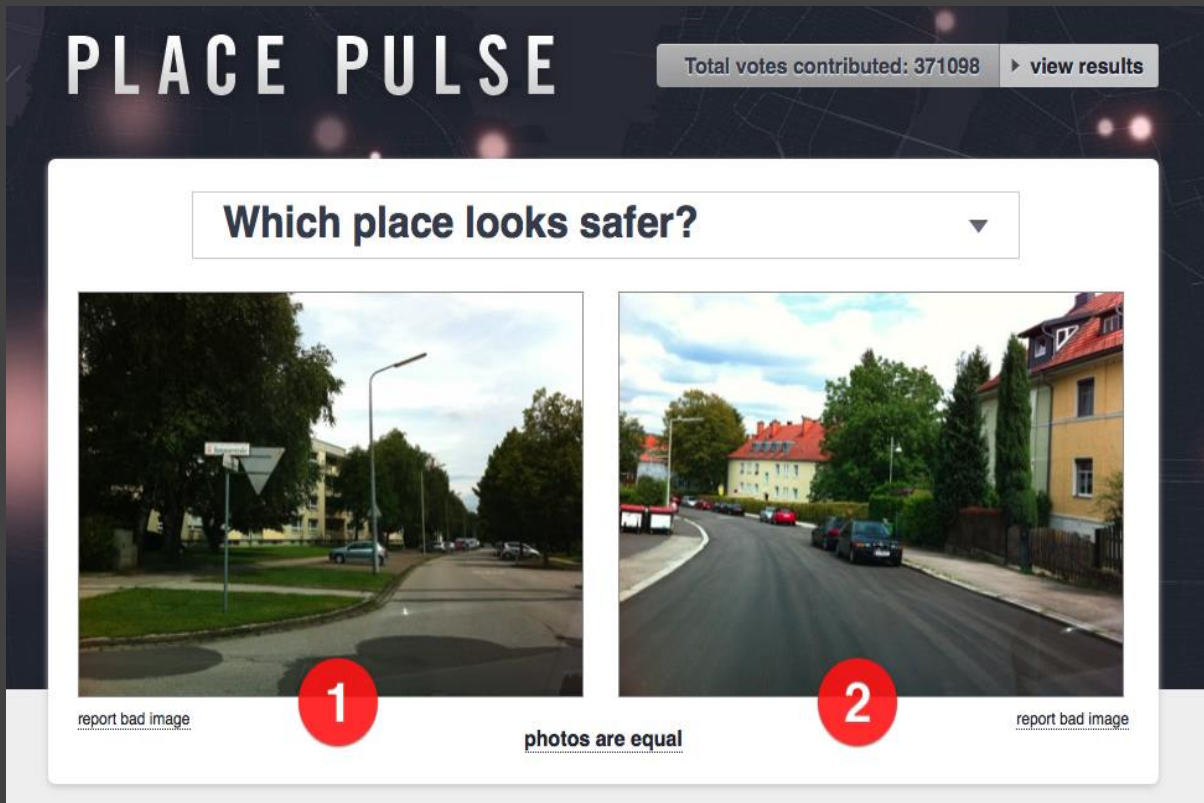
Crime Visual Analytics



Right to Information



Safety Perception



Crime Forecasting



Crime, Urban factors

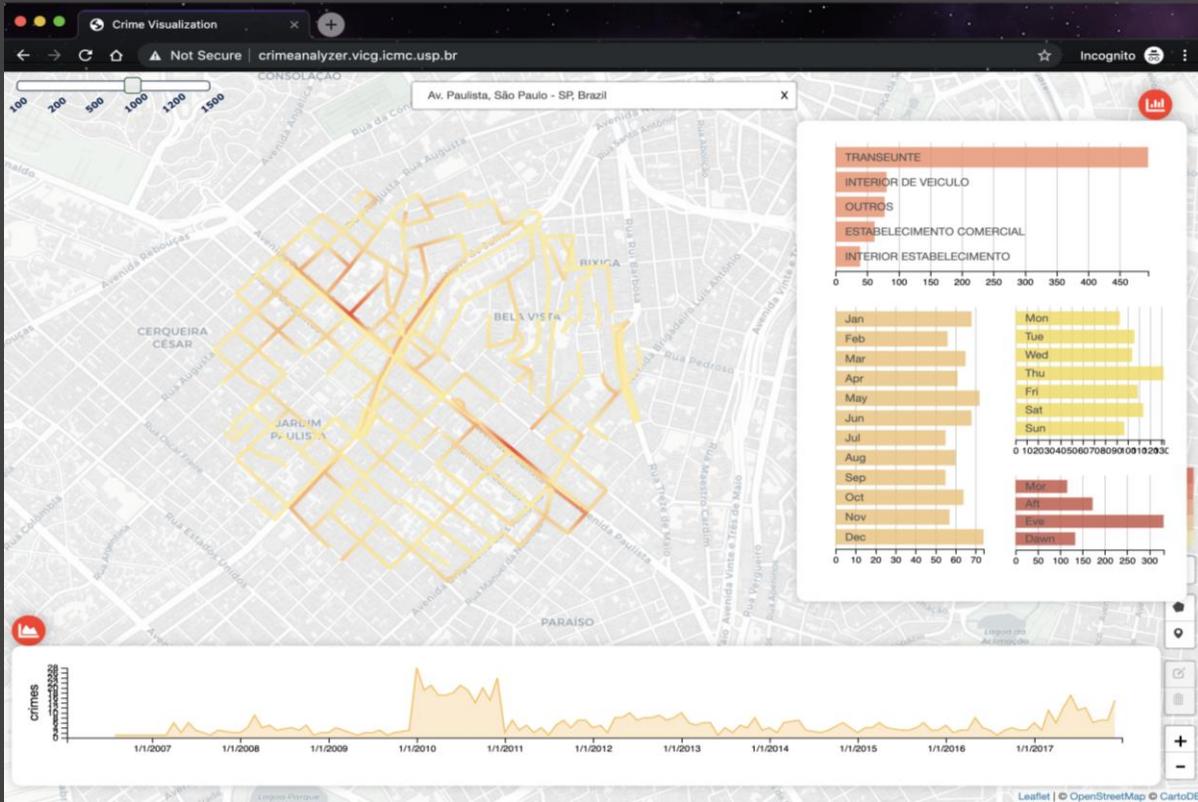


Data Science and Crime Analytics

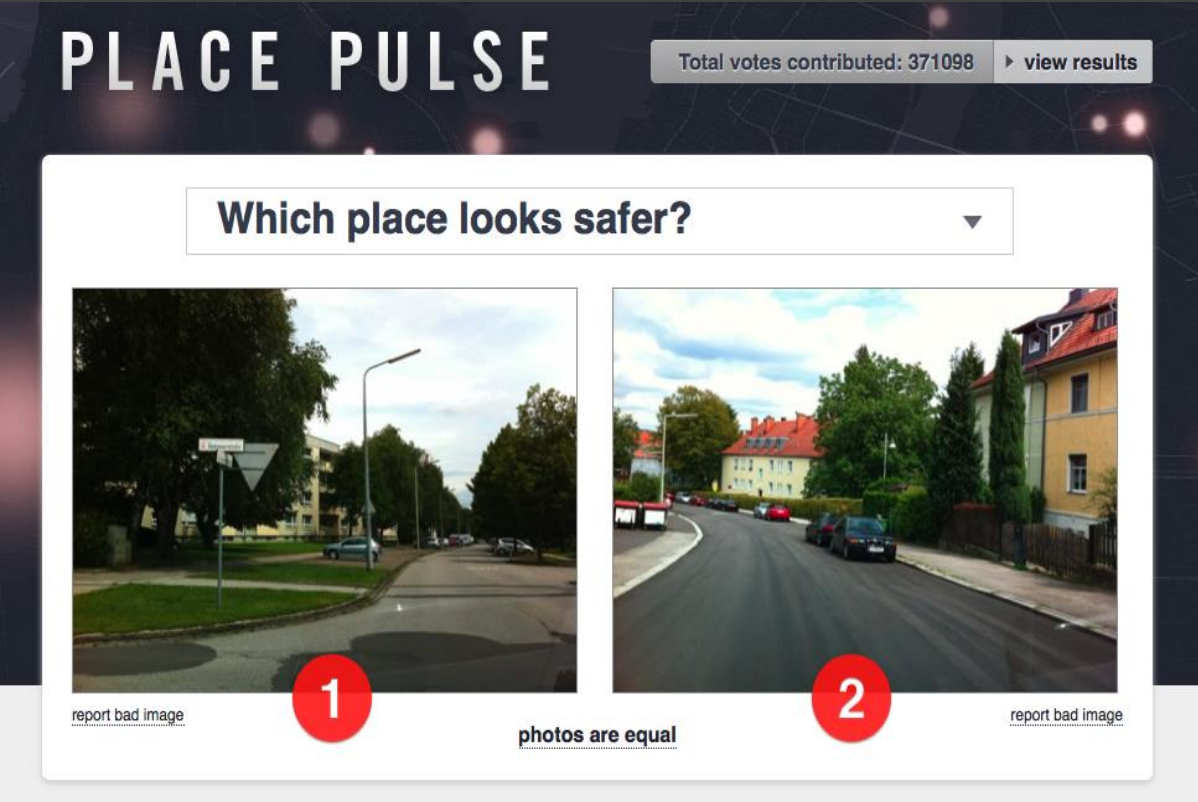
Crime Visual Analytics



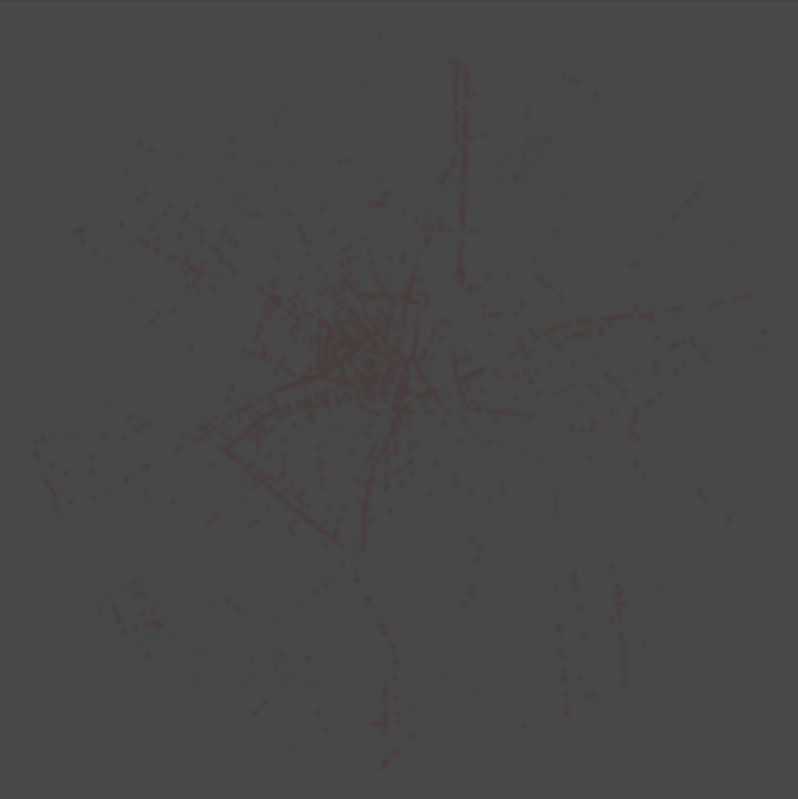
Right to Information



Safety Perception



Crime Forecasting



Crime, Urban factors



Goal

Analyzing the characteristics and **dynamics of crimes** in particular regions of the city

