Uber Link

By Team A.L.A.N. :
Aayush Prakash,
Laura Lerebours,
Arav Chand, and
Niyanth Ponnusamy

Introduction

- Members
  - **A**ayush Prakash: Team Leader
  - **L**aura Lerebours: Solution Architect
  - **A**rav Chand: Analyst and Visualizer
  - **N**iyanth Ponnusamy: Head Programmer
- Purpose: Address Issues in Barcelona
  - Traffic Congestion
  - Air Pollution
  - VTC Licensing

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Arav Chand

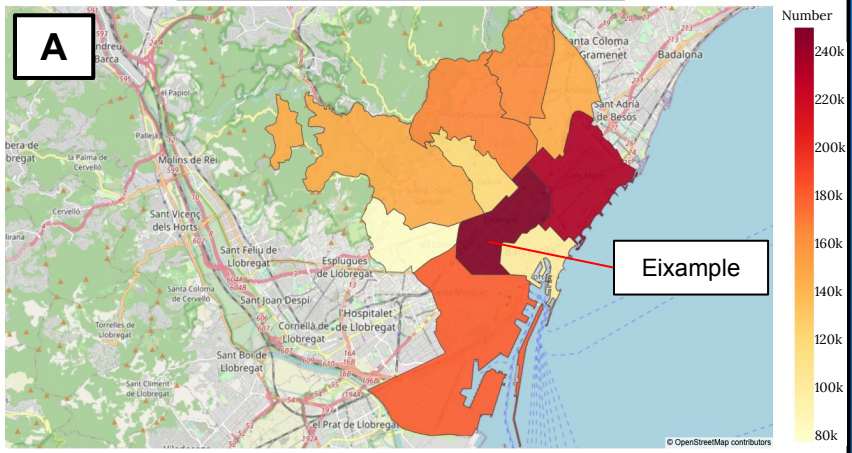
Niyanth Ponnusamy

Problems

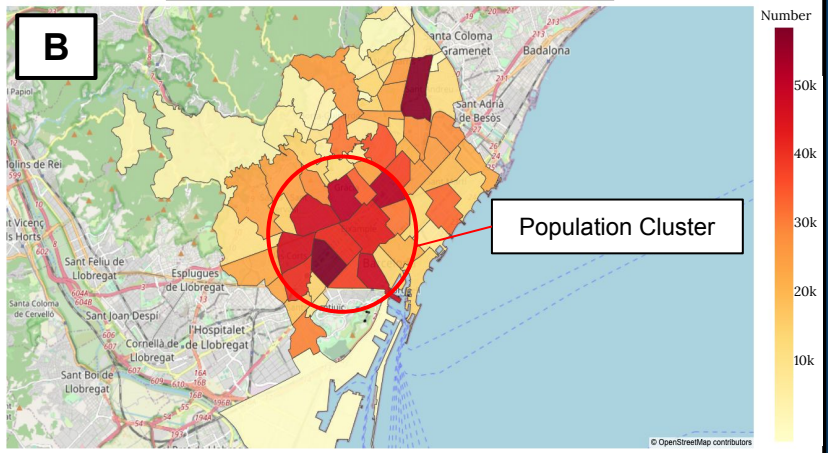
Traffic Congestion - via Population

- Previous research supports that, on average:
  - Higher Population ⇒ Higher Traffic Congestion [1]
- **Eixample** has high population cluster ⇒ has greater traffic congestion.

