Automatic Enhancement of Pedestrian Route using extracted Landmarks from OSM

“Turn right after the bakery”

Céline DURUPT / Chef de projet Géomatique / Concretio
Daphné Lercier / Makina Corpus
Simone MORGAGNI / Programme Expérience & Cognition / SNCF Innovation & Recherche
Tri Tue NGUYEN / Responsable Cartographie Digitale / SNCF Transilien - Marketing & Services
Frédéric Rodrigo / Makina Corpus

The problem

“In 20m turn right into Albert street”

← Road book based on platform number, street name and distance to describe the route for travellers

“Turn right after the bakery”

→ Road book based on surrounding description

Context

- Pedestrian
- Guidance from arrival platform to a coach
- Complex Surrounding
- Indoor / Outdoor Mix
- Multi-levels

Research

- Nascent research subject
- No mix of Indoor / Outdoor

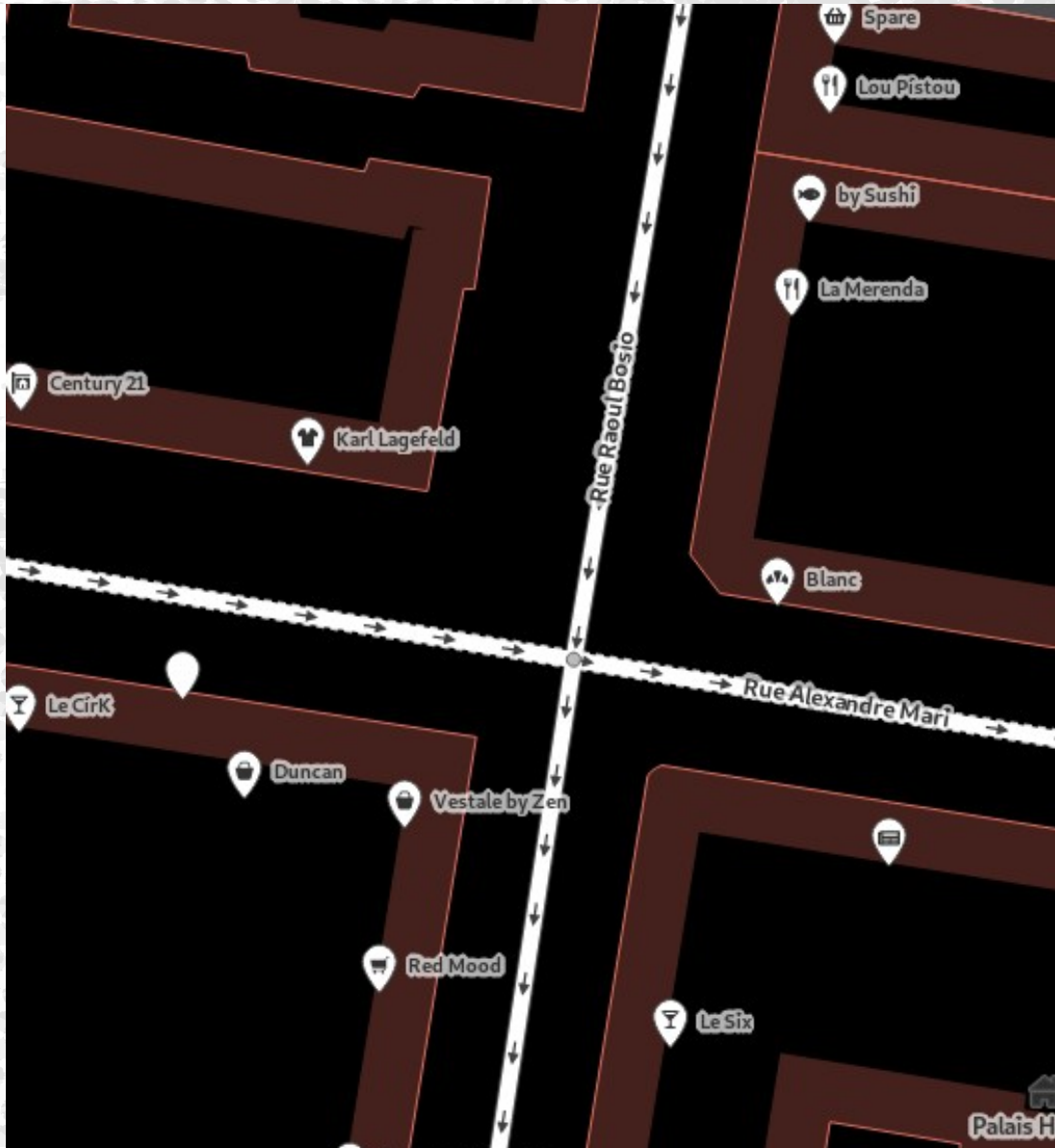
- Landmark: “prominent features in the environment that are unique or contrast with their neighbourhood forming points to orientate in space.”
- Saillence: “relevance of feature to serve as a landmark for guidance”

