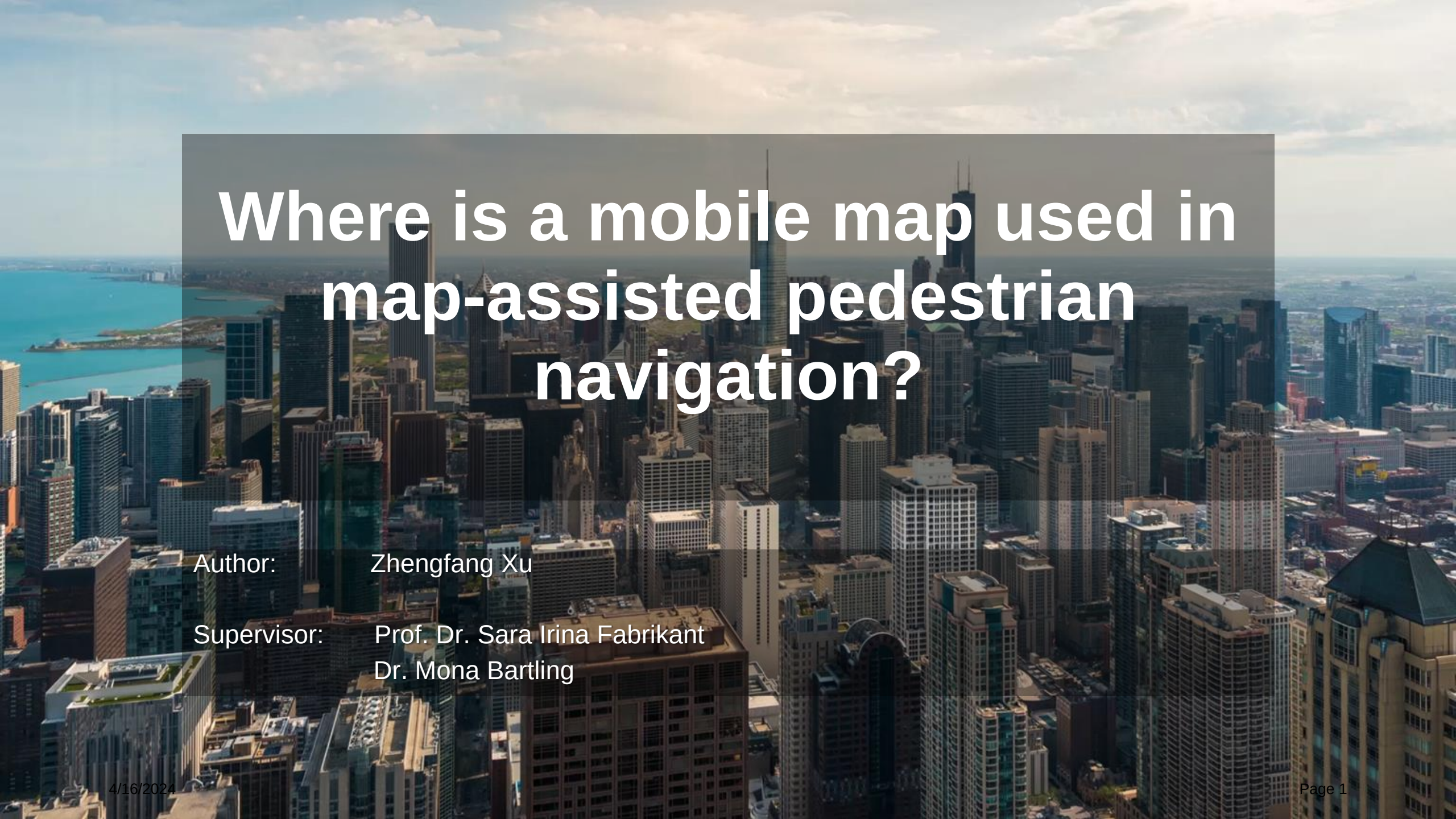

Where is a mobile map used in map-assisted pedestrian navigation?