Identifying **crime hotspots** within a particular region

Understanding and **comparing crime patterns**

Methodology

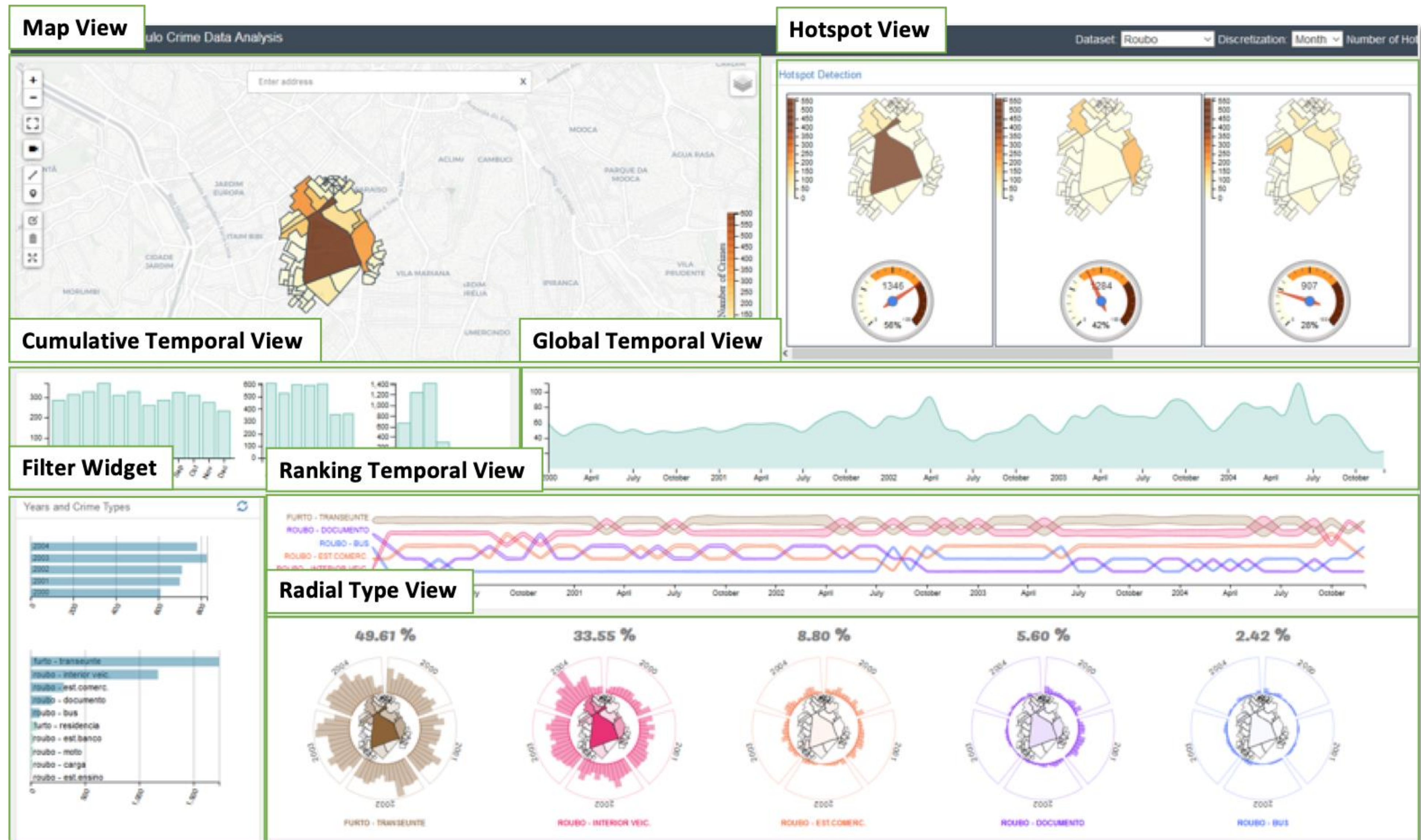
Identifying Hotspots

We propose a technique based on Non-Negative Matrix factorization

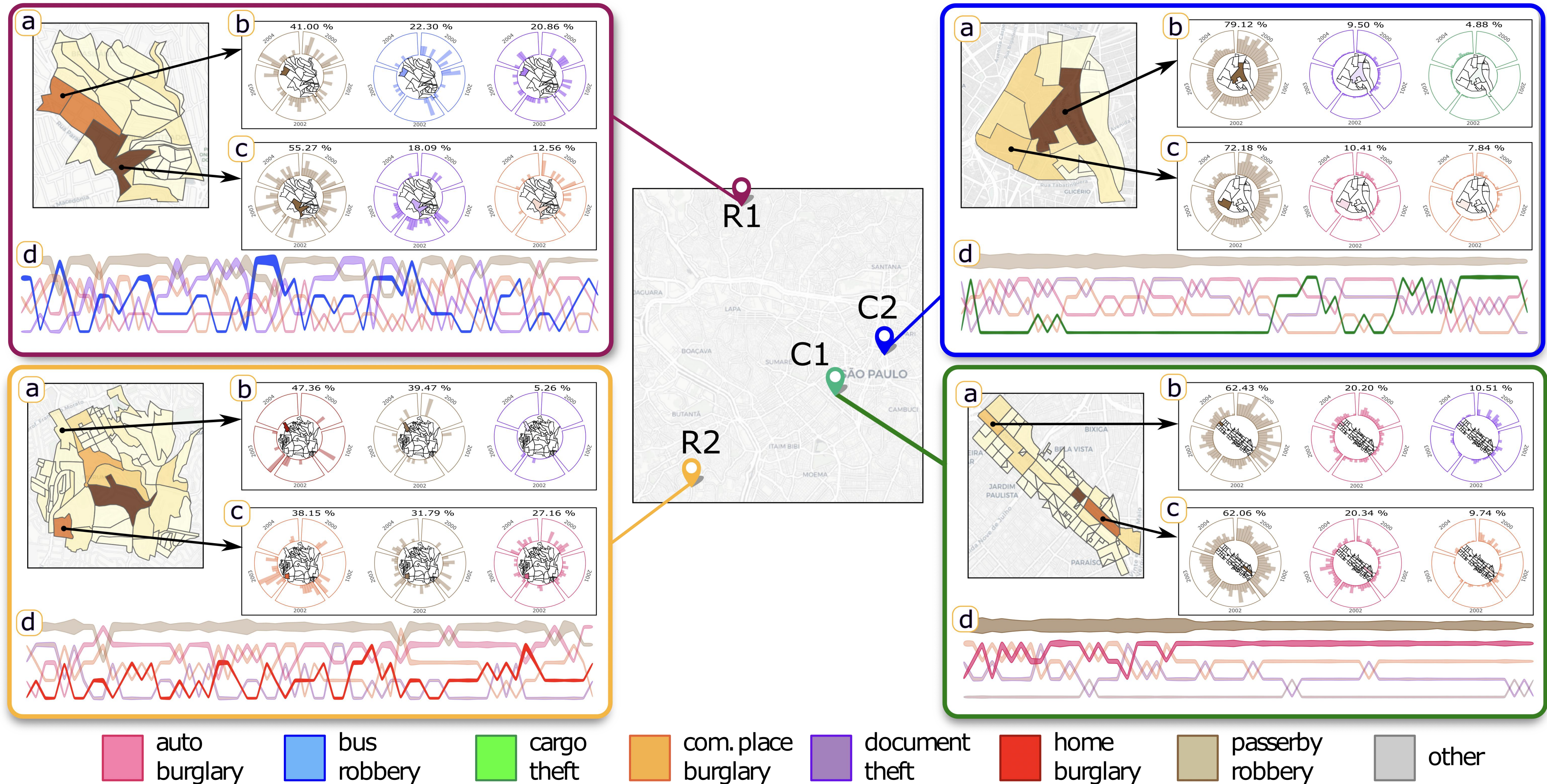
Exploring the dynamics of crimes

We implement a visual analytics tool named CrimAnalyzer