Population w.r.t. District

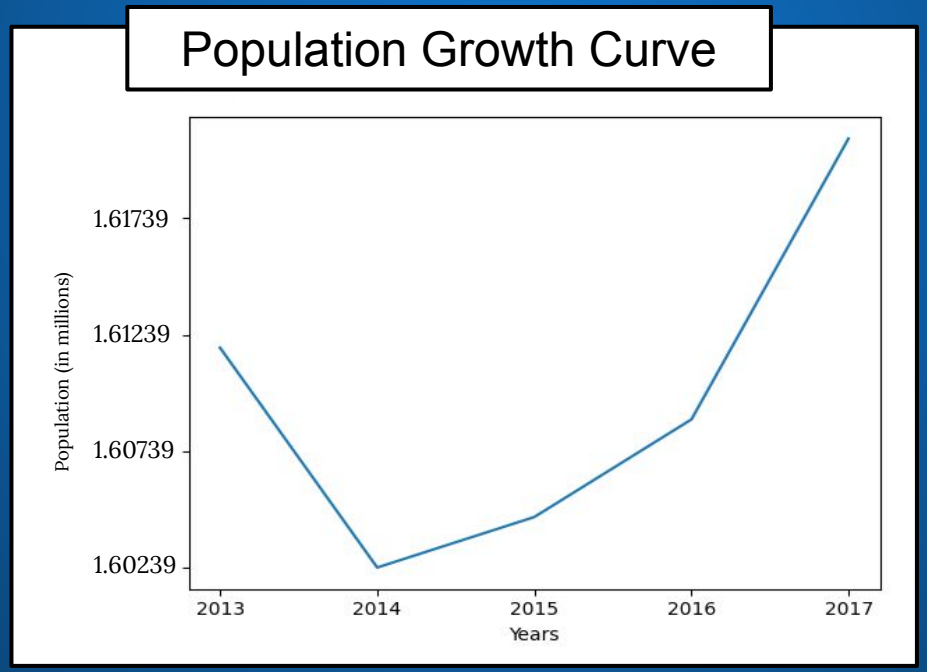


Population w.r.t. Neighborhood



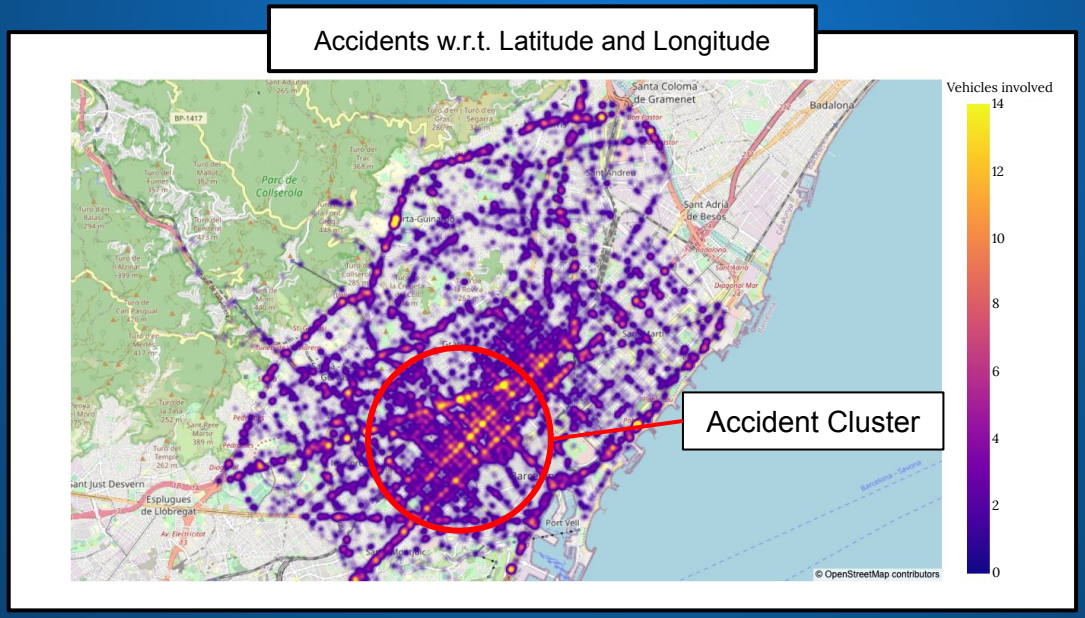
Population is Growing!

- **As uptrend continues, addressing traffic congestion becomes more critical.**



Traffic Congestion - via Accidents

- Similarly, previous research supports that, on average:
  - Higher Collision Frequency ⇒ Greater Traffic Volume [2]
- Accident cluster ⇒ greater traffic volume in **Eixample district** again



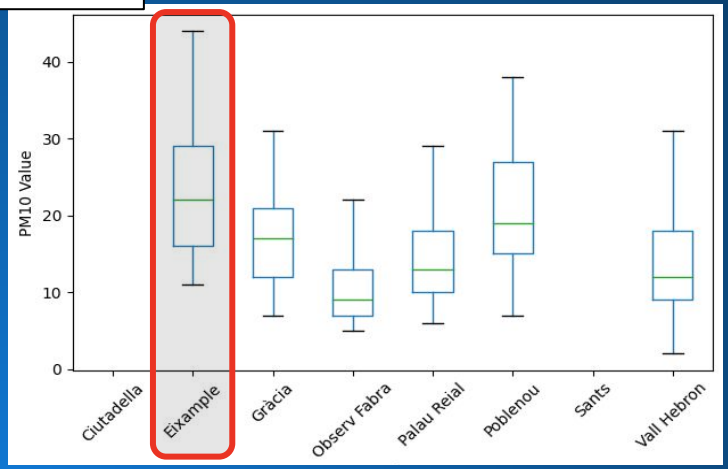
Air Pollution

- **Areas with Higher Traffic Congestion**
  ⇒ Higher PM10 and NO_2 levels

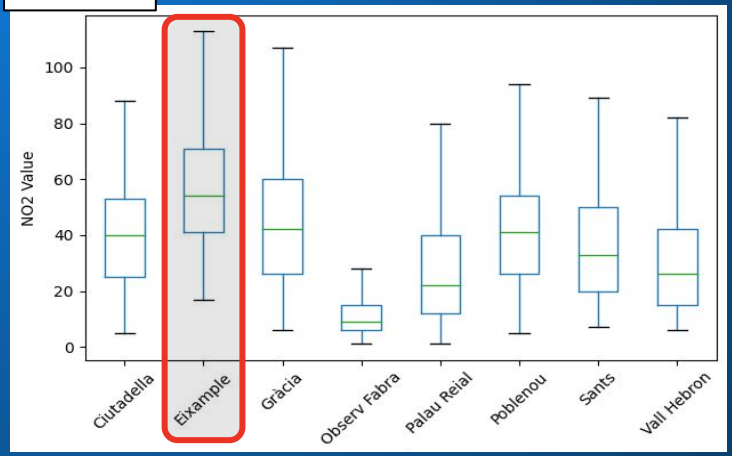
- Elevated PM10 levels
  - lead to high blood pressure,
  - heart attacks,
  - strokes, and
  - premature mortality [4].

- High levels of NO2
  - negatively affect respiratory systems,
  - cause headaches,
  - nausea, and
  - long-term infections [3].