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Supervisor: Prof. Dr. Sara Irina Fabrikant
Dr. Mona Bartling

When using a mobile map to navigate to a new place, where do you need to unlock the phone screen and check the map?

? To understand where people check the map, we need to know why people check the map.

Related research: motivations behind checking the map

Wayfinding behavioral actions are those linked to:

- ***orientation,***
- ***route decision,***
- ***route monitoring,***
- ***destination recognition***

(Carpman & Grant, 2002)

Checking map assists people in making decision during navigation.

Related research: decision making during navigation

Pedestrians tend to make decisions **before** reaching intersections.

People with **higher** spatial ability, are **earlier** to make decisions.

(Brunyé et al., 2018)

Map use strategies help us understand where people check maps.

Related research: types of map use strategies during navigation

constant support

independent and attentive

least effort and inattentive

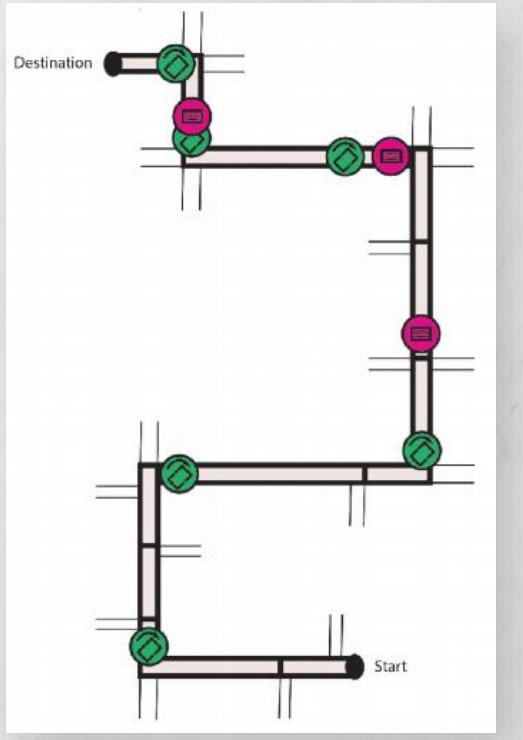
(Webber et al., 2012)

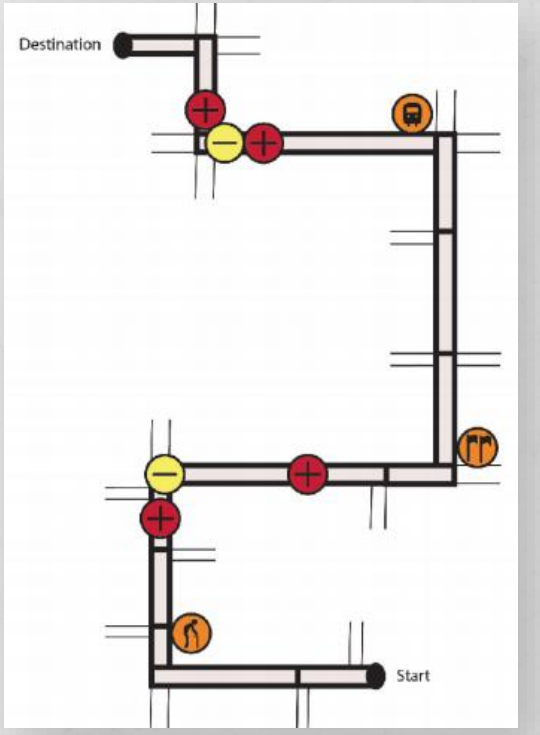
Map use strategies help us understand where people check maps.

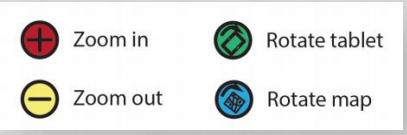
Related research: types of map use strategies during navigation

Taking specific map interaction types into consideration.