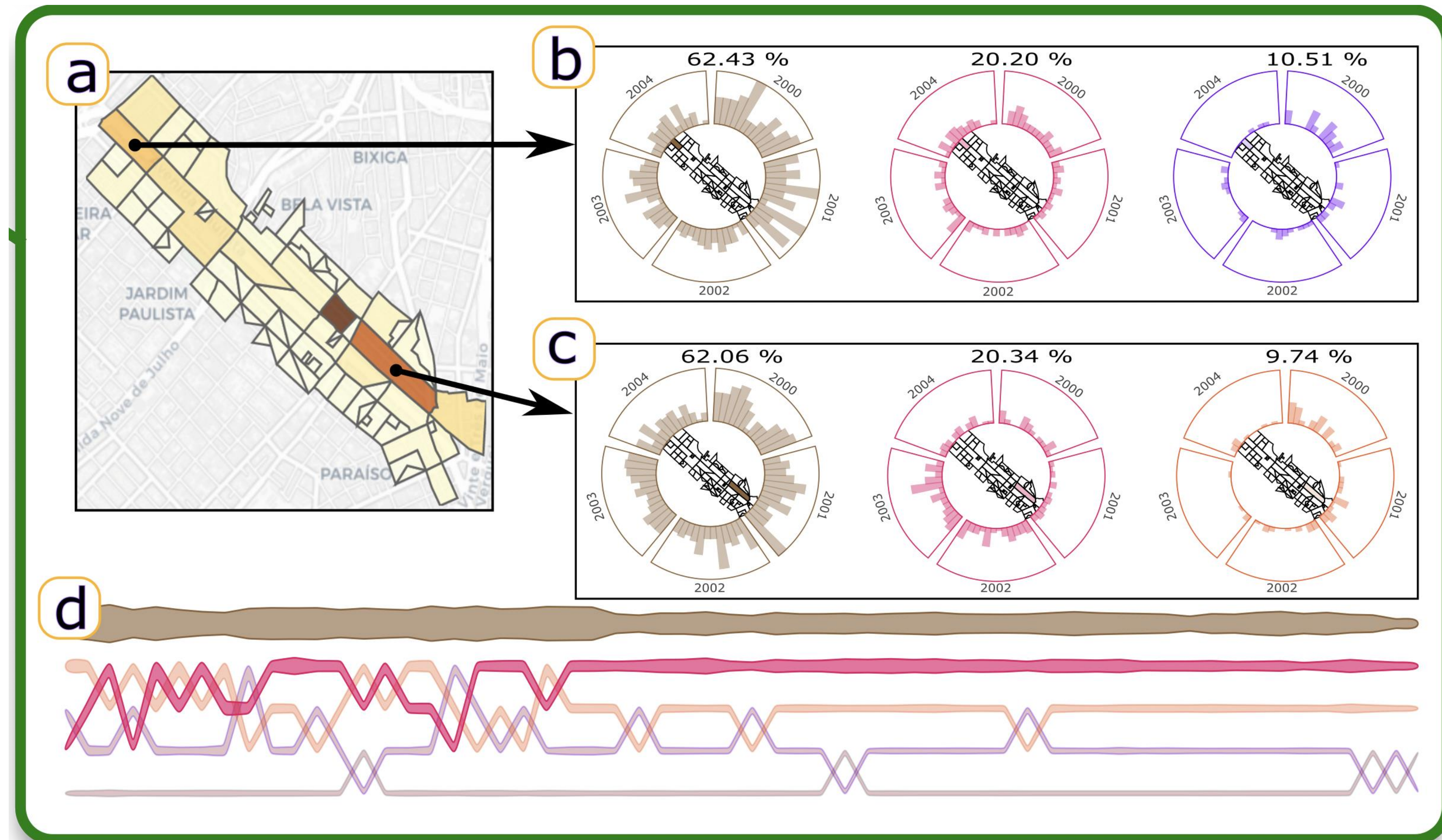
CrimAnalyzer



Crime Activity - Hotspot Identification



Crime Activity - Hotspot Identification

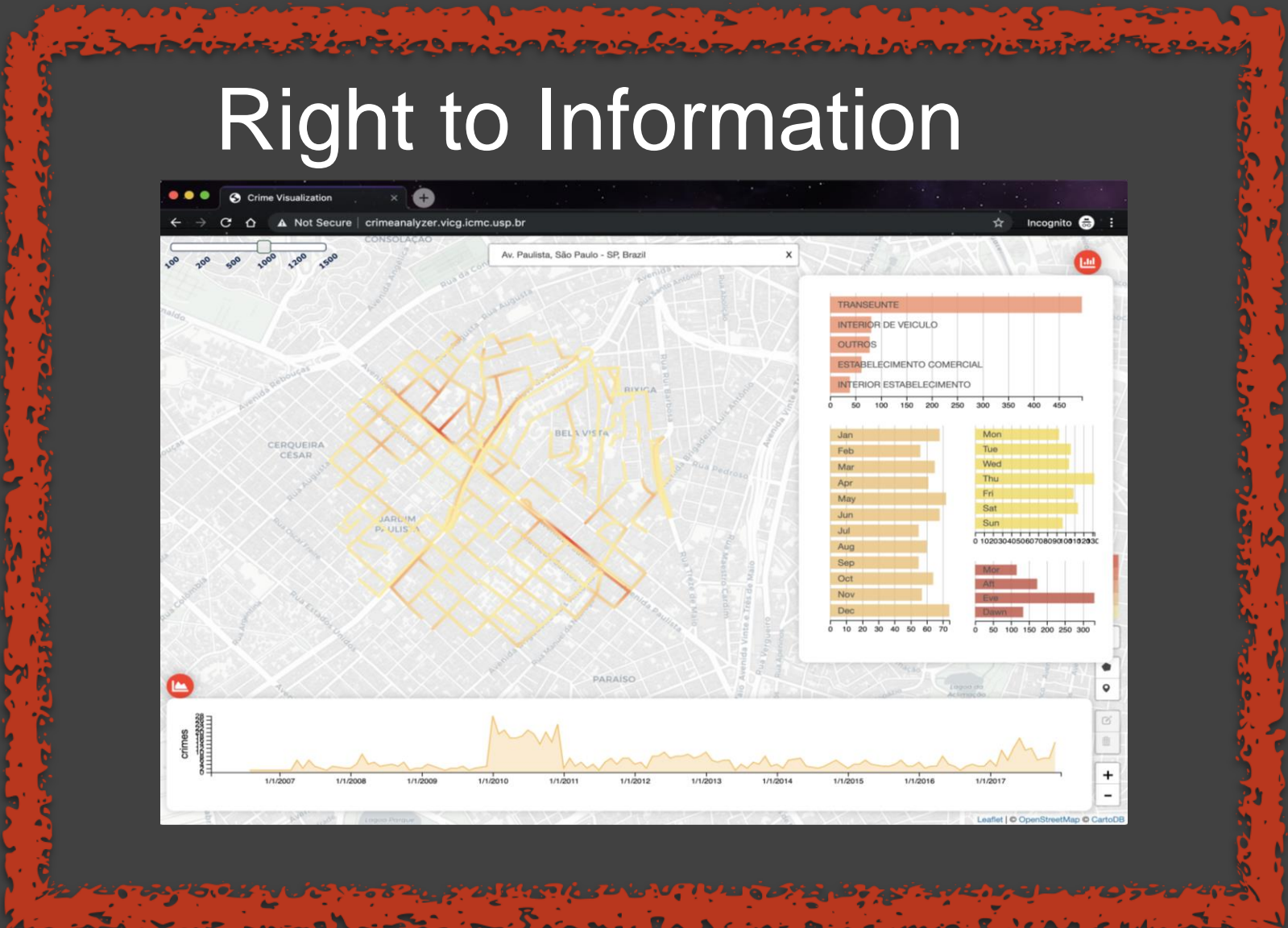


Data Science and Crime Analytics

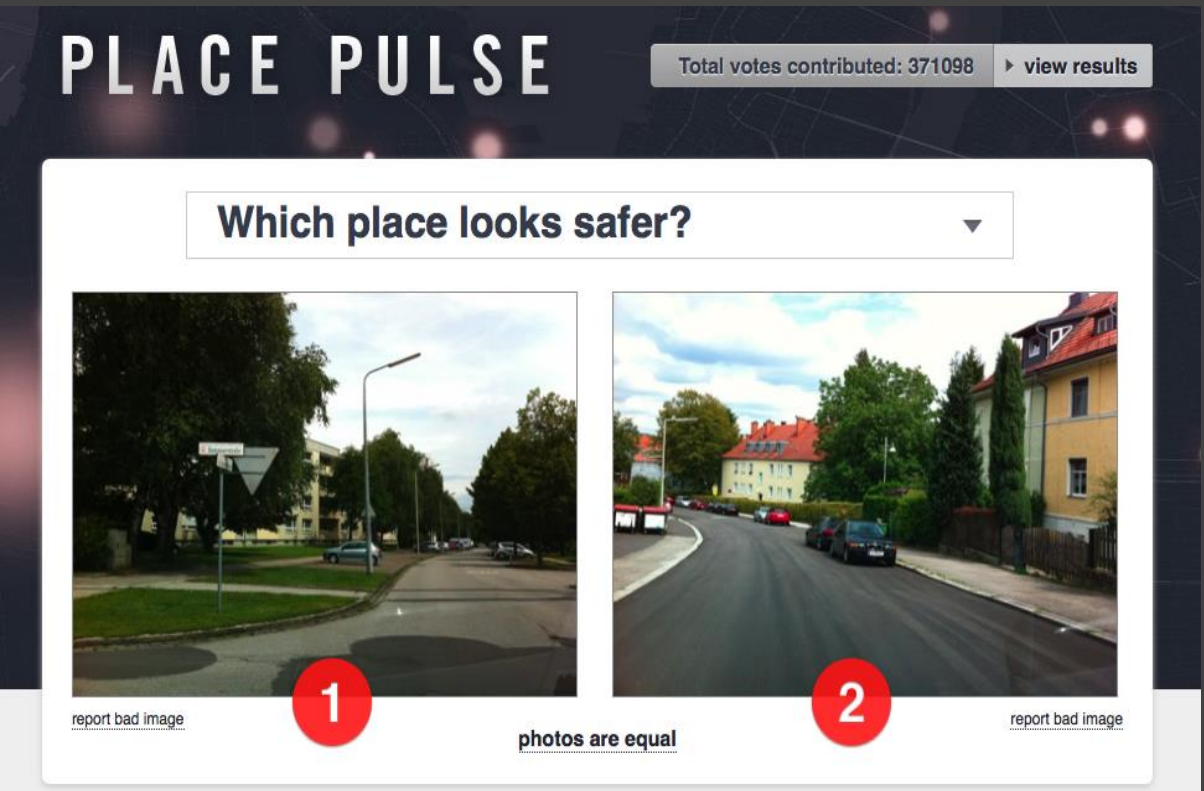
Crime Visual Analytics



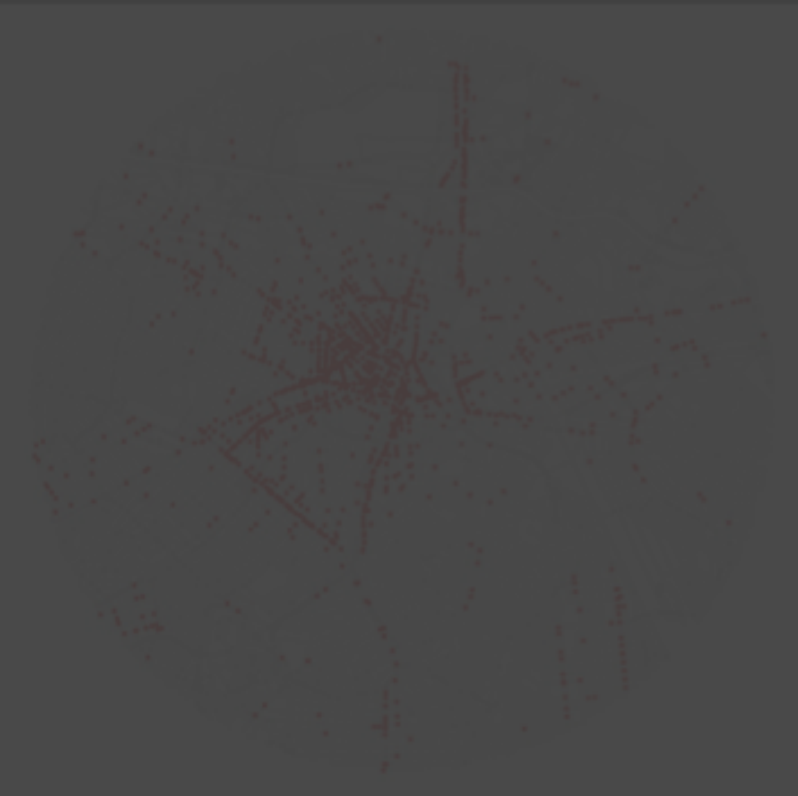
Right to Information