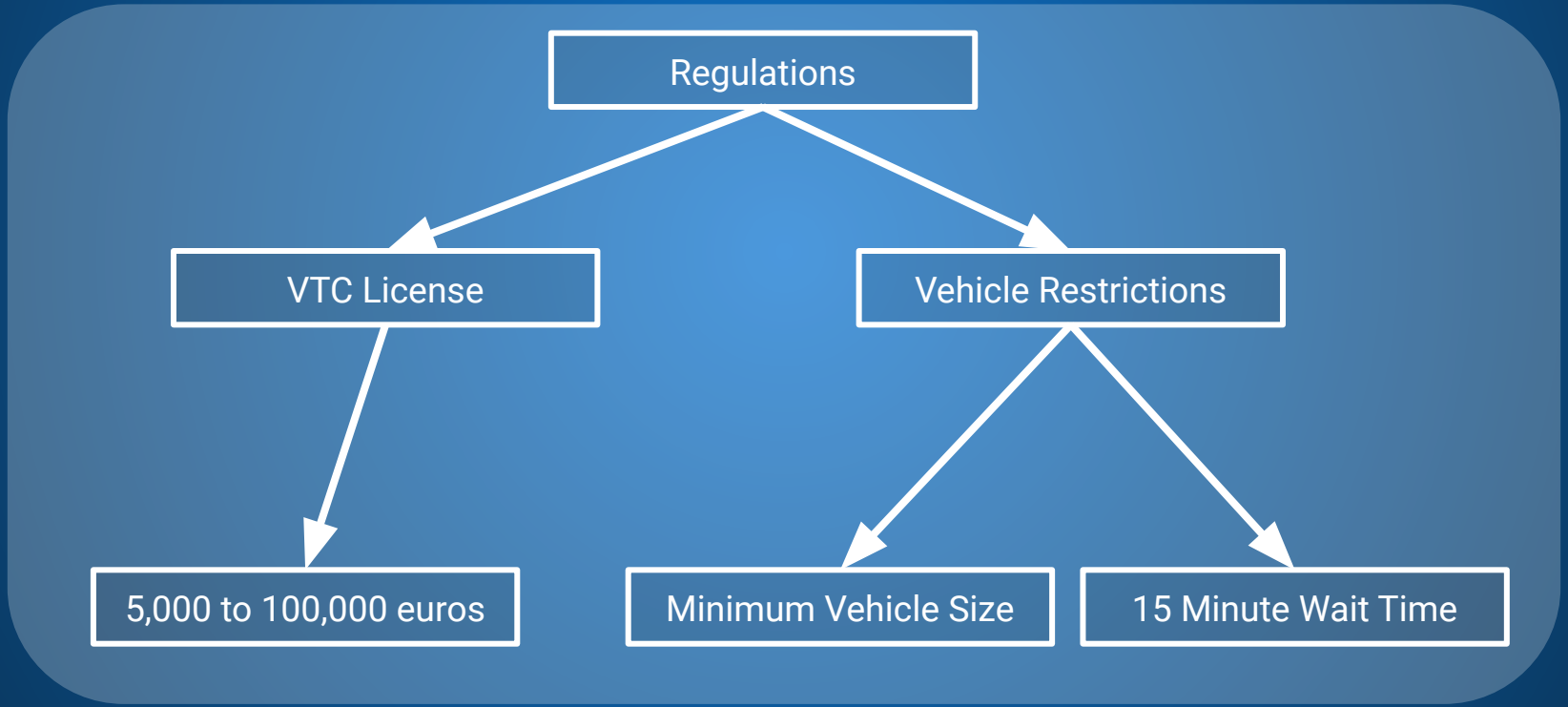
PM10



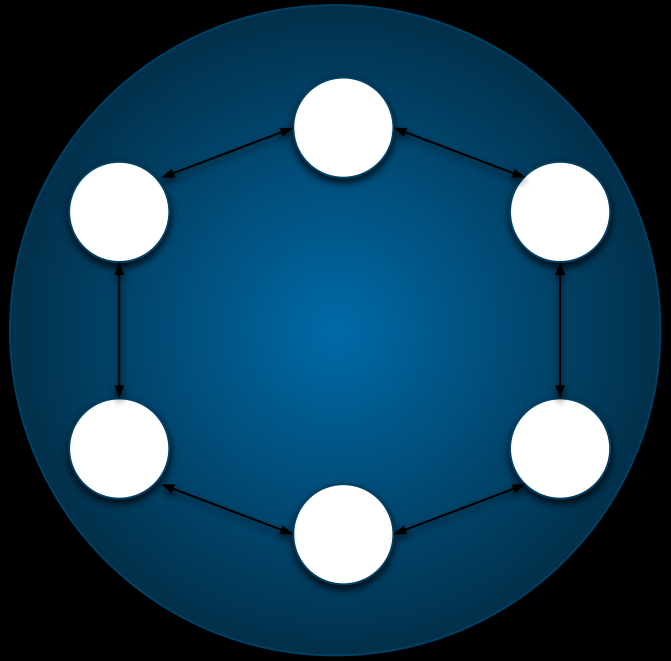
NO_2



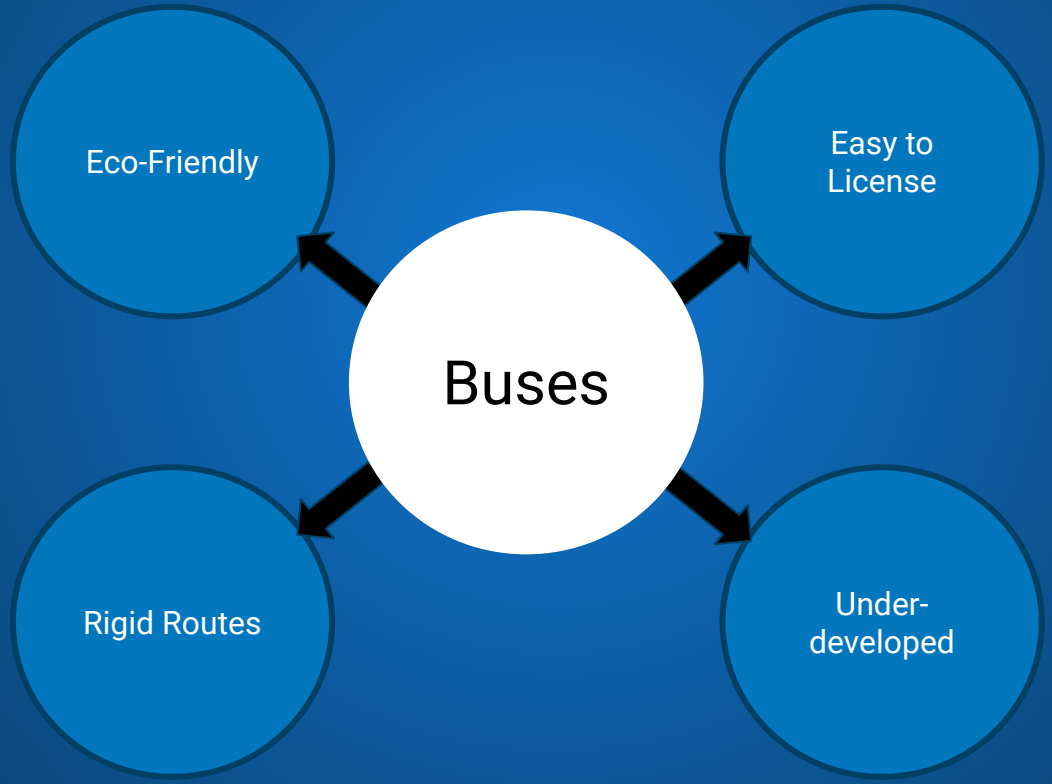
Licensing and Other Government Regulations