(Brügger, 2020)







Research Gap:

The existing research on map checking primarily focuses on intersections, with fewer studies investigating other trajectory factors with map checking. *(e.g., road length, turns, landmarks, shortcuts etc.)*.

Most studies use predetermined routes for their experiments and seldom consider the impact of route variations.
Example: In Brügger‘s experiment, a predefined route with 5 turns was used. What if the route has intersections but no turns?

Little research explored how environmental conditions, such as traffic density, affect people's map-checking behavior.

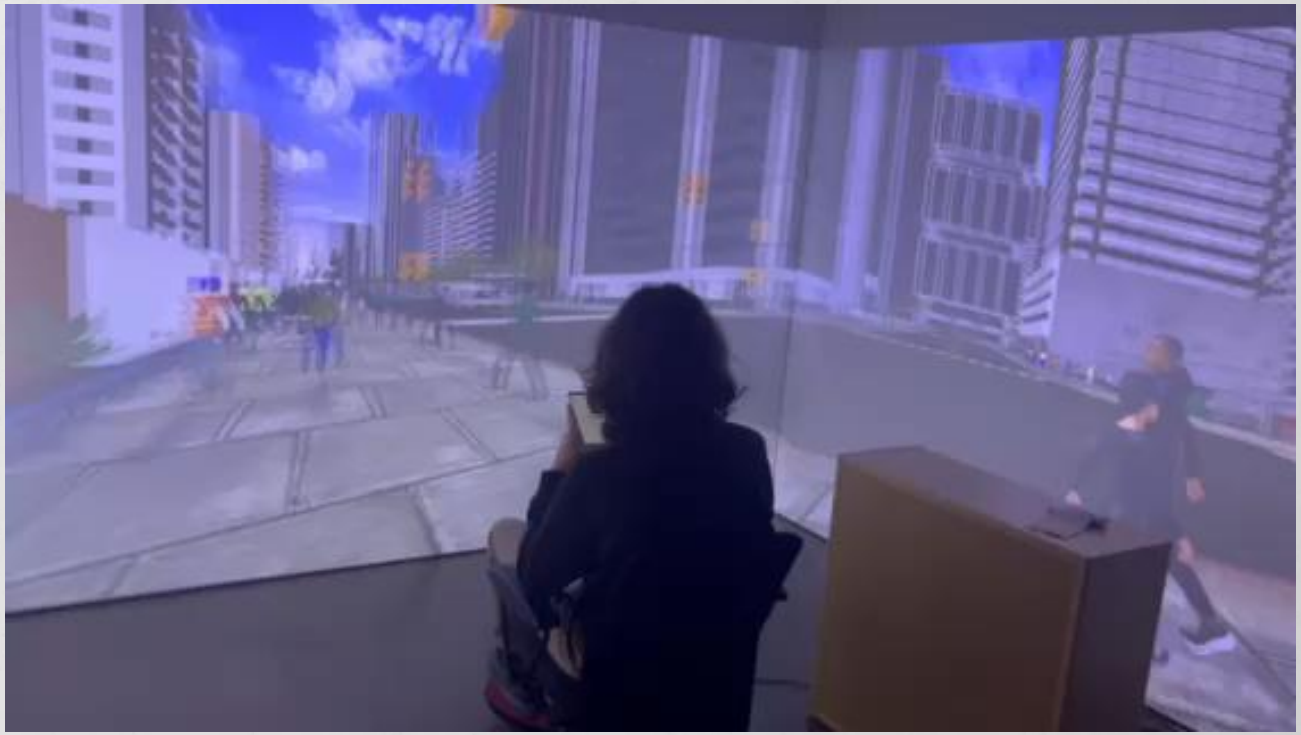
Research Question:

1. What are trajectory factors (e.g., intersections, turns, length etc.) that influence pedestrian map checking behavior, and how do these factors affect the map checking behavior?