Safety Perception



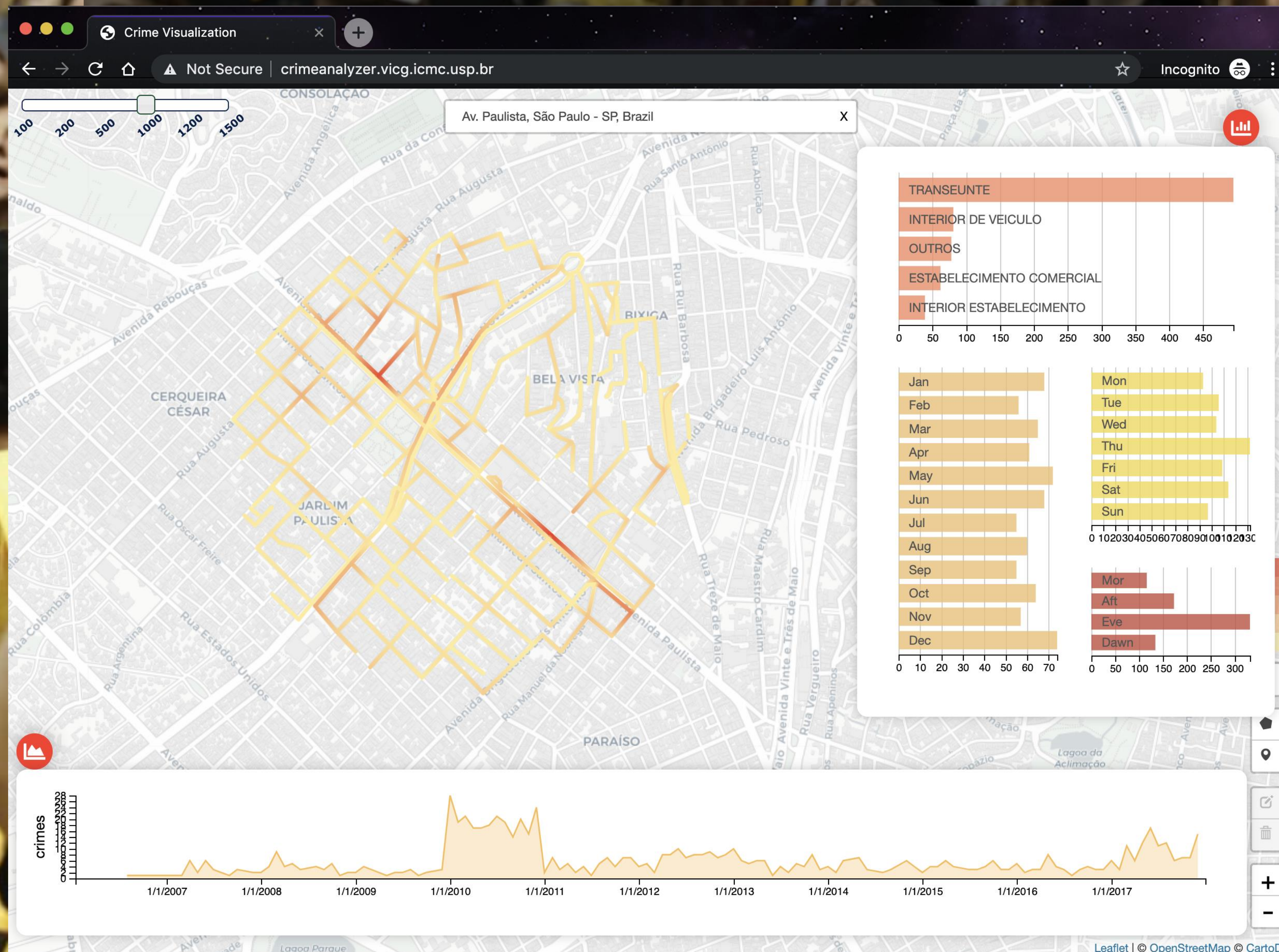
Crime Forecasting



Crime, Urban factors



CrimAnalyzer for the Crowd



Right to Information

Population has the right to know the criminality in their neighborhood

Positive impact in the feeling of insecurity

Better engagement of the population to improve security

Focused actions

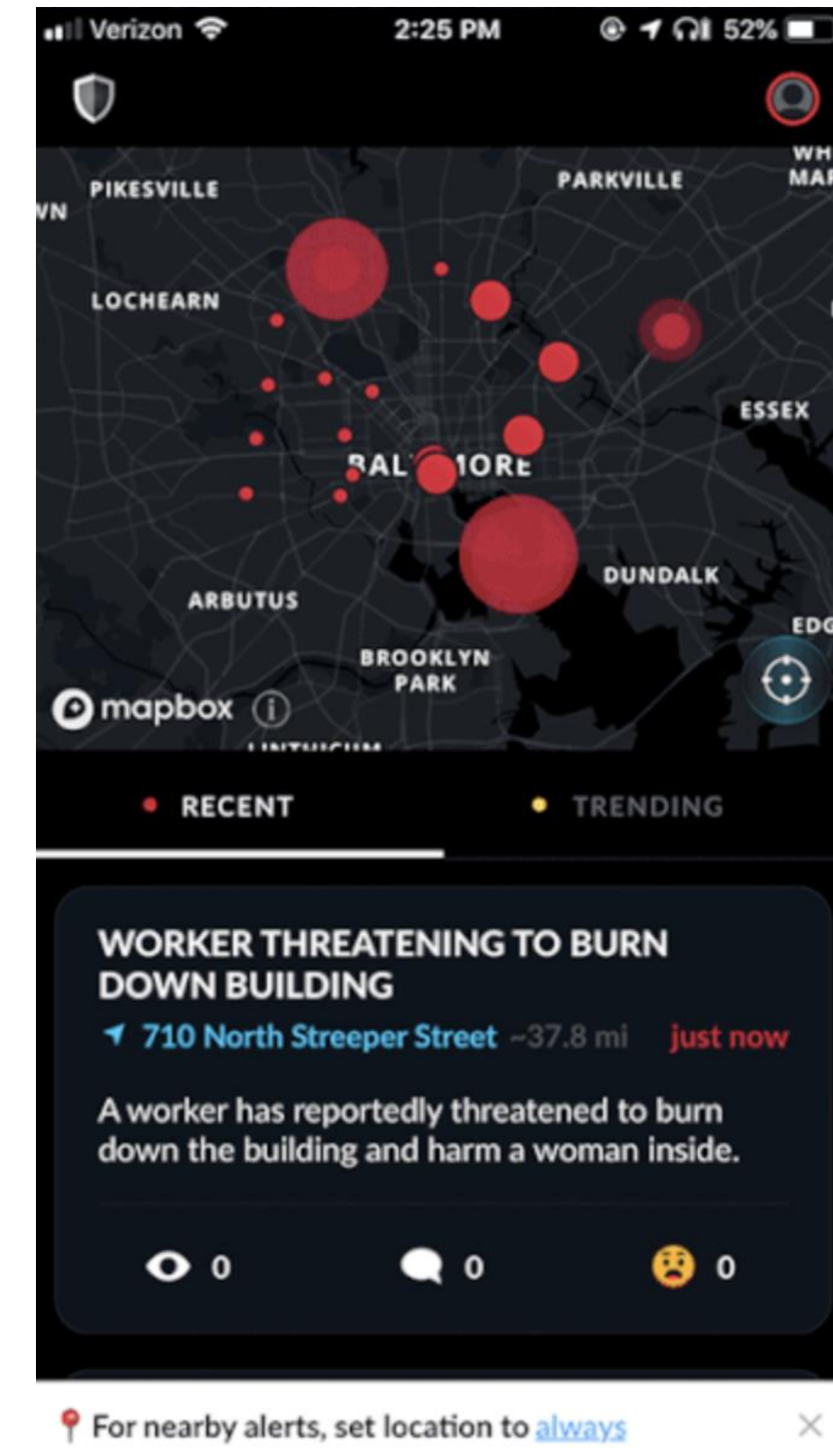