Current Situation and Systems



Barcelona Bus System

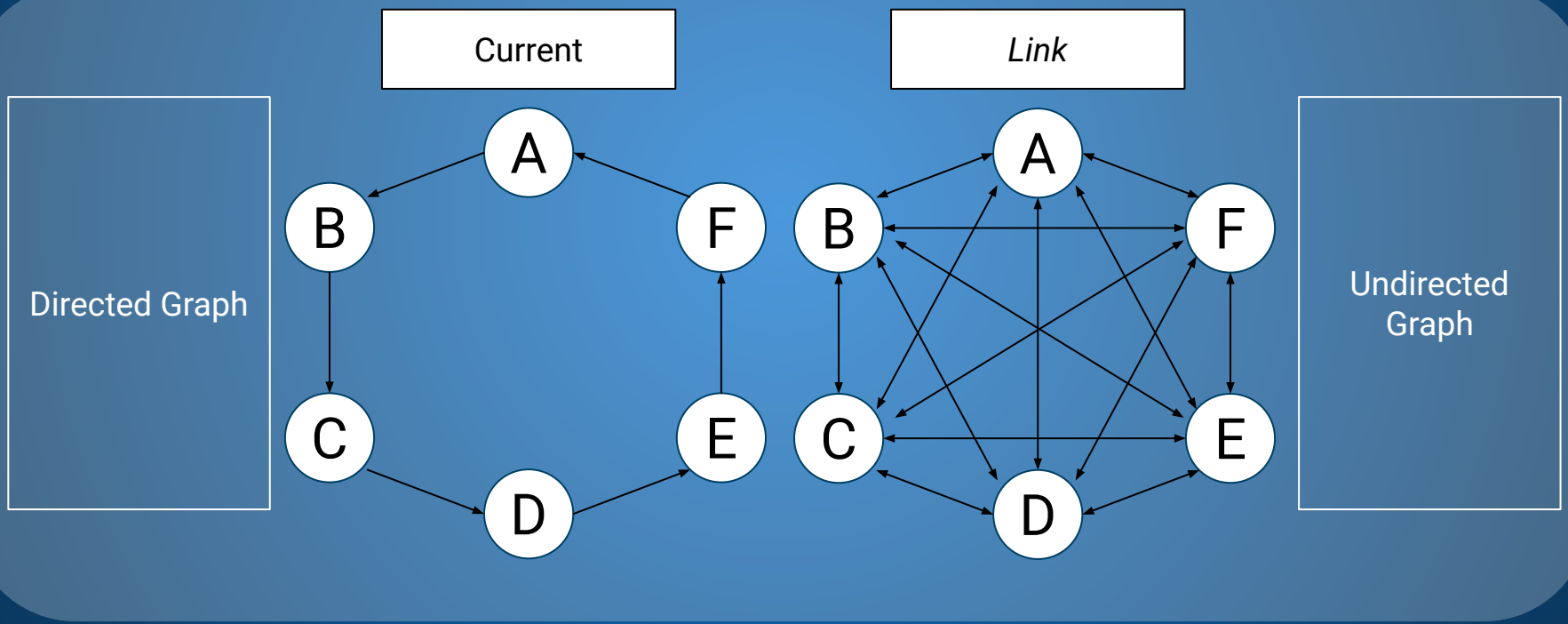


Uber's Presence in Barcelona

- Uber Eats
  - Unaffected by Government Regulations
- Competition
  - Cabify
  - Local Taxis
- Population Compliance
  - Favor towards small businesses