2. What are the differences in map-checking behavior between heavy and light traffic density conditions?

Data source: VR Experiment

- Study on mobile map assisted wayfinding (Bartling et al., 2023)
- **Total study participants:** 54
- **Environmental condition:** Light and heavy traffic density
- **Number of recorded wayfinding task trajectories:** 863
- The behavior of users unlocking the screen has been recorded



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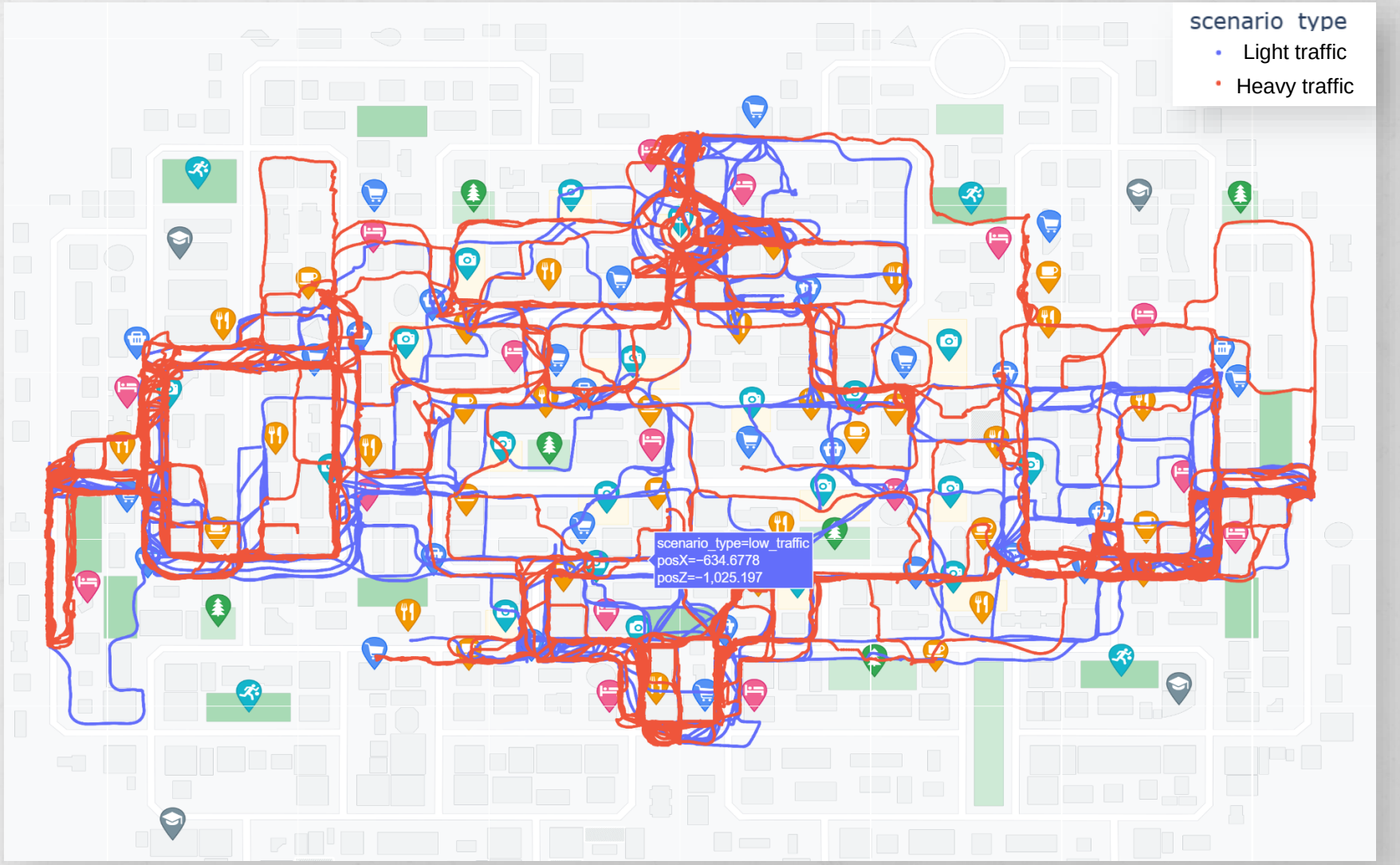
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Heavy traffic
scenario_type=low_traffic
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posZ=−1,025.197

