

Semantic Observation on Street Greenery Visuality with Mental Well-being

Group 3

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Outline

1. Introduction
2. Methodology
3. Results
4. Analysis
5. Discussion



Introduction

Aims of Project

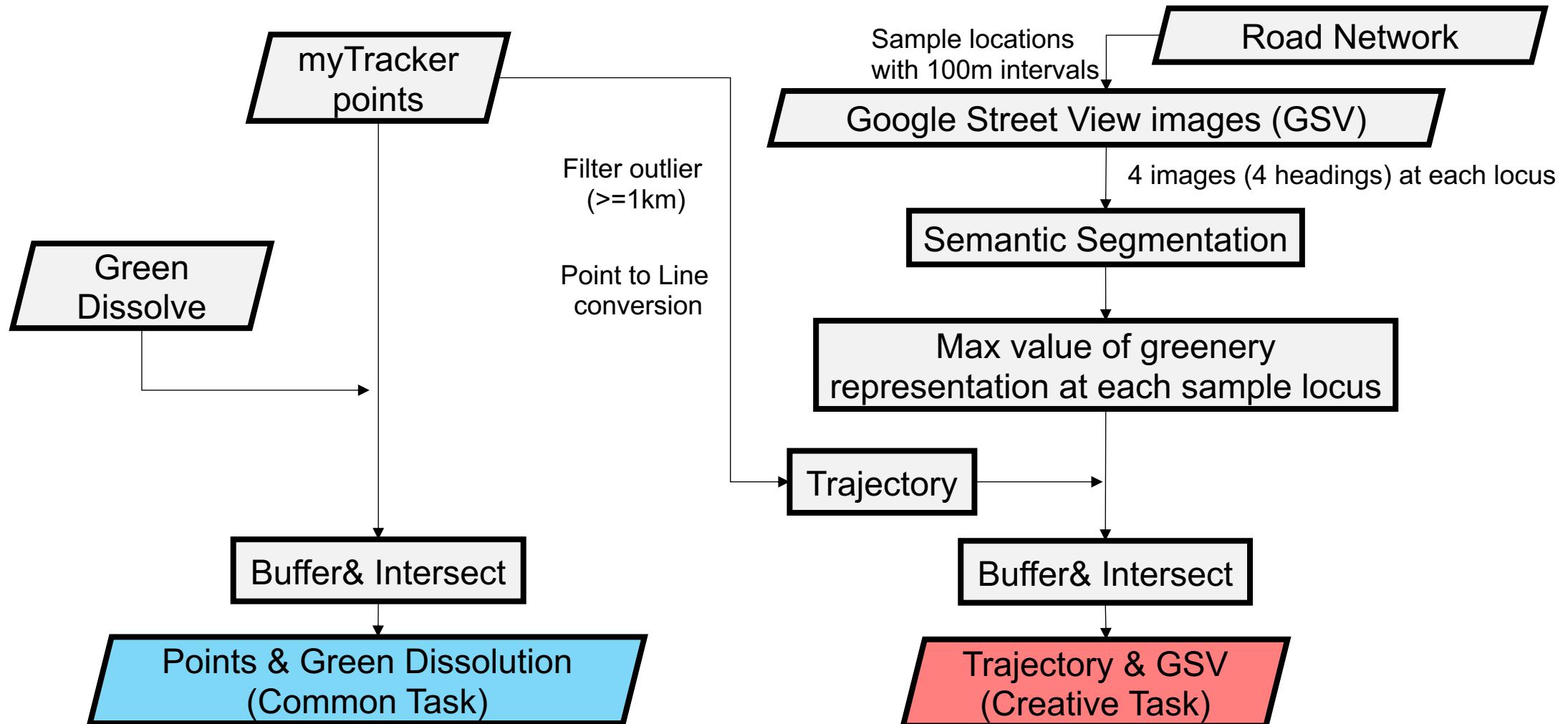
1. Examine the relationship between static and dynamic exposures to roads/greenspace and their impact on mental well-being
2. Investigate how green exposure level based on street view data affects mental well-being, and compare the result with the impact of greenery exposure based on mobile phone tracking data

