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EXTRACTING USER'S SIGNIFICANT PLACES FROM LOCATION DATA

Excel@FIT 2023

BRNO UNIVERSITY OF TECHNOLOGY
FACULTY OF INFORMATION TECHNOLOGY

2.1 INPUT DATASET

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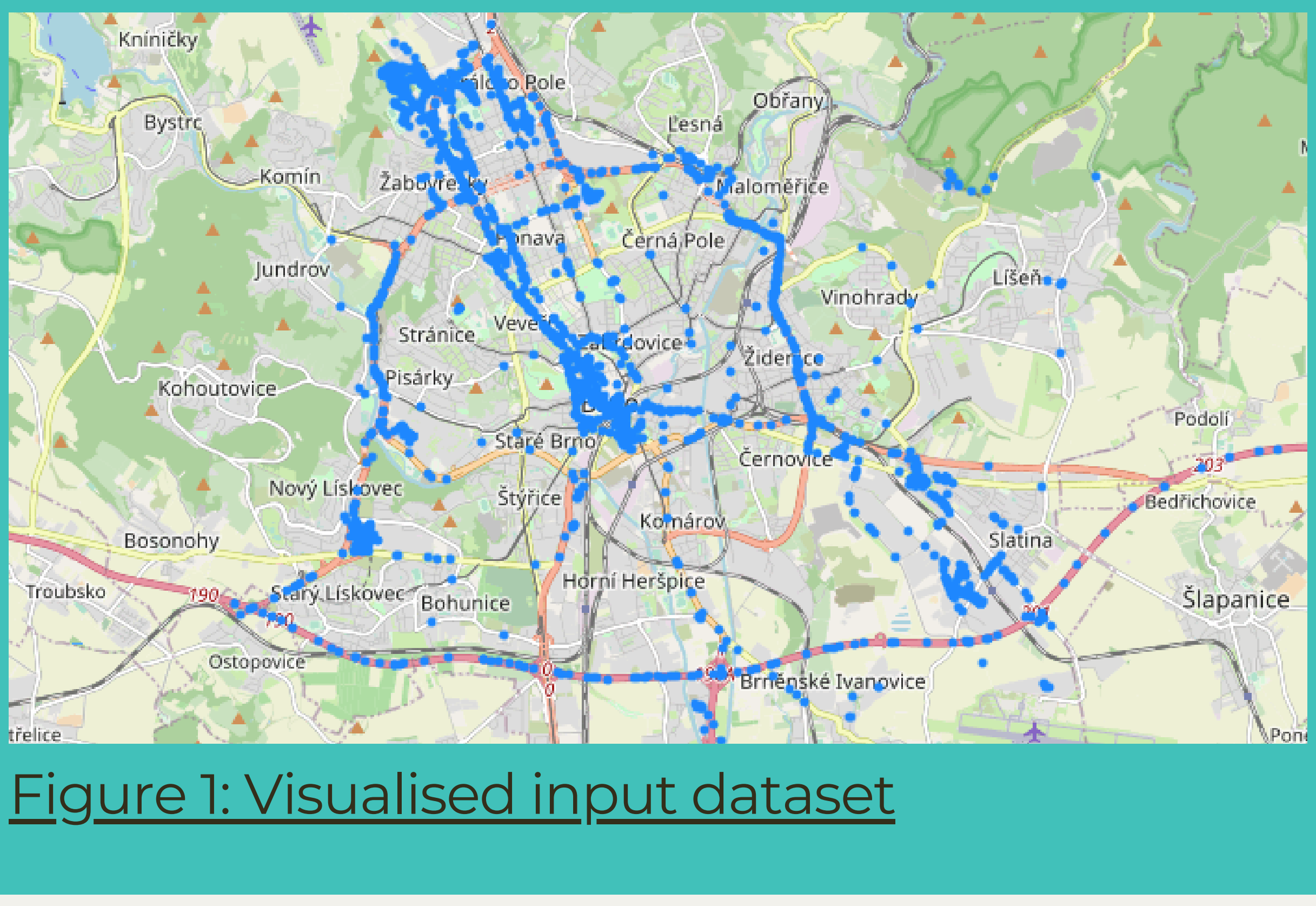