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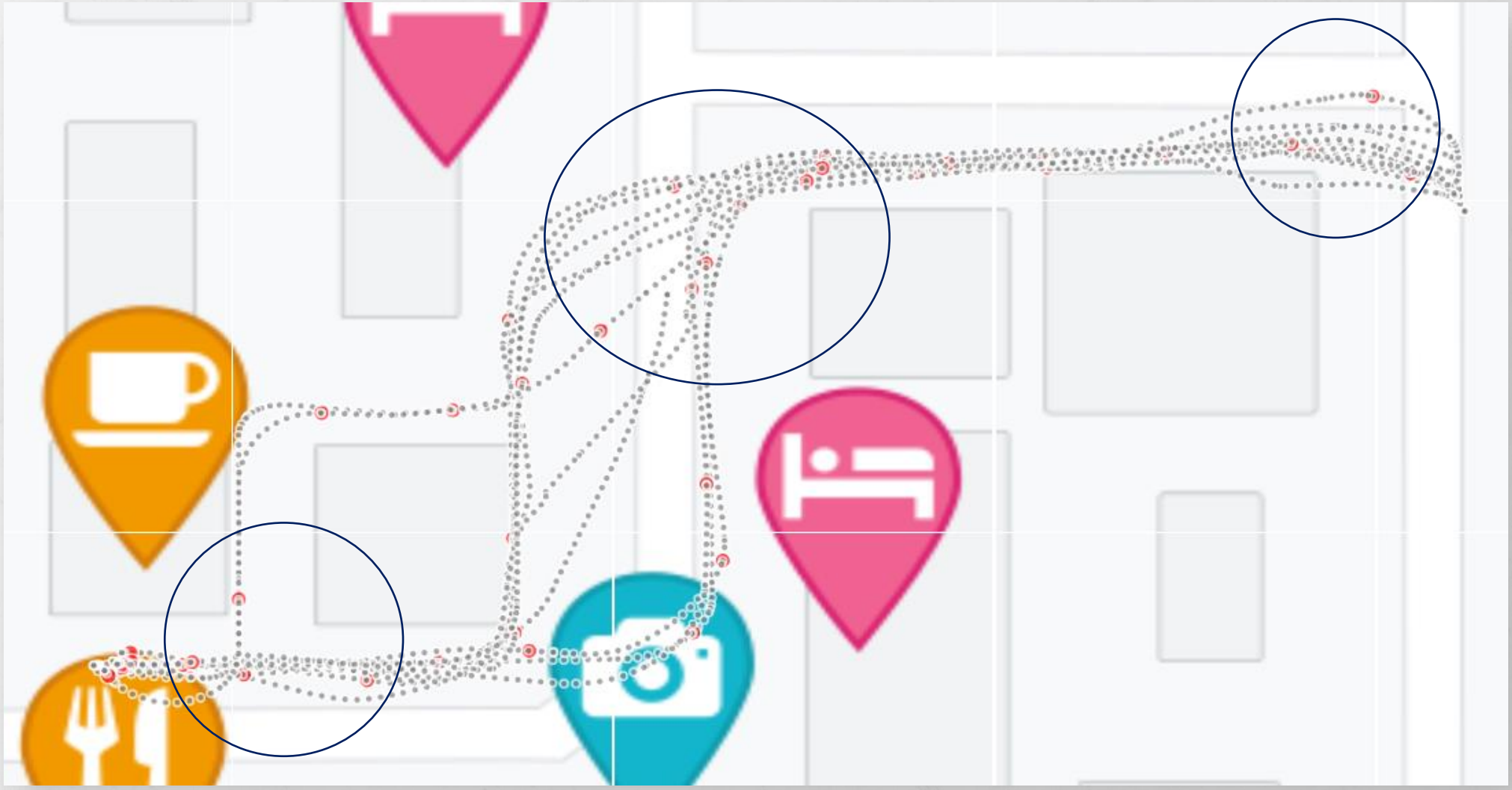
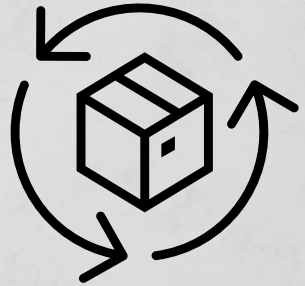