Extraction

- Inside / Outside
- Landmark category: Tags
- Weight, as per category:
  - Visual: Size, Prominence, Distinguishable, Daytime/Nighttime, Name
  - Semantic : Familiarity, Unambiguous
  - Structural : Spatial extents, Permanence
- Weight evaluated from 98 participants

Punctual Landmarks Outside visibility

- Node projection
  - Door
  - Frontage



Punctual Landmarks Inside visibility

- Be inside the room to see the landmark
- Hide the room from outside the building
- Duplicate on doors

Block Visibility

- Physical
  - Buildings
  - Rooms
  - Barriers
- Soft
  - Railways
  - Waterways

Clustering

- Gather many small objects
  - Bench
  - Vending machine
  - ...

Routing computation

- Steps
- Decision-making

Landmarks Selection

- No landmark on level changes
- Landmark horizon to 10m or 50m
- No containing or similar landmark

  → No parking as landmark when we are already on a parking

Visible Landmarks

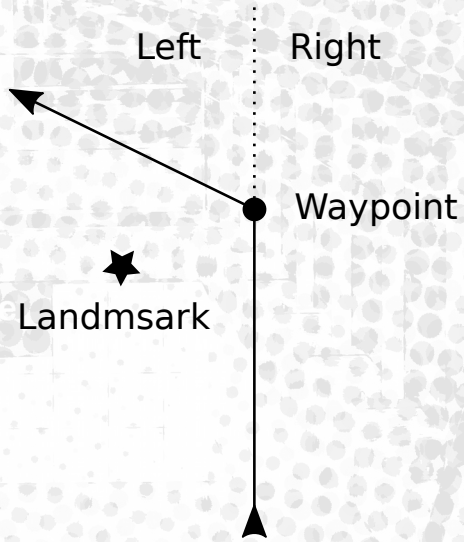
- Visibility test
- Preprocessing: door, frontage, room/wall
- Ray casting

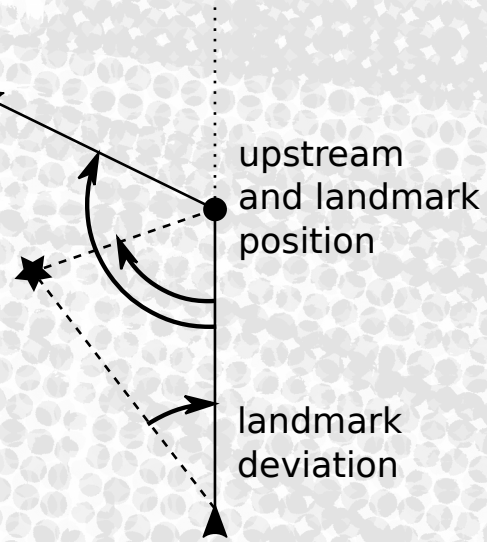
Duplicates

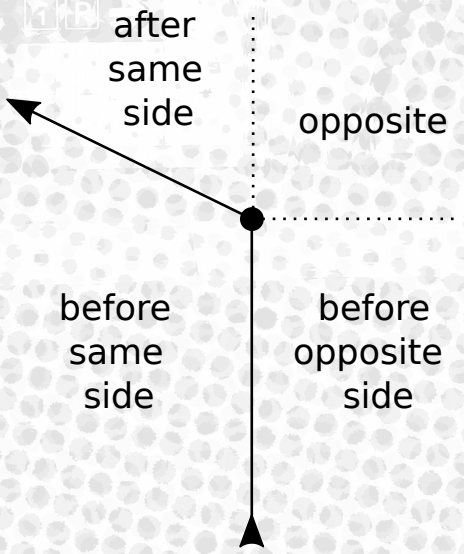
- Does not keep multiple close similar objects