Figure 1: Visualised input dataset

- GPS points
  - latitude
  - longitude
  - timestamp

2.2 PROPOSED SOLUTION

STAY-POINT DETECTION

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- Differential-based stay-point detection algorithm
  - time threshold
  - distance threshold

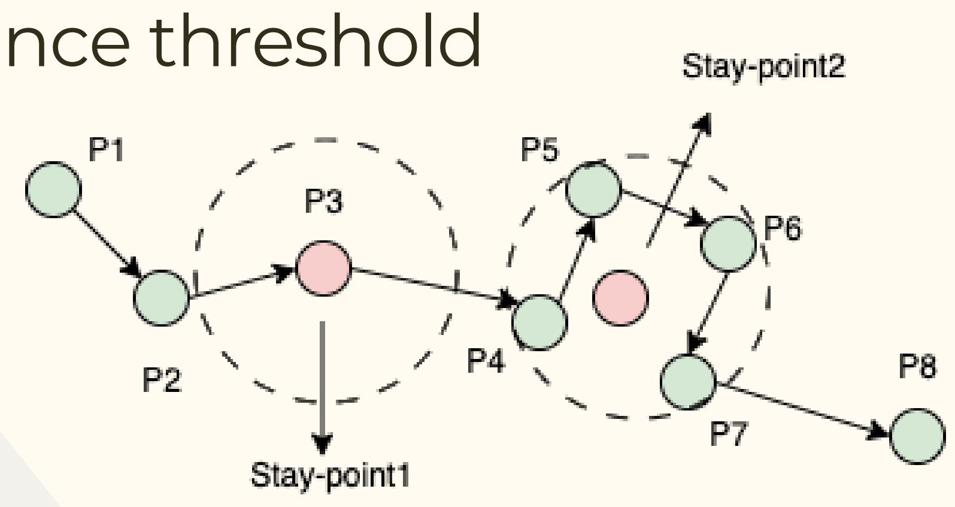
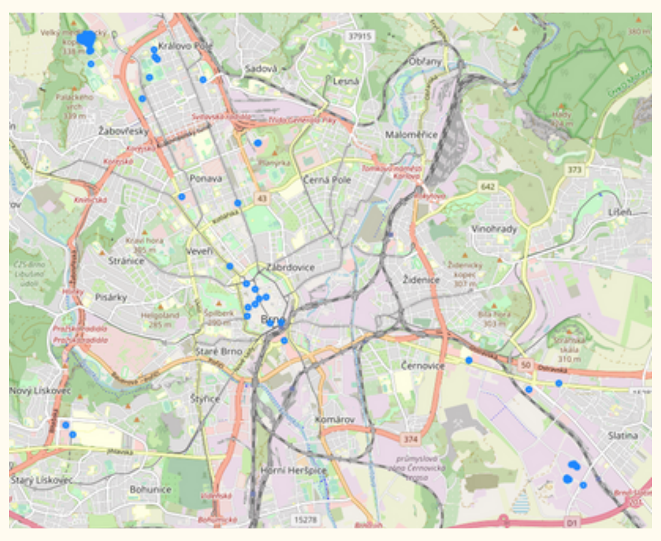
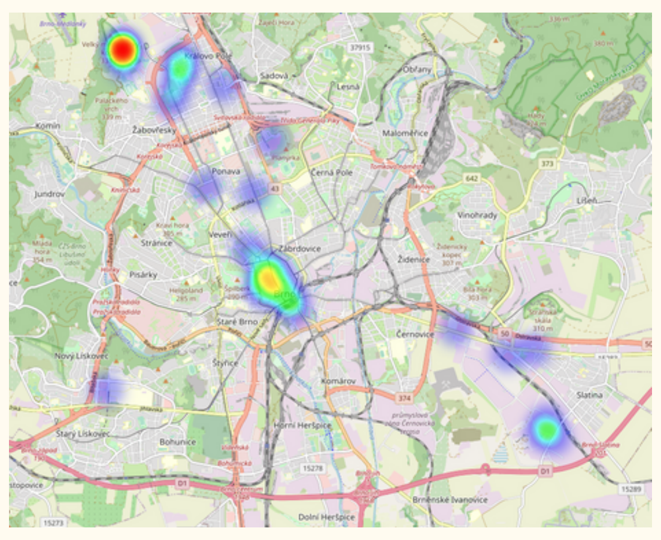