Safe pathways

Predicting safe routes

Socio economic impact

Property price

Local businesses



An App For Mapping Crime, or Urban Paranoia?

Right to Information

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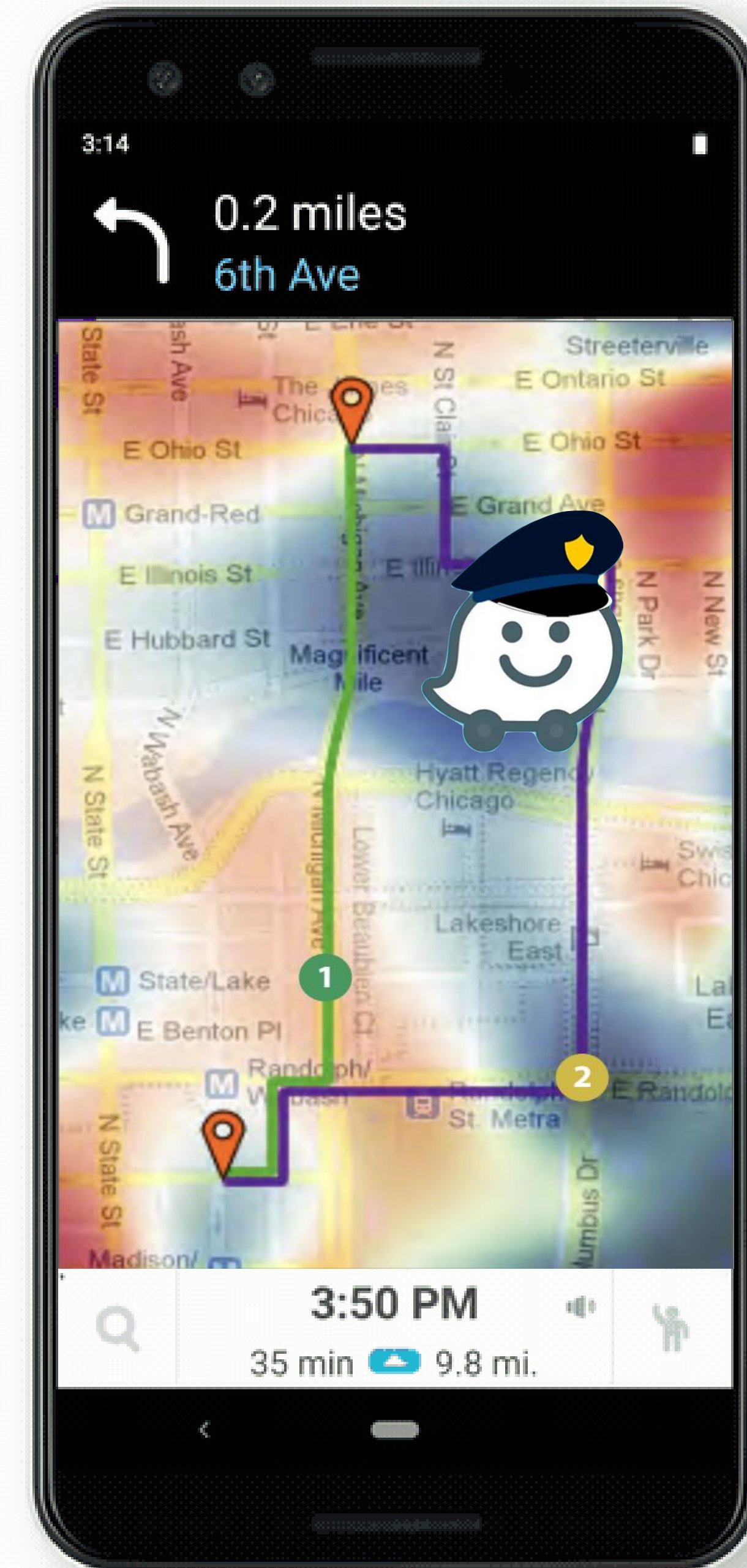
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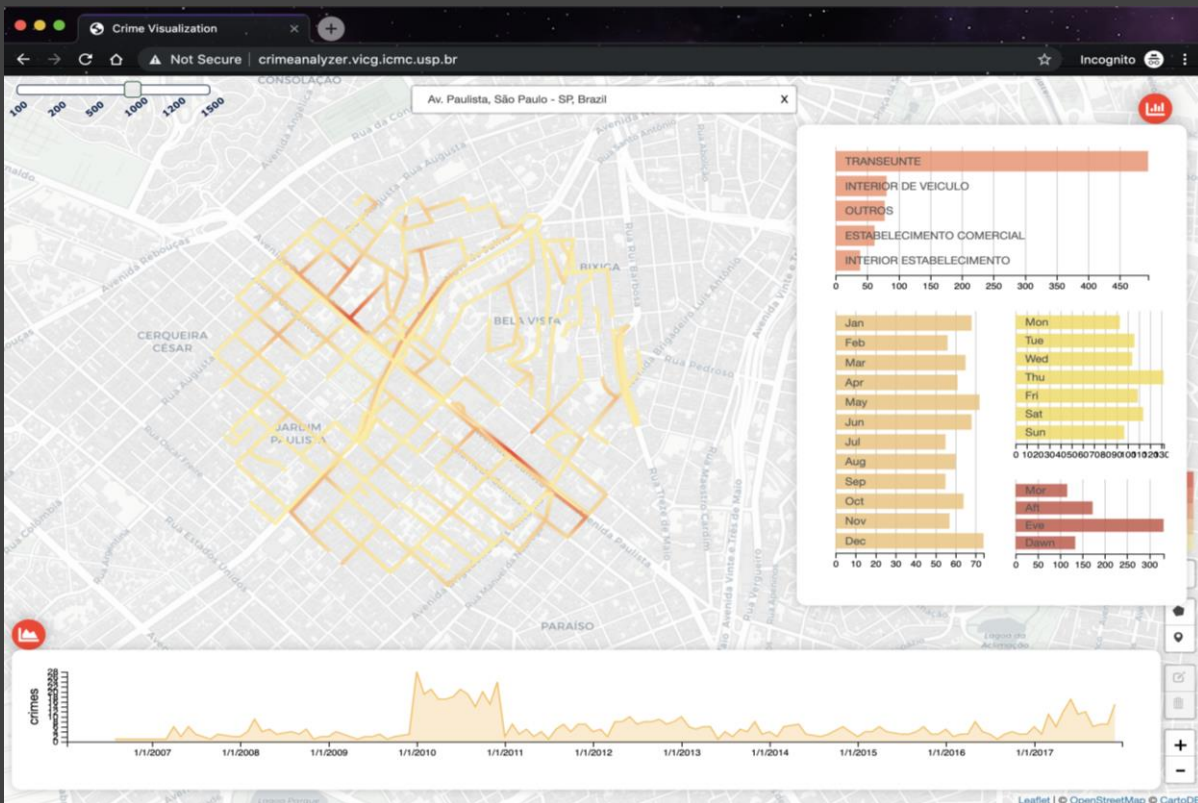