Solution

Current vs *Link* Graphically



Technical Schematic

Clients

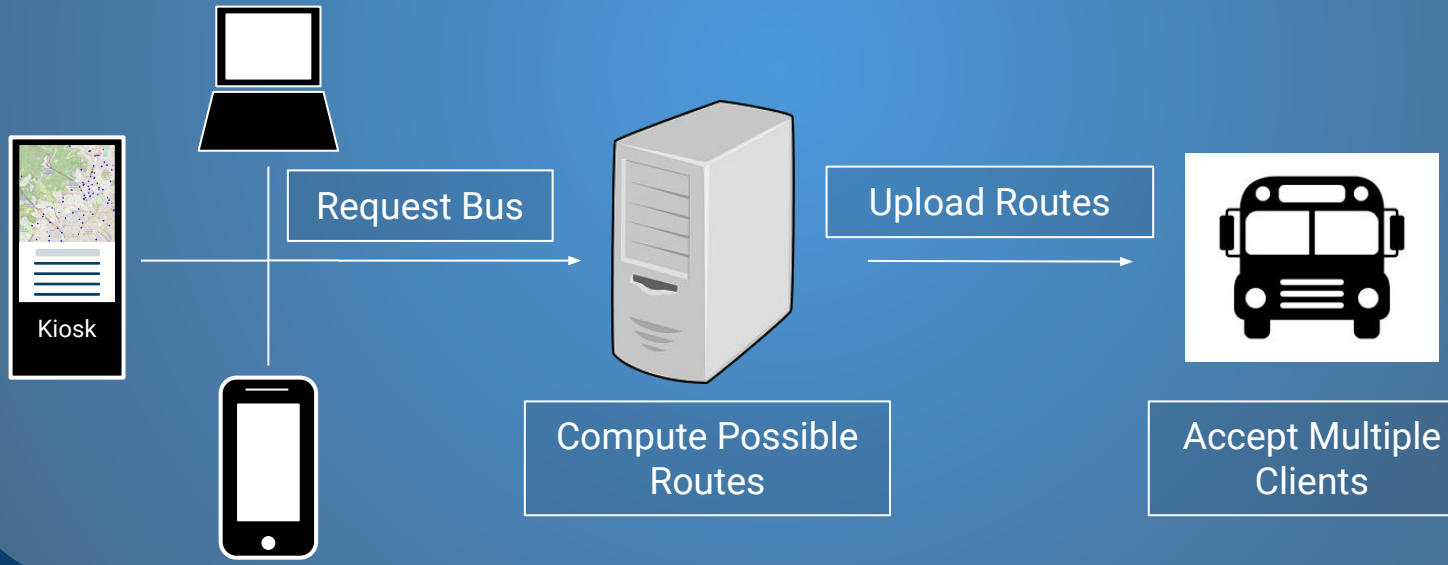
1. Classic Uber App & New Kiosks

Server

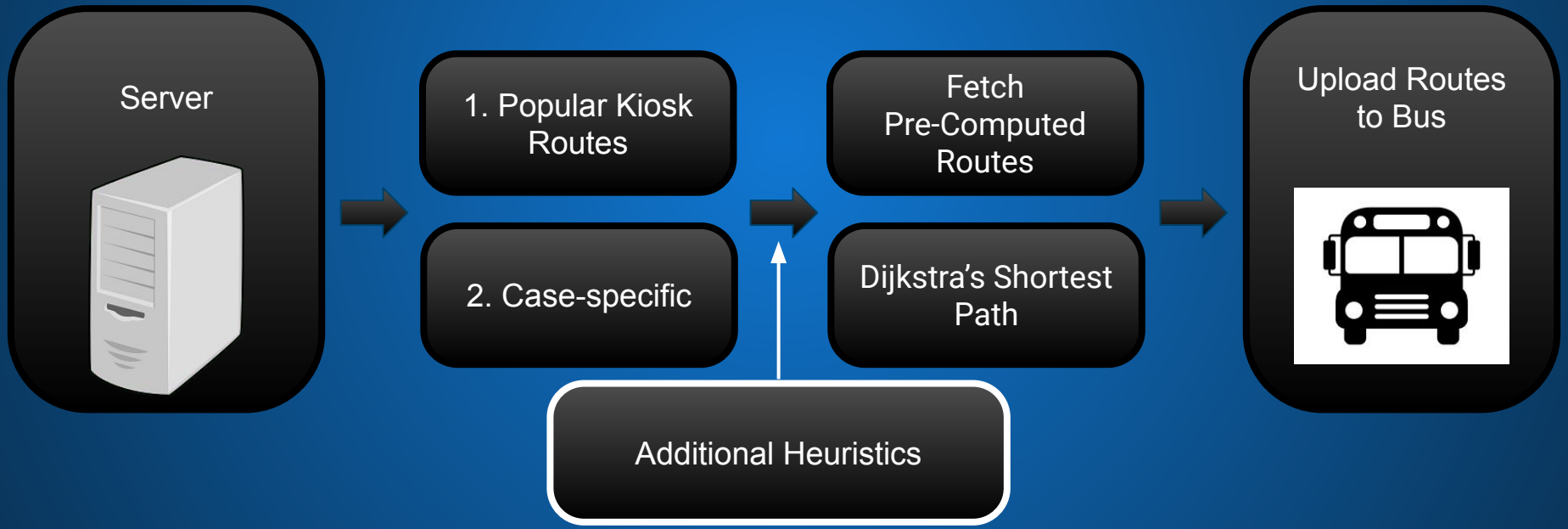
2. Optimize route efficiency & wait-times