Hypothesis

- » Three-dimensional street view data is more effective in capturing how greenery is perceived by people on the ground
- » Use of three-dimensional data produces more reliable results
- » Exposure to green space enhances mental well-being
- » Exposure to main roads adversely affects mental well-being

Methodology

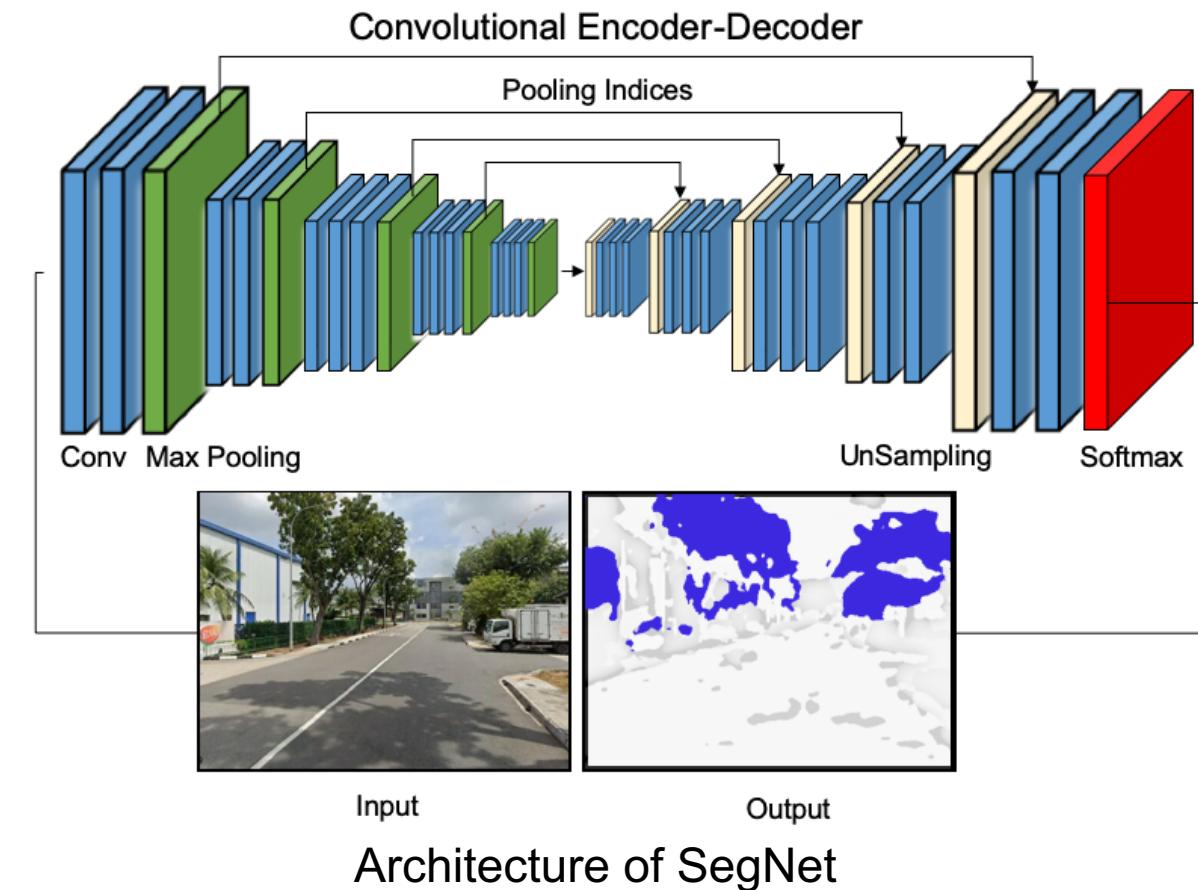
Workflow



Methodology

Semantic Segmentation

- » is the task of inferring the proportion of a certain objects in a given image by a Deep Neural Network
- » SegNet
 - Lightest model in terms of computation
 - Trained with 600 street images termed *CamVid*
 - Accuracy
 - Training accuracy: 96.7%
 - Validation accuracy: 79.6%
 - Testing accuracy in Singapore: 74.7%
 - Applied to 24,460 GSV images
 - 6,115 sampled location * 4 images (4 headings)