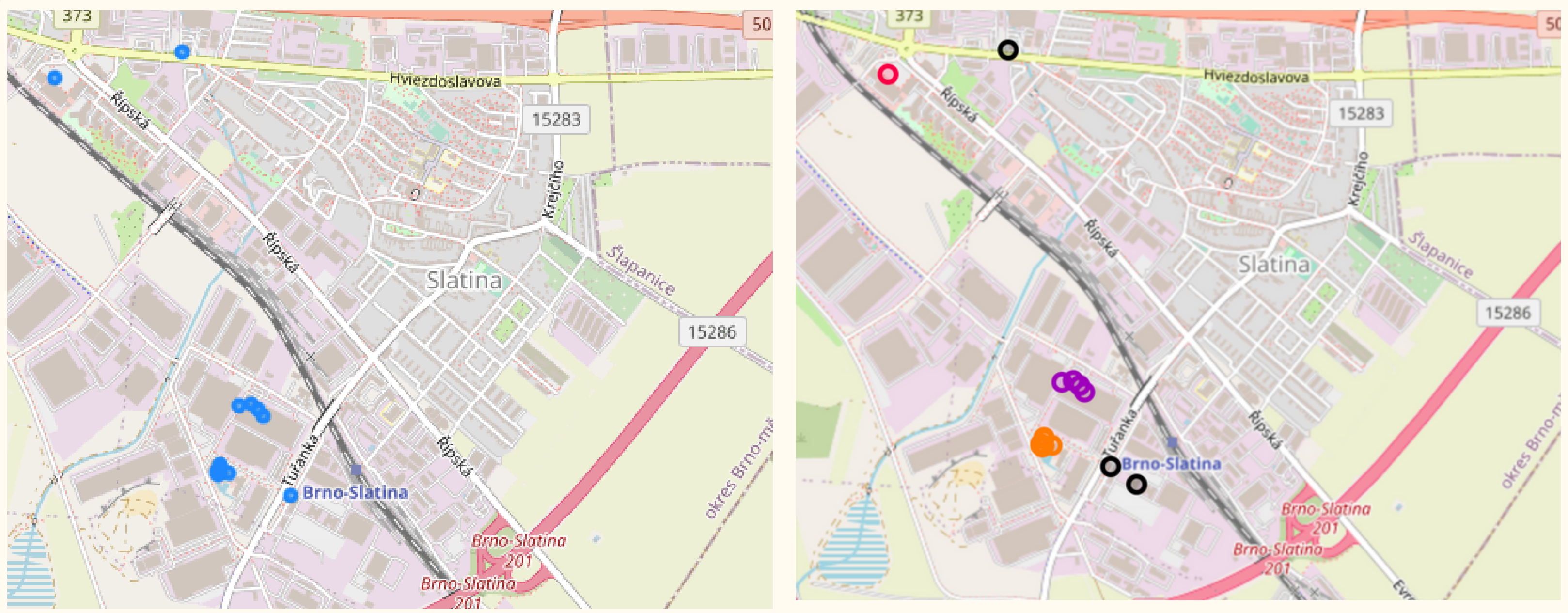
Figure 2: Two types of stay-points





AGGREGATION INTO LOCATIONS

- HDBSCAN



a) input b) output

Figure 3: Clustering result

SEMANTIC ENRICHMENT