Bus

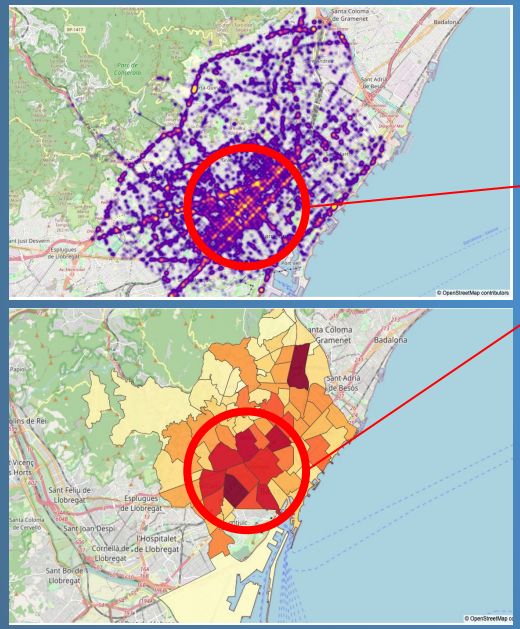
3. Environmentally-Friendly Transport



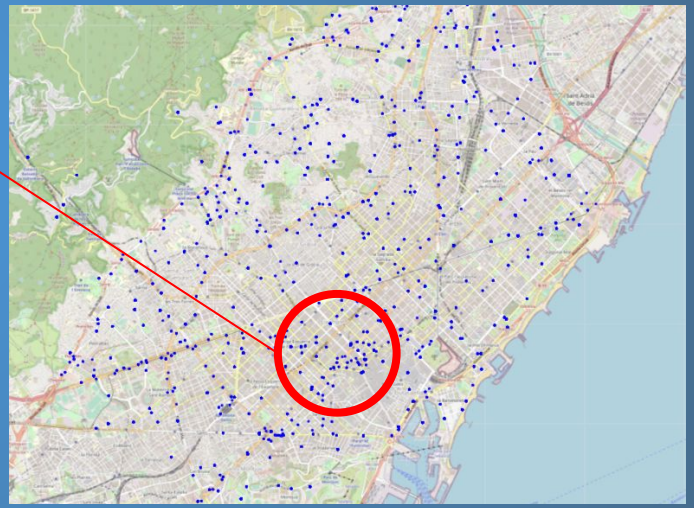
Path Optimization



Marketing Pipeline - Kiosk Placement



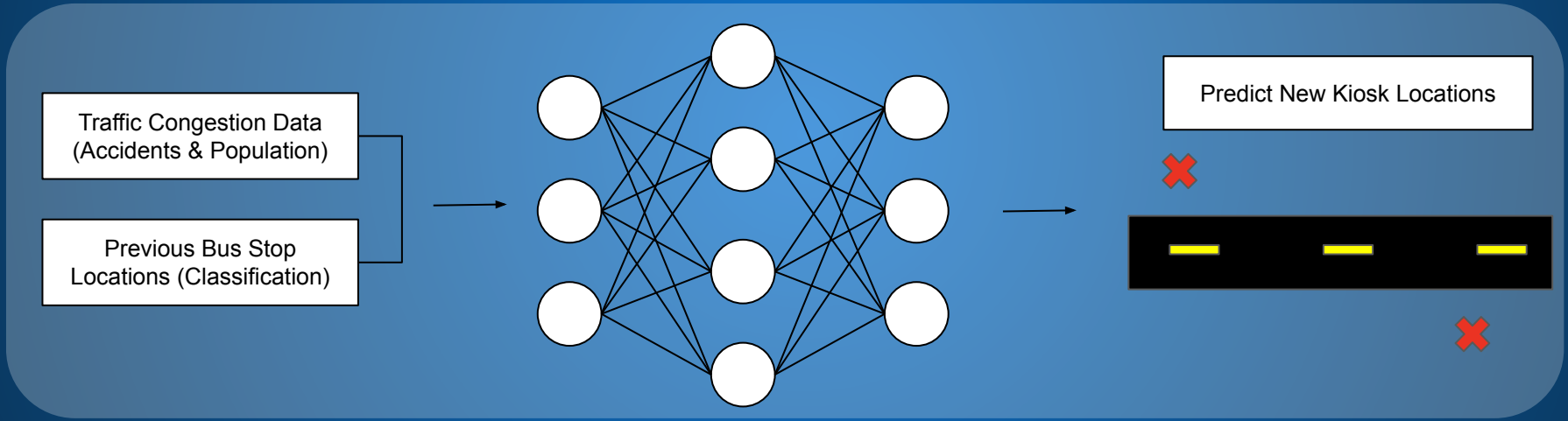
Similar Clustering



Traffic Congestion Data

Current Bus Stop Locations

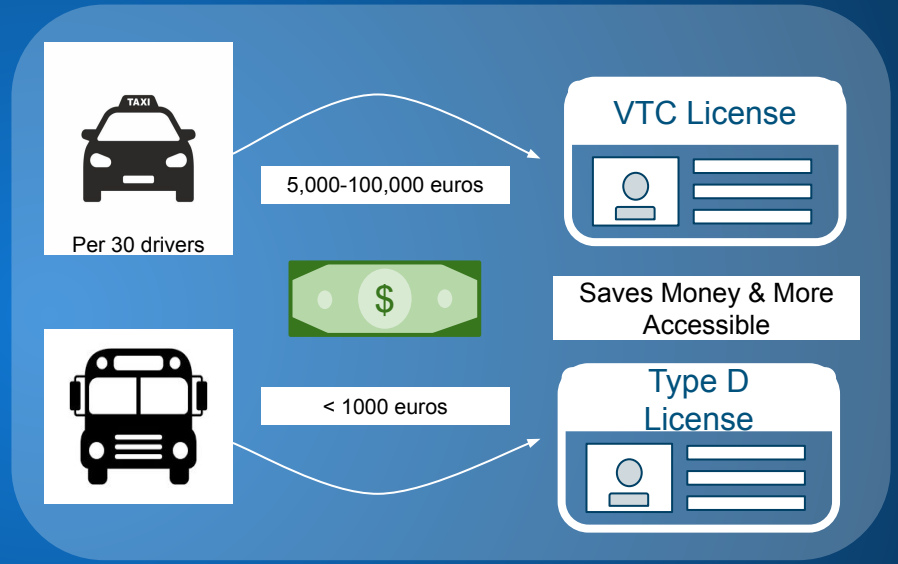
Marketing Pipeline - Kiosk Placement



Significance

Environmental and Cost Benefits

- Every vehicle on the road releases an average of one pound of CO2 per mile driven.
- Taking public transportation reduces CO2 emissions by 45%, decreasing pollutants in the atmosphere and improving air quality.



Fewer Vehicles on the road → Lower amount of CO_2 in atmosphere → Improved air quality → Fewer cases of respiratory ailments

Environmental Benefits

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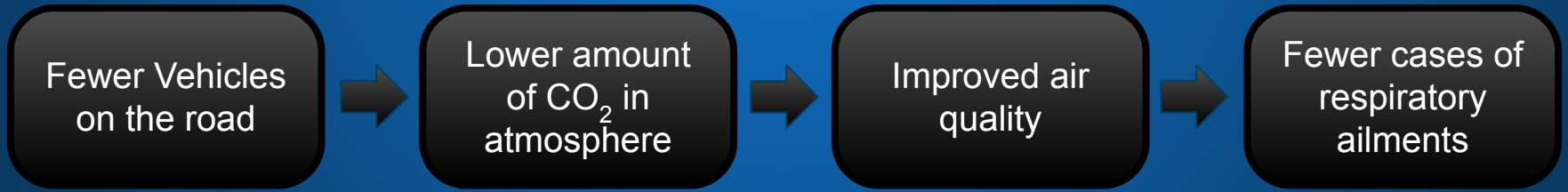
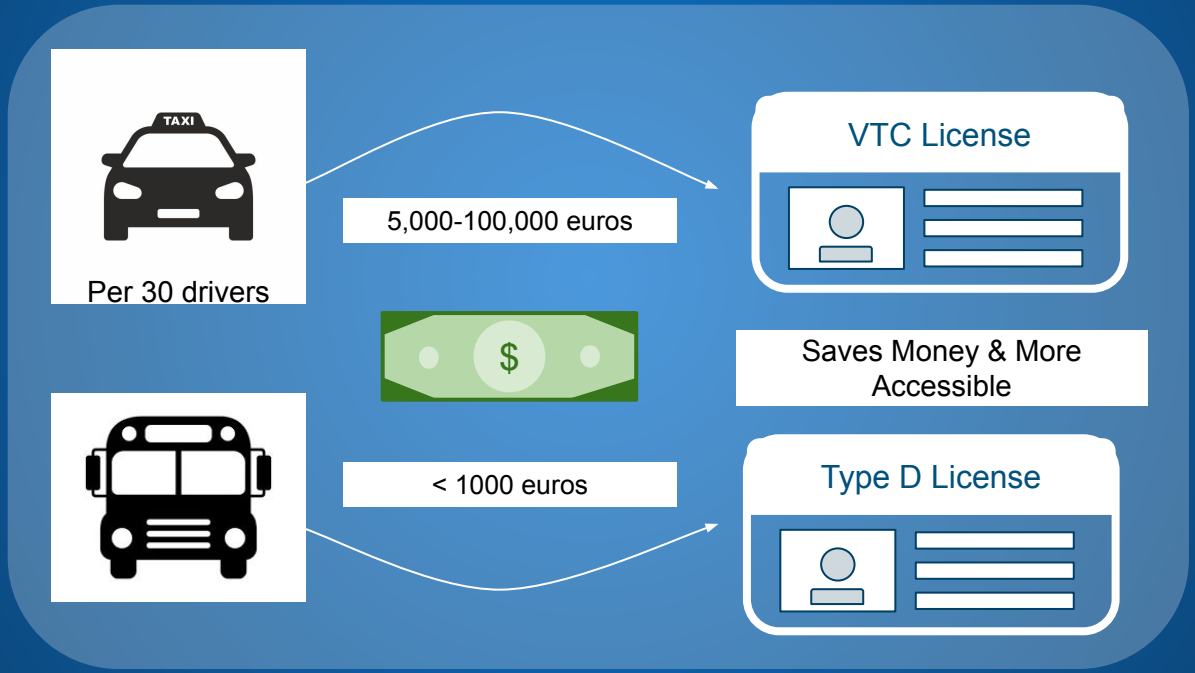


Cost-Efficiency



Travel

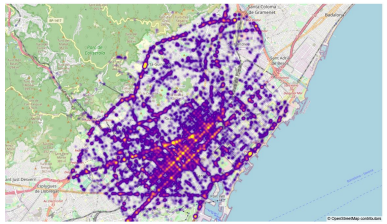
- Foreigners may have trouble hailing a taxi in Barcelona due to a **language barrier**.
- Bus will arrive in a similar amount of time as that of a normal Uber and will help you reach your destination
- Increase in Uber's market share in Barcelona