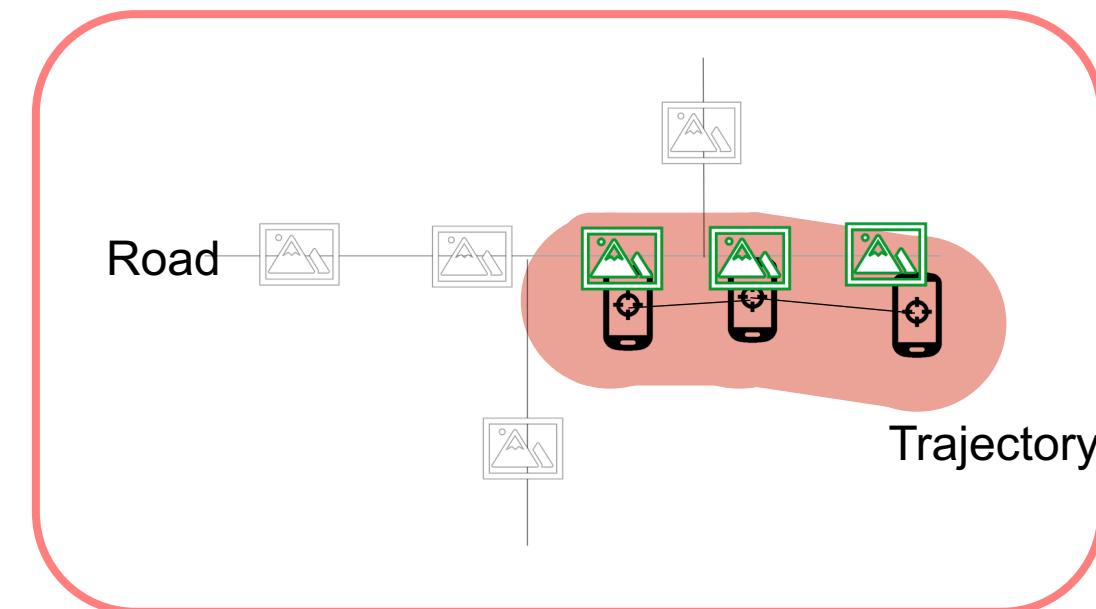
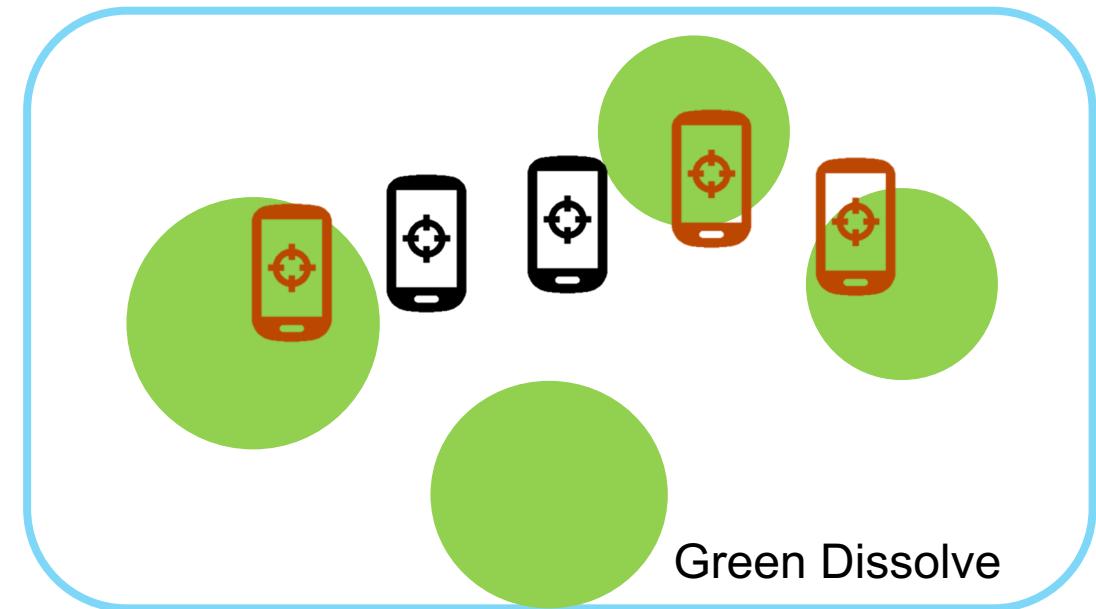


V. Badrinarayanan, A. Kendall and R. Cipolla, "SegNet: A Deep Convolutional Encoder-Decoder Architecture for Image Segmentation," in *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 39, no. 12, pp. 2481-2495, 1 Dec. 2017.