- OSM API queries

HOME AND WORK LOCATIONS

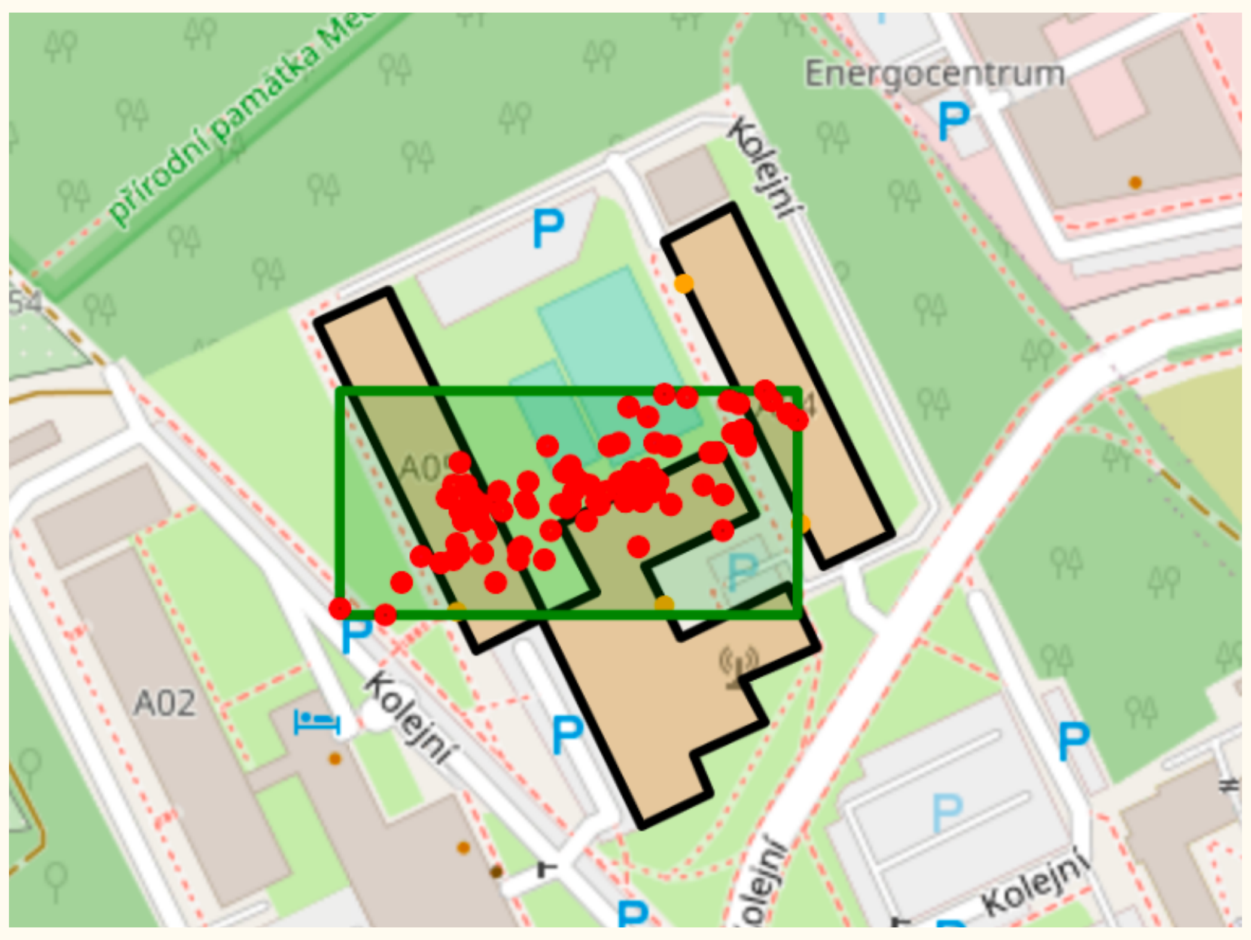


Figure 4: Input data points (red), bounding box (green), OSM query result visualisation (orange and black)