Data Science and Crime Analytics

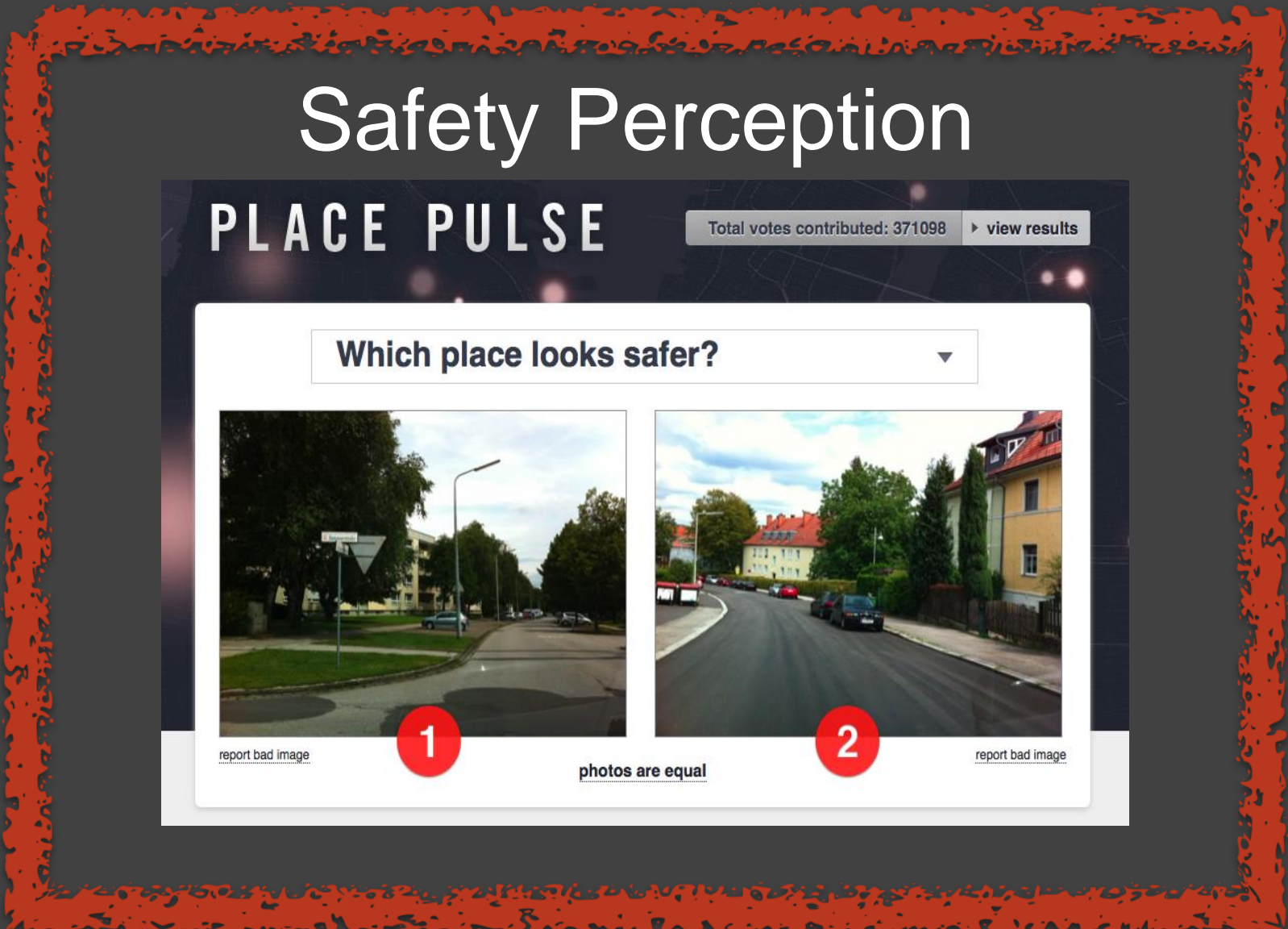
Crime Visual Analytics



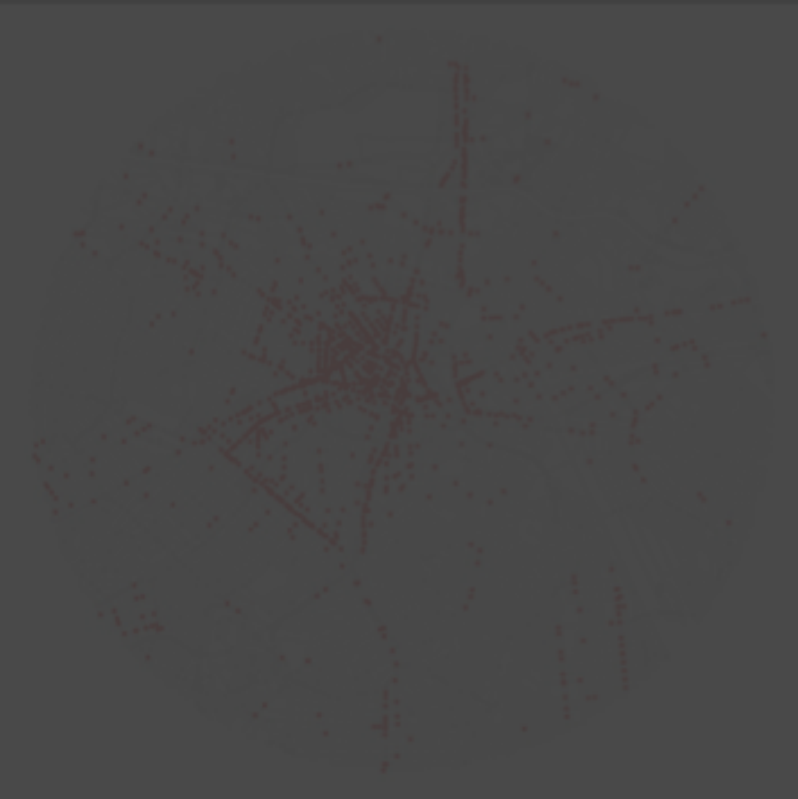
Right to Information



Safety Perception



Crime Forecasting



Crime, Urban factors







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chavez

SEMPURAY

PAINTING