Conclusion

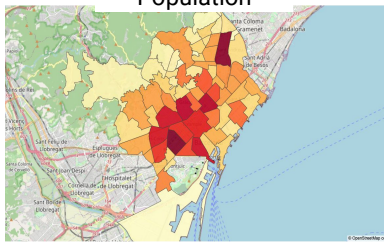
Problems

Traffic Congestion

Accidents

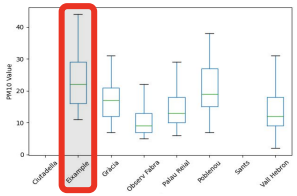


Population

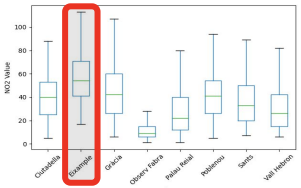


Air Pollution

PM10



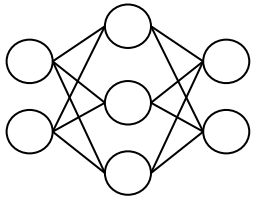
NO2



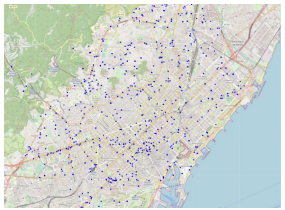
Solution

Kiosk System

Predictor (ANN)

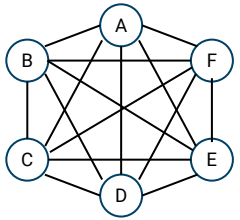


Deployment

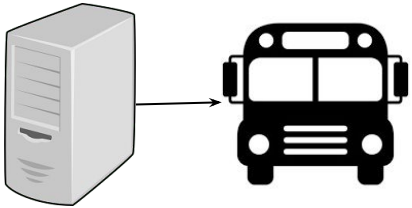


LINK System

Undirected Approach



Computational Pipeline



Our design is widely distributable, also allowing for Uber to work in coordination with local bus companies.

Conclusion

- Traffic Congestion and Air Pollution are major problems in Barcelona and current bus system is not efficient in solving these issues
- Customers can use the Kiosk system or the Uber app
- Placement of the Kiosk will be optimized using an Artificial Neural Network using variables such as population density and accidents
- It will be widely distributed allowing for Uber to work in coordination with local bus companies.

Thank You!!!

Works Cited

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[9] Transports Metropolitans de Barcelona, “Barcelona bus map 2021 | Transports Metropolitans de Barcelona,” www.tmb.cat, 2021. https://www.tmb.cat/en/barcelona-transport/map/bus

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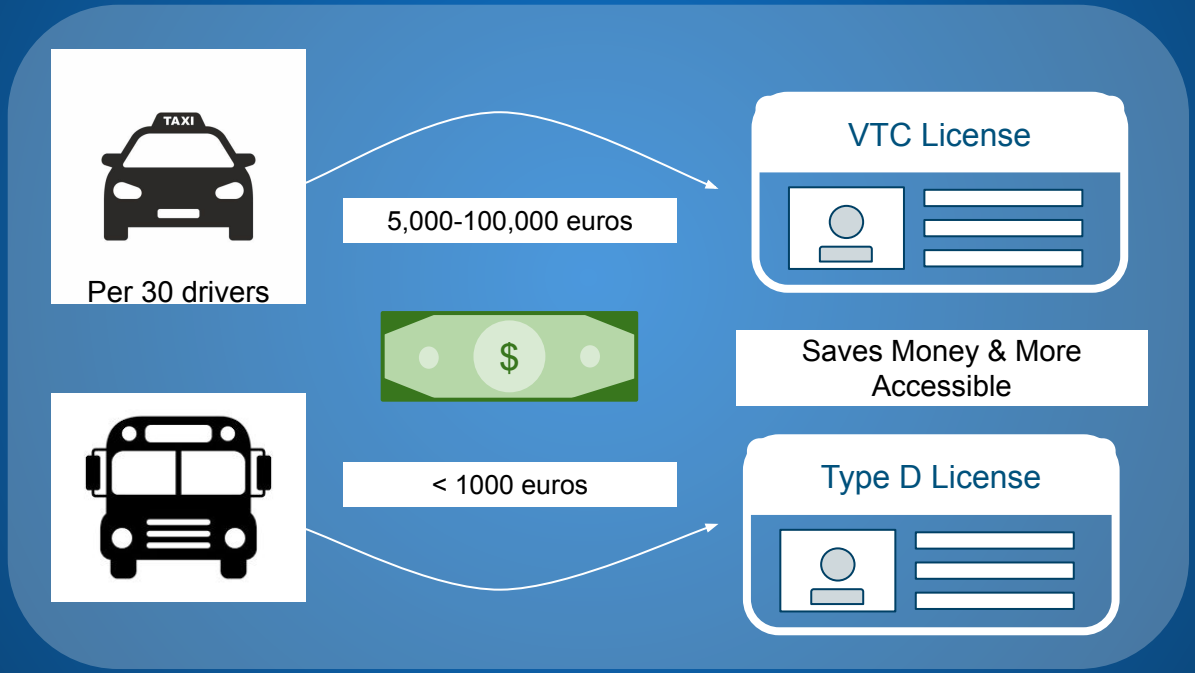
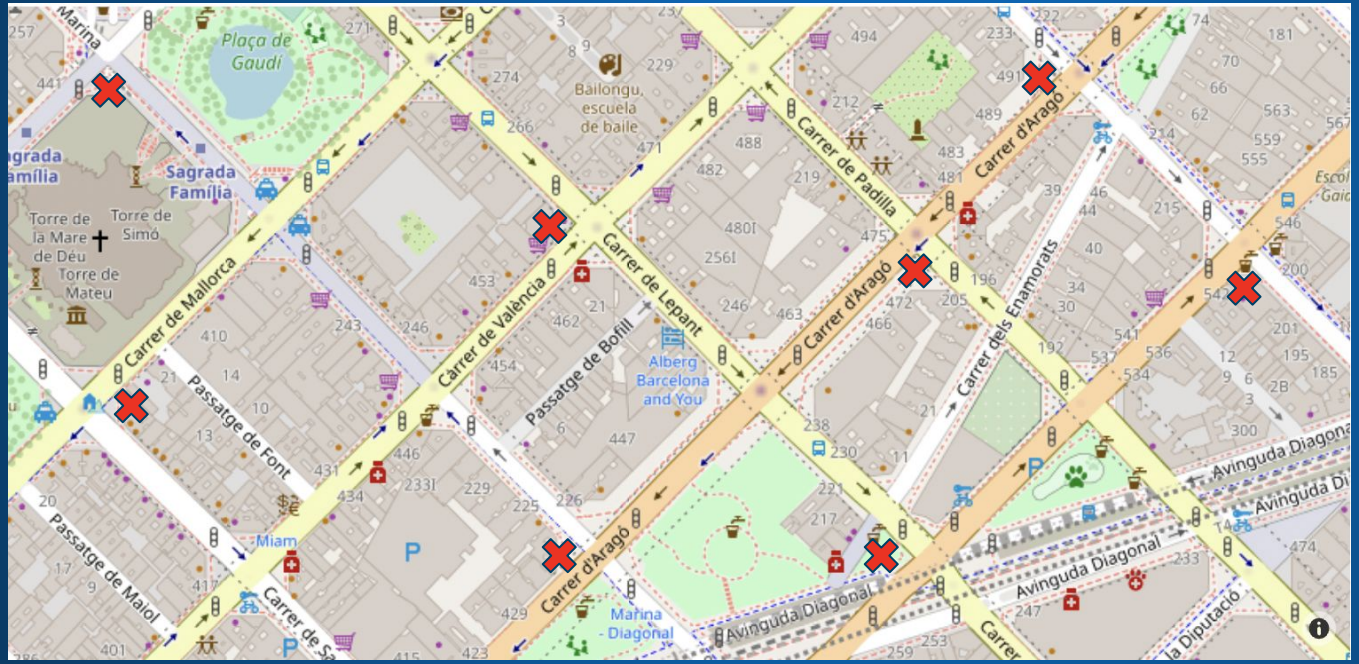
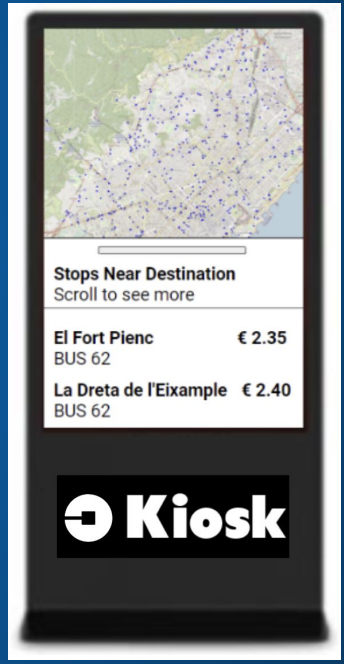
Cost-Efficiency