- building categories proportions
- time of the day
- stay duration

MAPPING PLACES TO POI

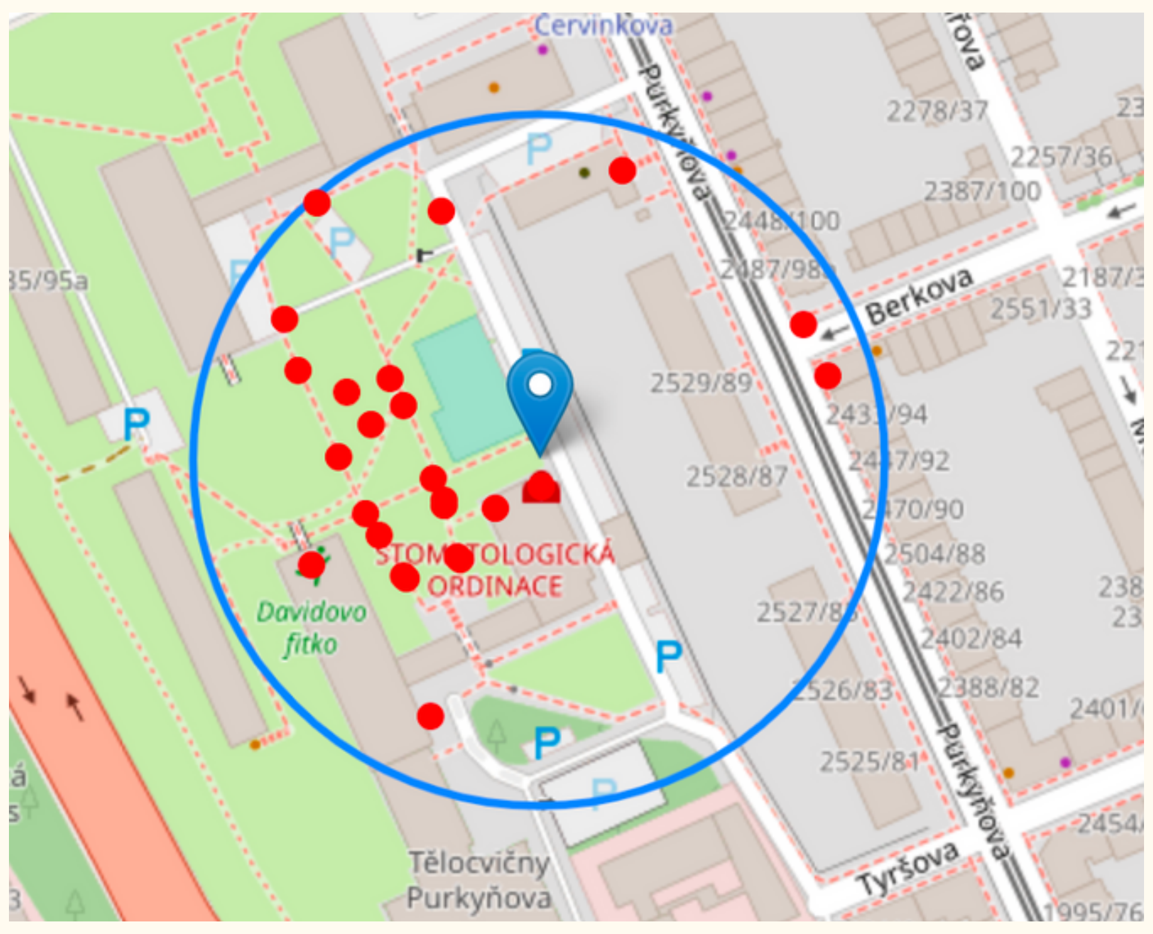
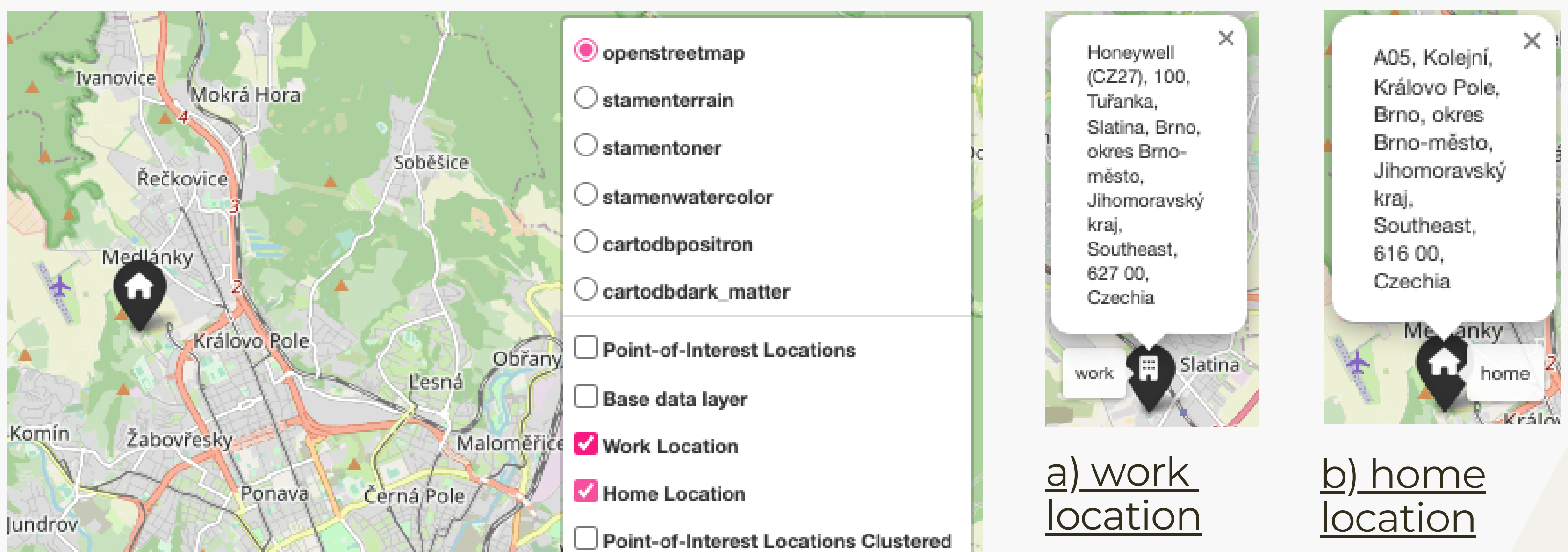