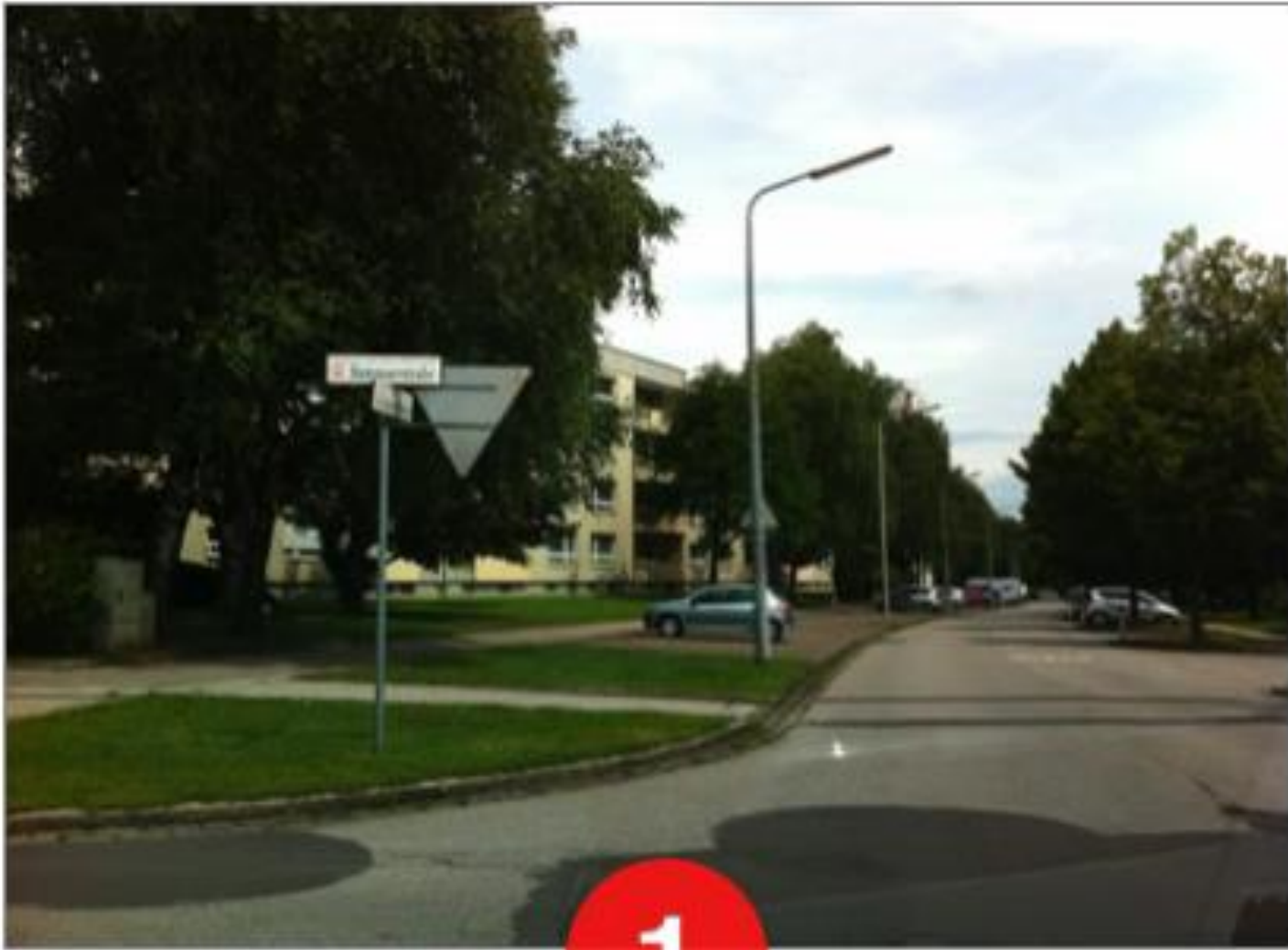
3

How to Capture Human Perception?

PLACE PULSE


Total votes contributed: 371098 [▶ view results](#)

Which place looks safer?



report bad image

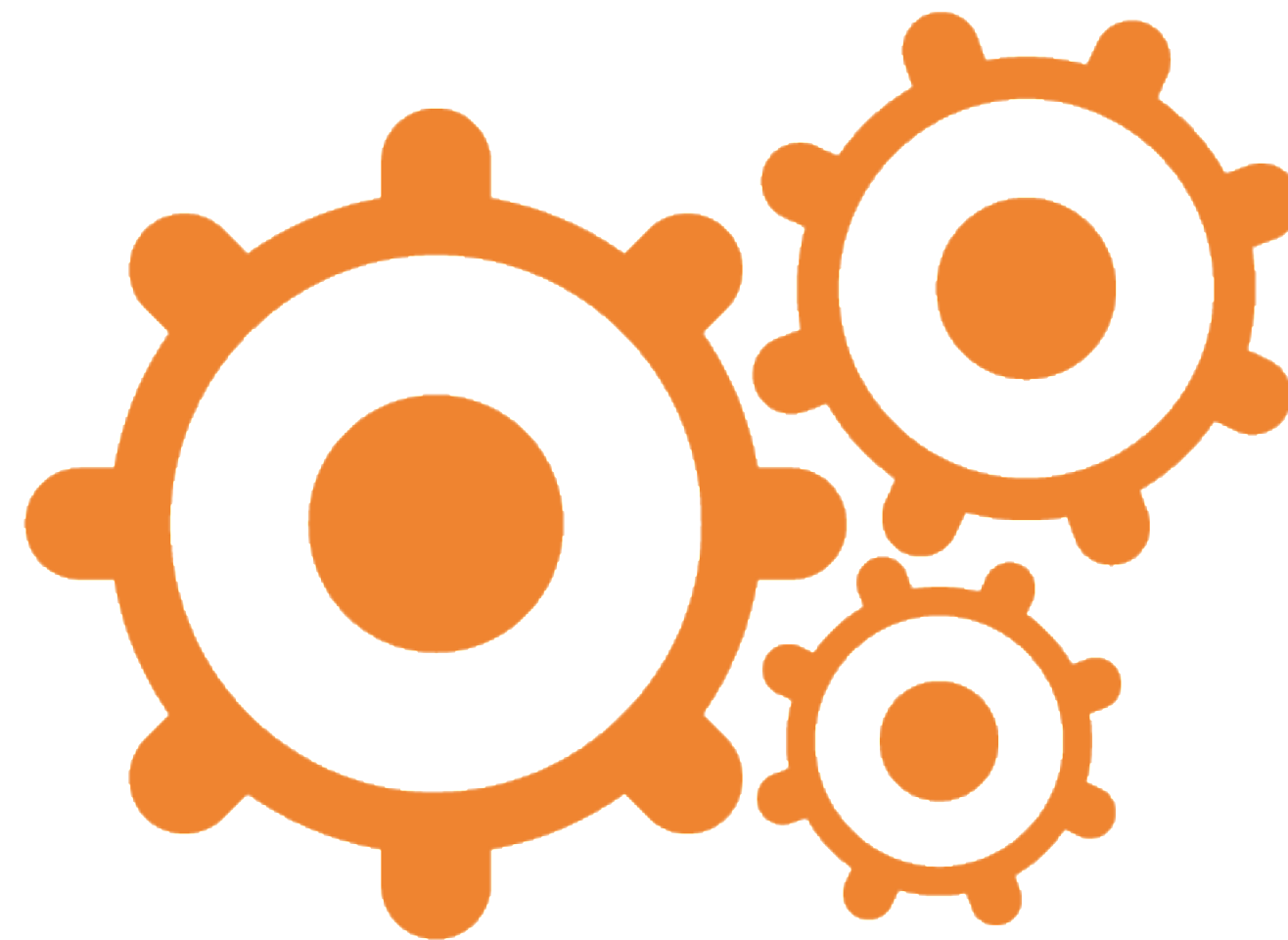
1



report bad image

2

[photos are equal](#)



Computational Model



Safe (score: 0.95)