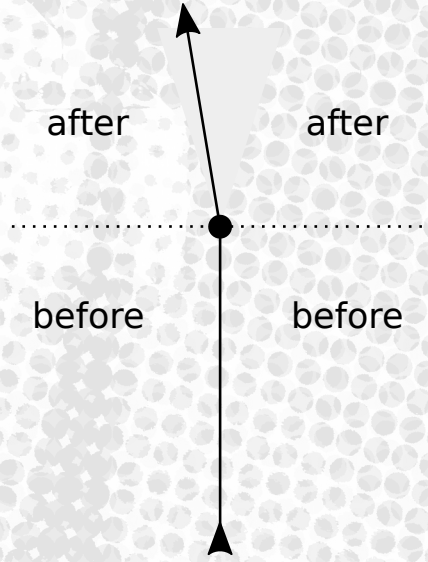
Relative position

- Adjust weight of landmark based on
  - Relative position
  - Distance

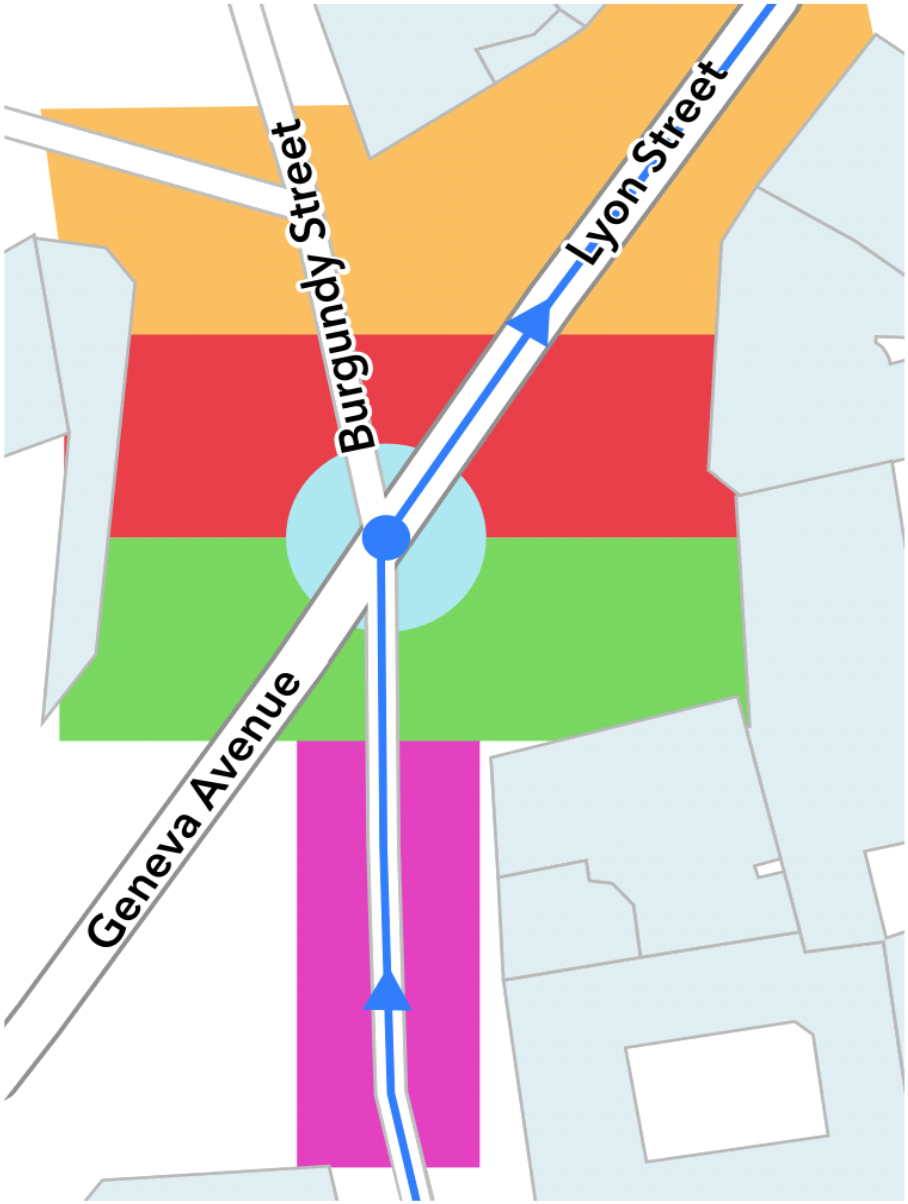








Landmark integration



decision point

building

If the landmark is located in this area...