Implementation

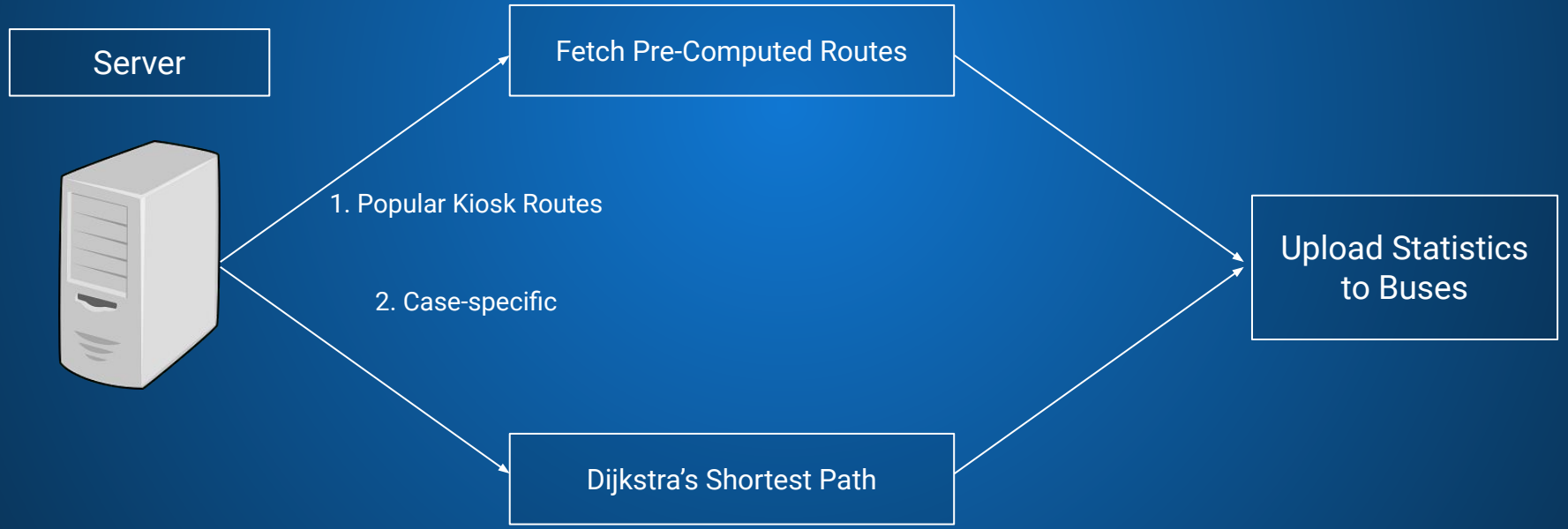
Overview - Kiosk





X: Theoretical kiosk positions

Path Optimization




LINK

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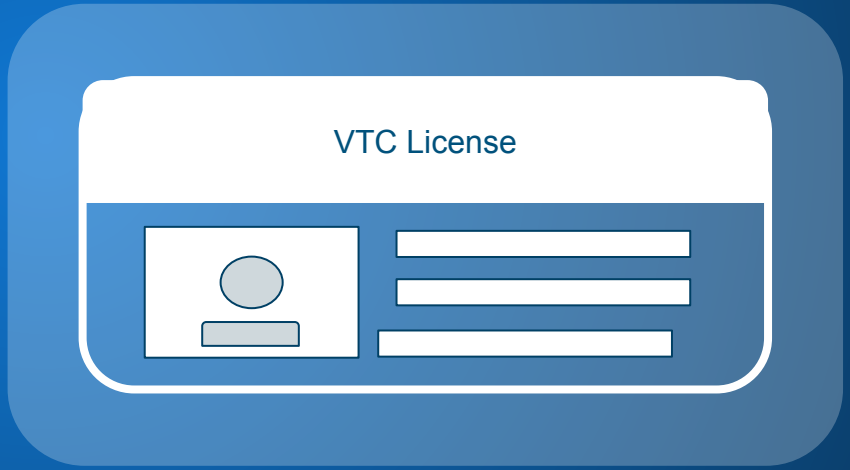
Licensing and Other Government Regulations

- Licensing
  - VTC License
  - Expensive
- Regulations
  - Wait Times
  - Vehicle Size



Licensing and Other Government Regulations