StreetScore



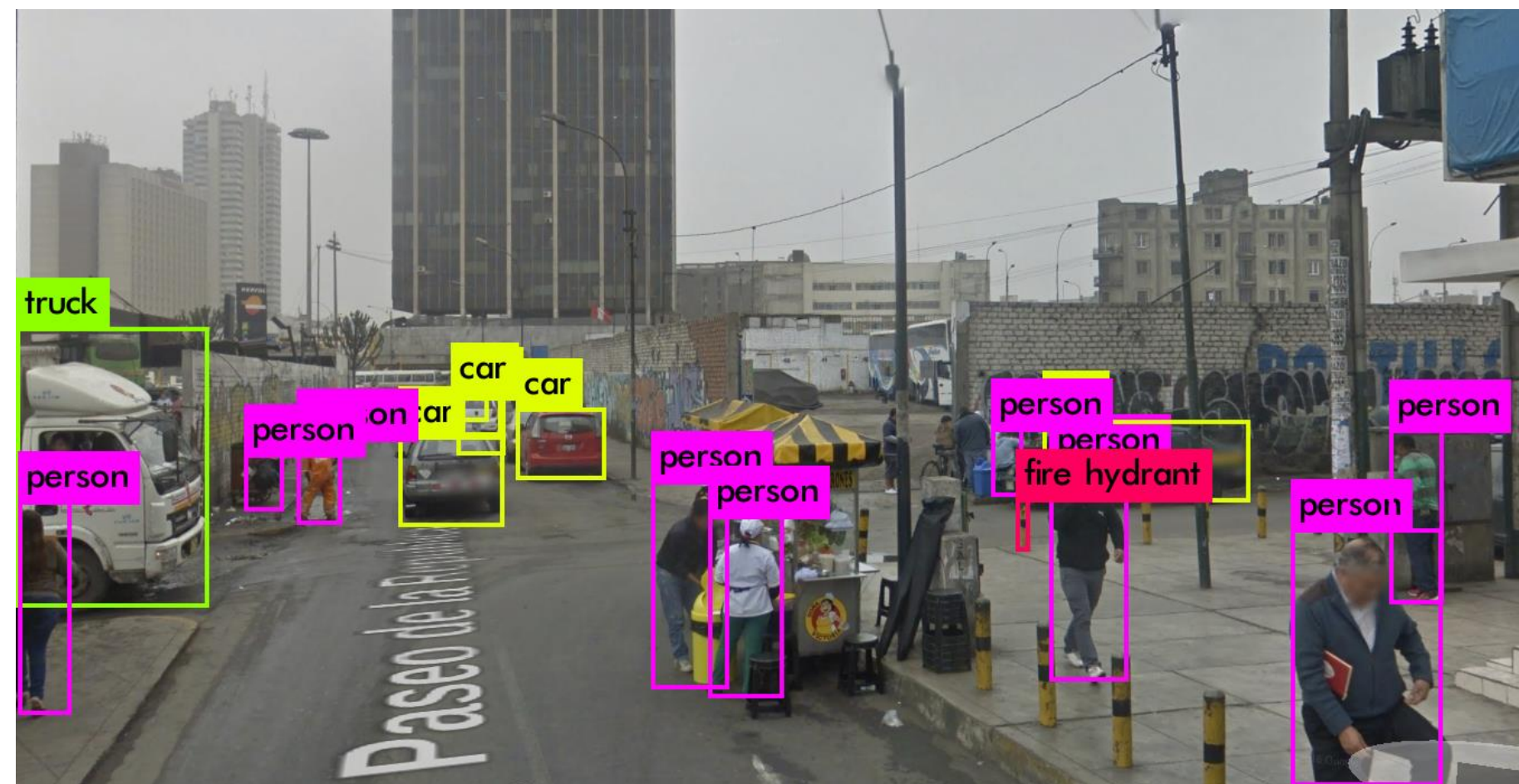
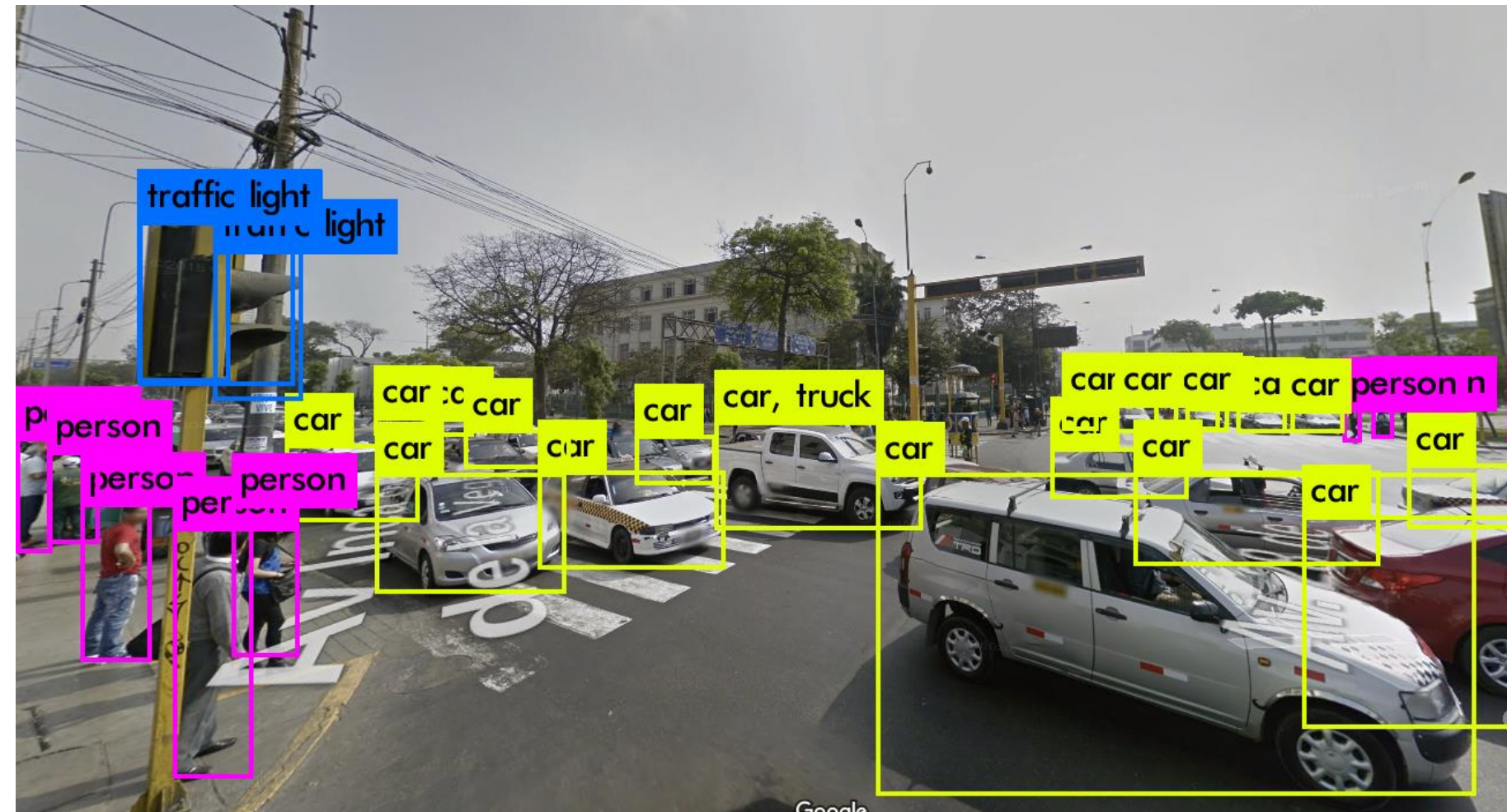
Model Interpretation



Safe (score: 9.5)

What visual features make this image looks safe?

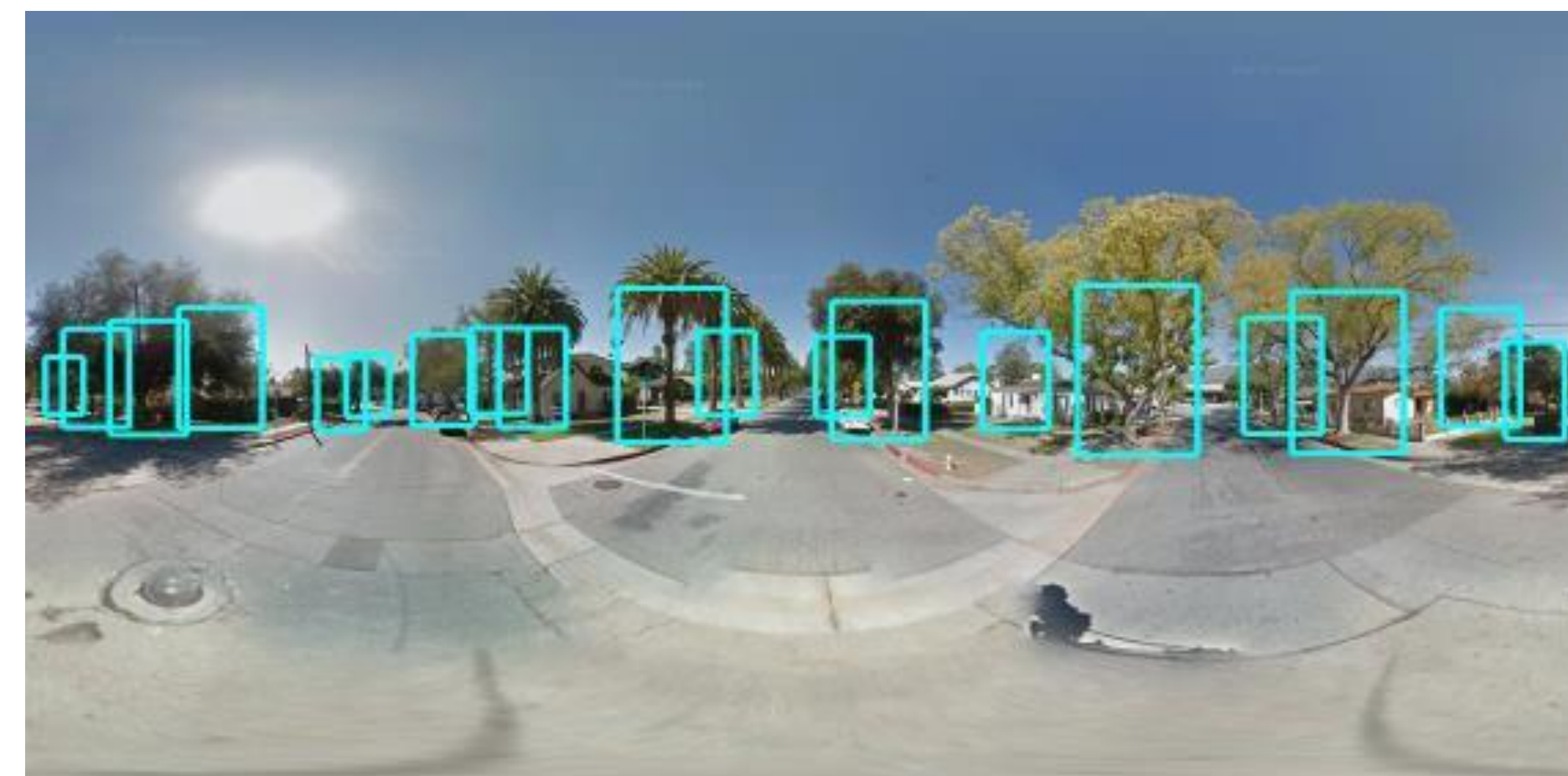
Model Interpretation



Object Detection ¹



Graffiti Detection ²



Tree Detection ³

1. YOLOv3: An Incremental Improvement
2. Quantifying the presence of graffiti in urban environments
3. Cataloging Public Objects Using Aerial and Street-Level Images – Urban Trees

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