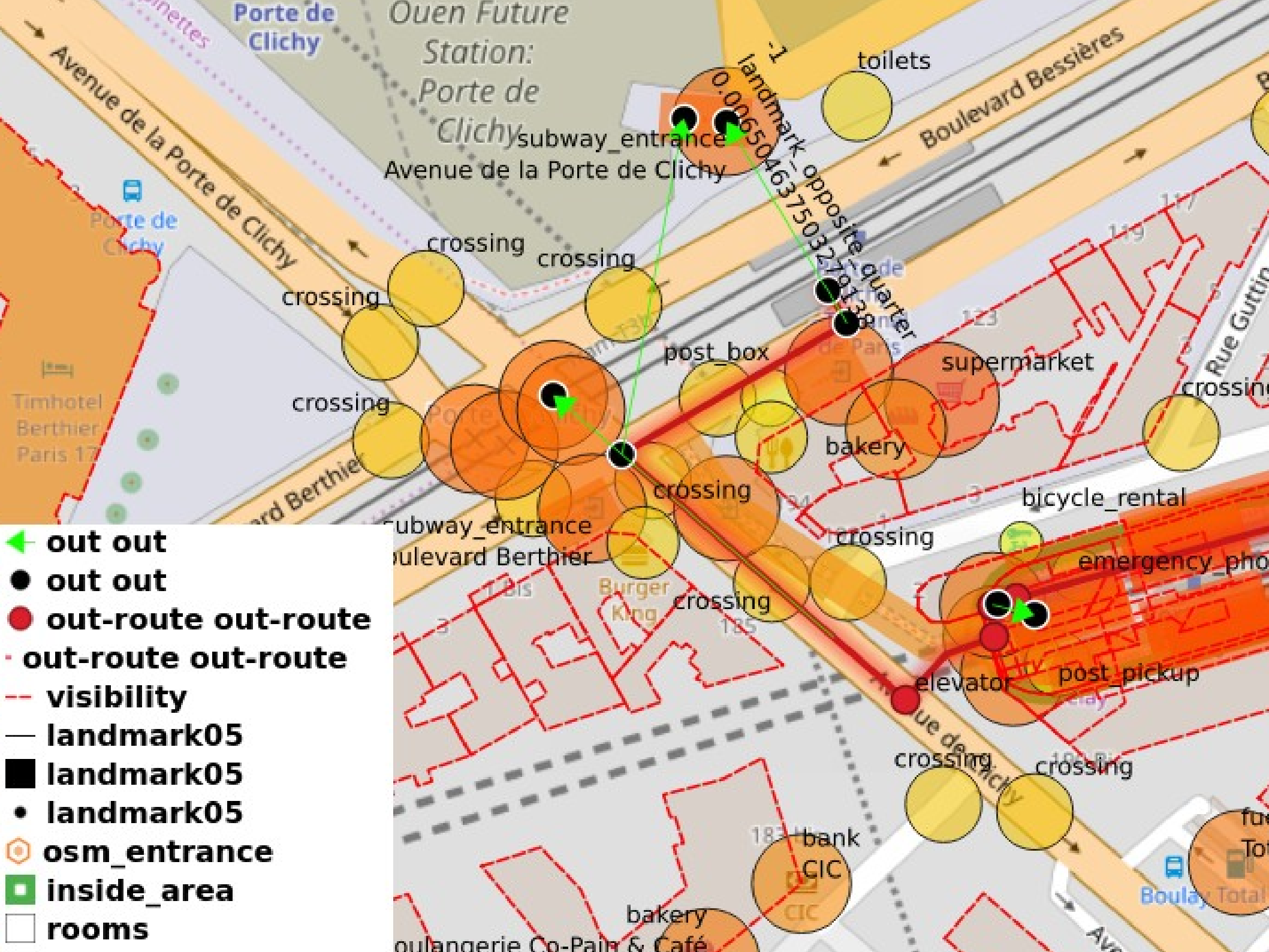
"Turn right on Lyon Street **in the direction** the landmark"

"Turn right on Lyon Street **after** the landmark"

"Turn right on Lyon Street **before** the landmark"

"**You will see** the landmark **on your left/right then** turn right on Lyon Street

"Turn right on Lyon Street **at** the landmark"


Porte de Clichy
Ouen Future Station: Porte de Clichy
Avenue de la Porte de Clichy
Boulevard Bessières
toilets
subway_entrance
Avenue de la Porte de Clichy
landmark 0.006504637503278138 opposite quarter
crossing
crossing
crossing
crossing
post_box
supermarket
bakery
crossing
bicycle_rental
crossing
emergency_pho
elevator
post_pickup
crossing
crossing
bank
CIC
bakery
Rue Guttin
Timhotel Berthier Paris 17
Burger King
out out
out out
out-route out-route
out-route out-route
visibility
landmark05
landmark05
landmark05
osm_entrance
inside_area
rooms

Landmarks integration

- Transform the results of the routing and landmark extraction algorithms into natural language
- Linguistic and geographic combined approach
- Side-by-side improvement of the routing and integration algorithms