Figure 5: Process of mapping point (blue marker) to POI (red points) using circular buffer (blue)

- visit timestamp
- circular buffer to search nearby POIs
- POI properties

3. RESULTS



● openstreetmap
○ stamenterrain
○ stamentoner
○ stamenwatercolor
○ cartodbpositron
○ cartodbdark_matter

☐ Point-of-Interest Locations
☐ Base data layer
☑ Work Location
☑ Home Location
☐ Point-of-Interest Locations Clustered

Honeywell (CZ27), 100, Tuřanka, Slatina, Brno, okres Brno-město, Jihomoravský kraj, Southeast, 627 00, Czechia

A05, Kolejní, Královo Pole, Brno, okres Brno-město, Jihomoravský kraj, Southeast, 616 00, Czechia

a) work location

b) home location

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Figure 6: Home and work locations

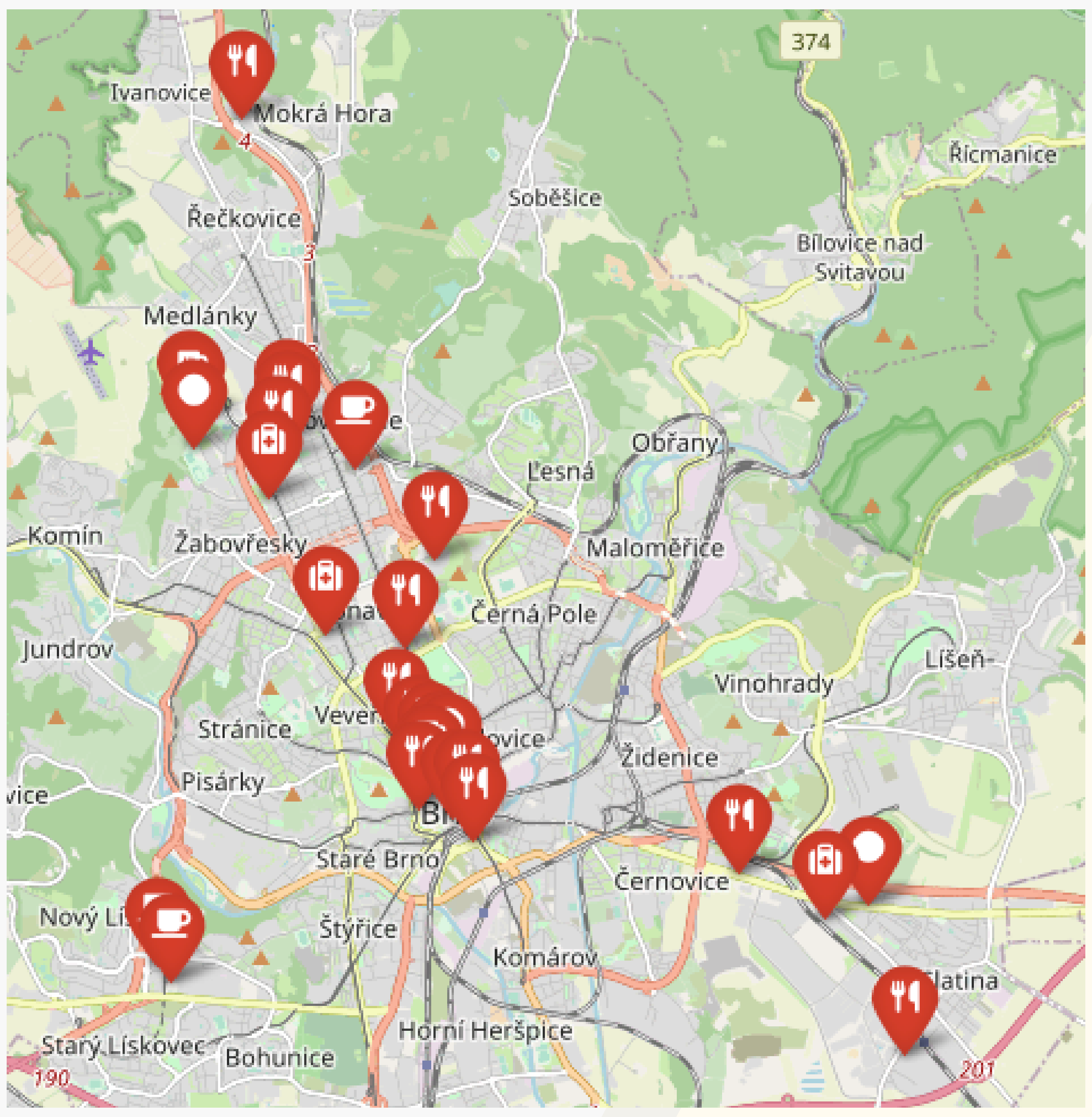
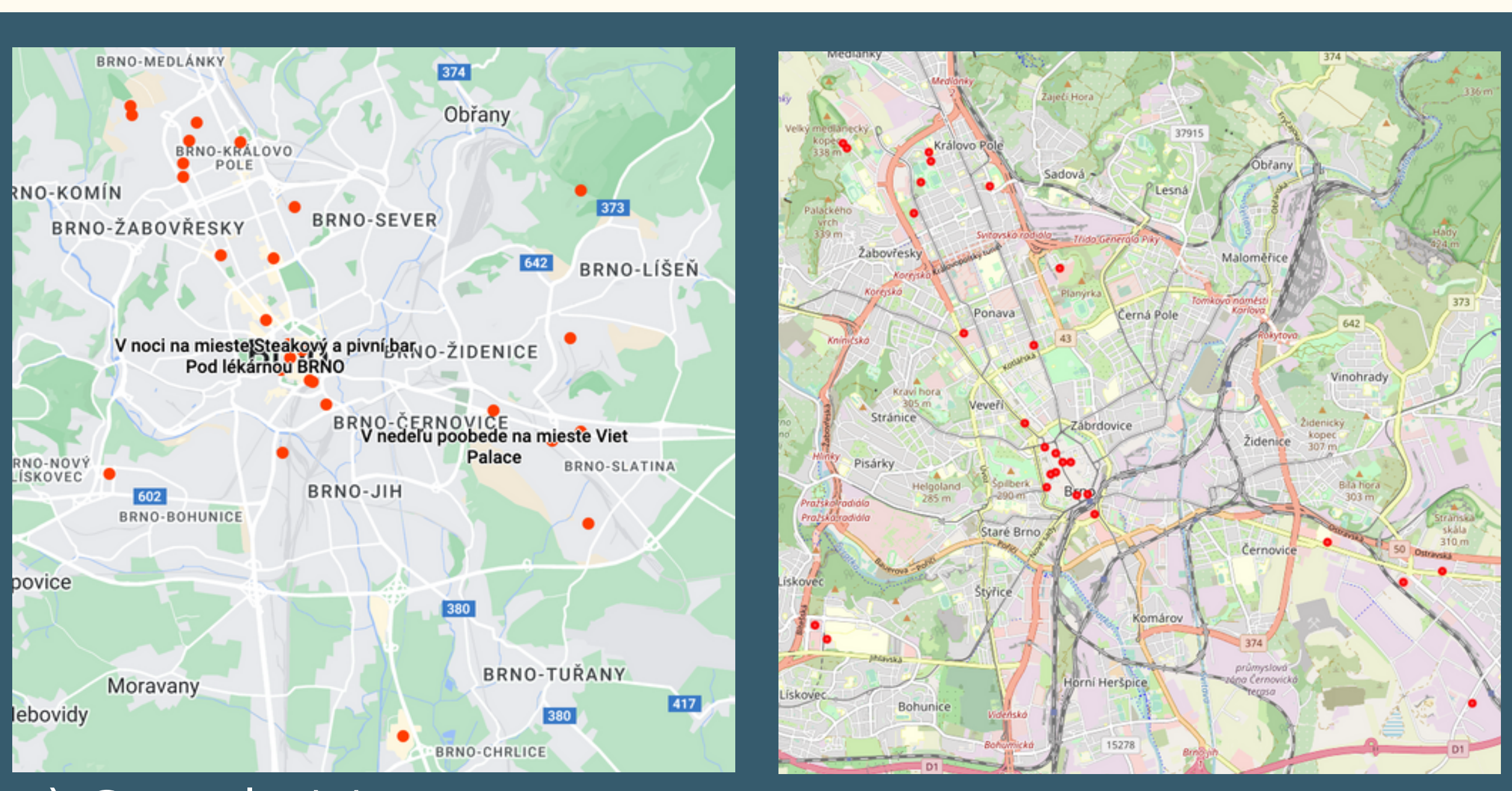


Figure 7: Extracted places mapped to POIs

COMPARISON WITH GOOGLE MAPS



a) Google Maps

b) Proposed framework

Results

Places found	128
Correct	118
Incorrect	10
Missed	3
Accuracy	**90%**

Figure 8: Result comparison with Google Maps

* QR codes contain links to full-size maps

Github pages

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