Method:



To answer the RQ, I want to approach the research from two perspectives:

Number of map checking in a trajectory/ Locations of map checking in a trajectory

Method:

Number

- **Exploratory data analysis on potential factors which influence the number of map checking in a trajectory**

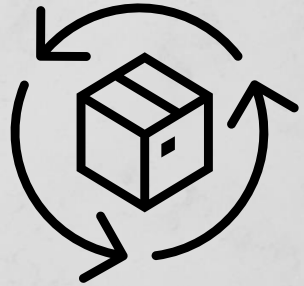
Length, number of turns, number of intersections, shortcut involvement, numbers of landmarks, etc.

- **Regression analysis on individual factors with the number of map checking**
- **Establish comprehensive model to predict the number of map checking for a trajectory**
- **Comparative analysis between traffic density**

Comparing the differences between heavy traffic density and light traffic density.

(e.g., Do landmarks have a significant impact on the number of map checking during light traffic conditions, but not during heavy traffic?)

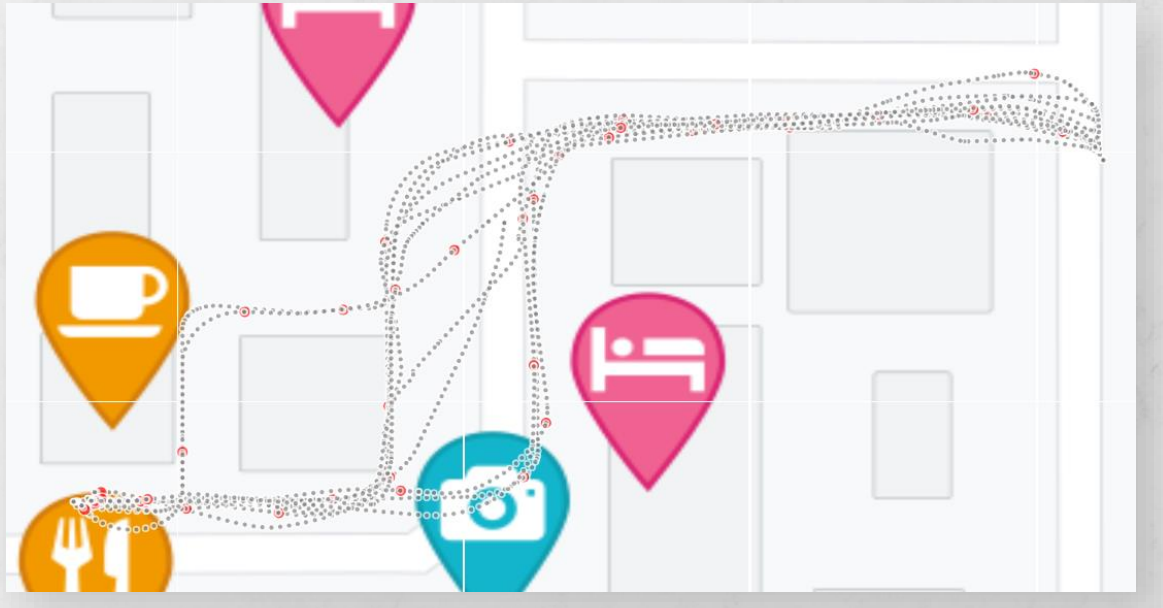
Method:

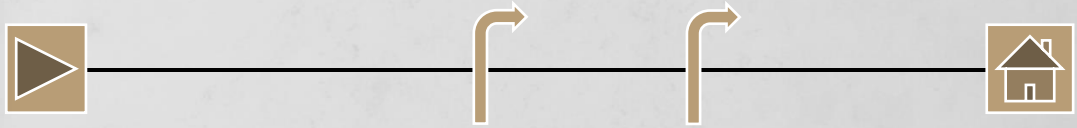


- **Abstracting trajectory**

Enabling complex pedestrian trajectories to be clustered and compared.

Location





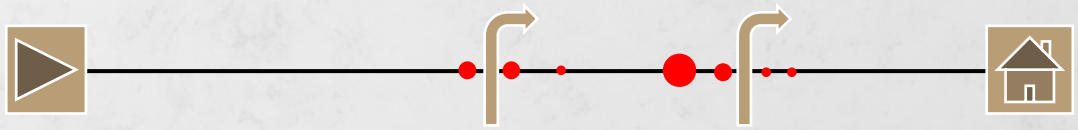
Method:

- **Cluster the abstracted trajectories based on the distribution of key factors.**

e.g., start point - turn - turn – destination or start point - intersection - intersection - turn – destination, etc.

- **Visualize map checking points on the abstracted trajectories**

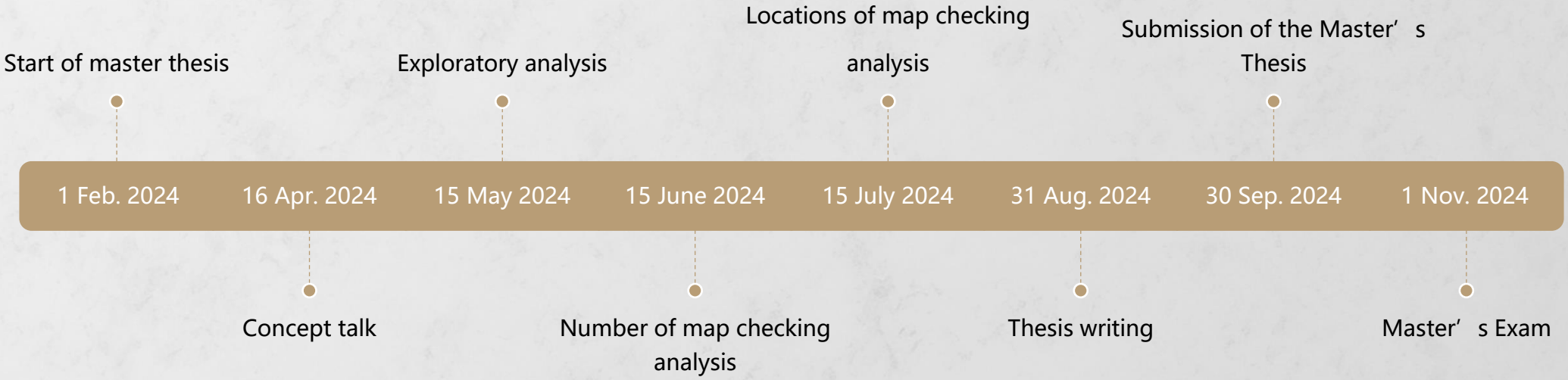
Location

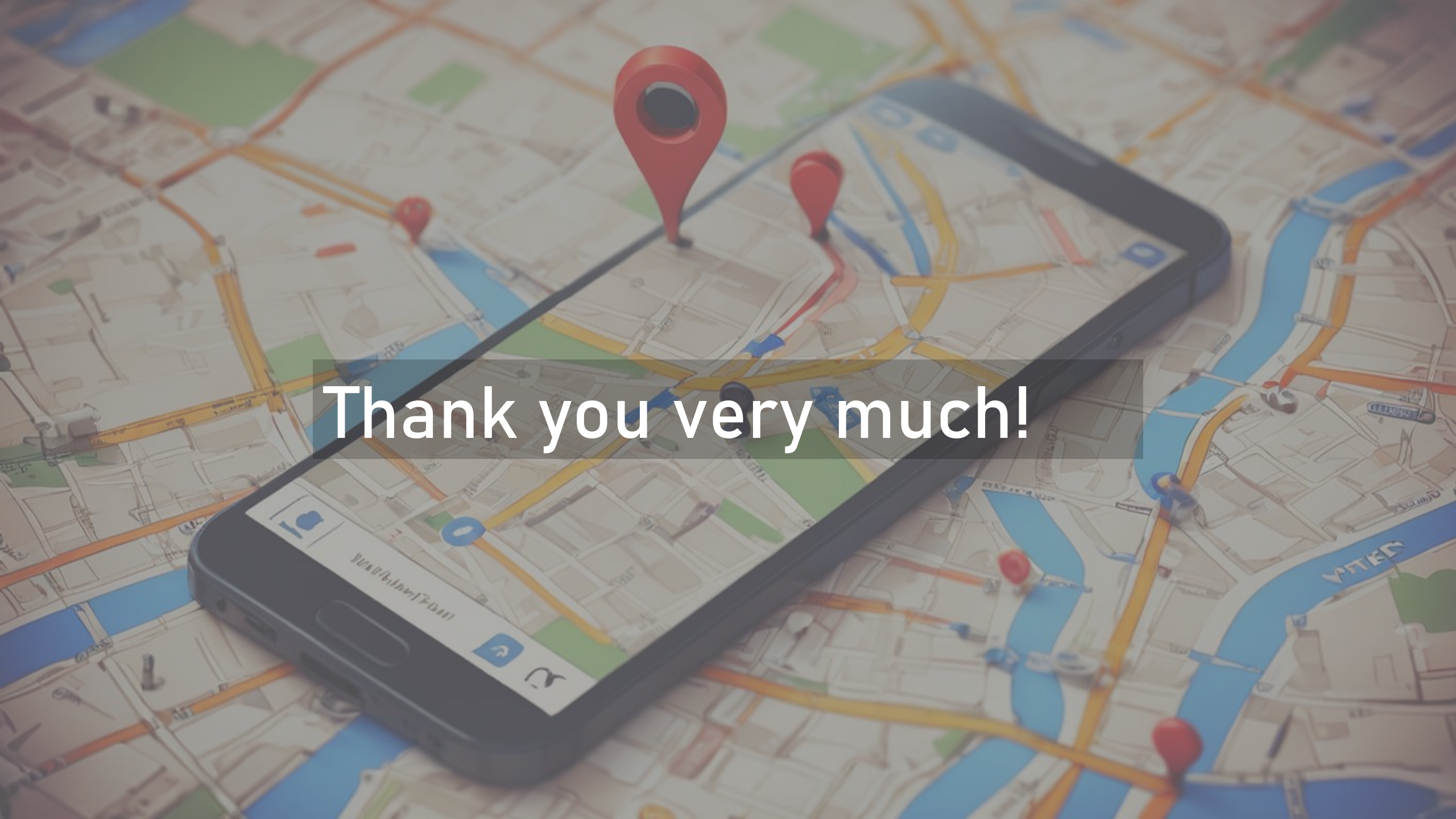


- **Comparative analysis**

Compare the distribution of map checking points across trajectories from **different clusters**.

Compare the distribution of map checking points across trajectories **within the same cluster but different traffic densities**.


Start of master thesis
Exploratory analysis
Locations of map checking analysis
Submission of the Master' s Thesis
1 Feb. 2024
16 Apr. 2024
15 May 2024
15 June 2024
15 July 2024
31 Aug. 2024
30 Sep. 2024
1 Nov. 2024
Concept talk
Number of map checking analysis
Thesis writing
Master' s Exam


Thank you very much!