Methodology

Metrix for Correlation Analysis

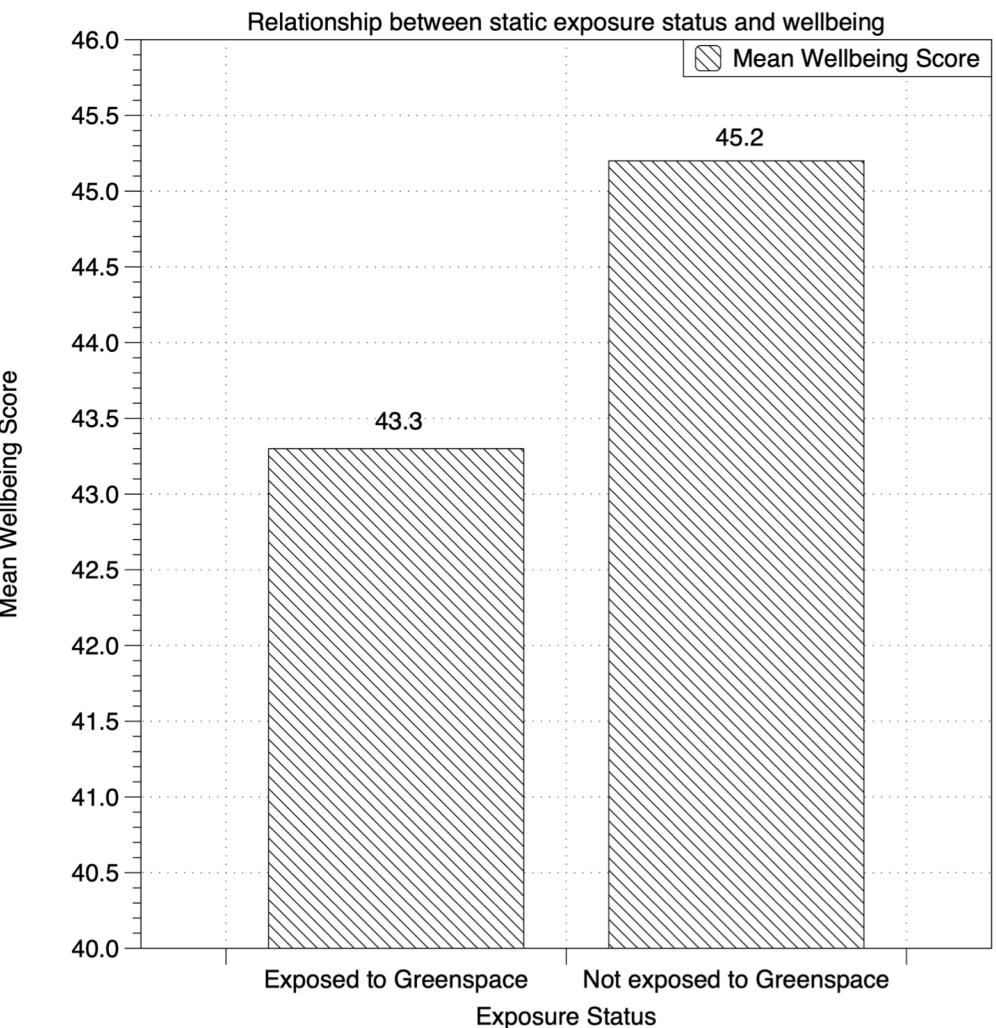
Dataset Track Format	Green Dissolve	GSV
Points	Common Task	For Reference
Trajectory	For Reference	Creative Task



Results (1/5)

Abnormal result

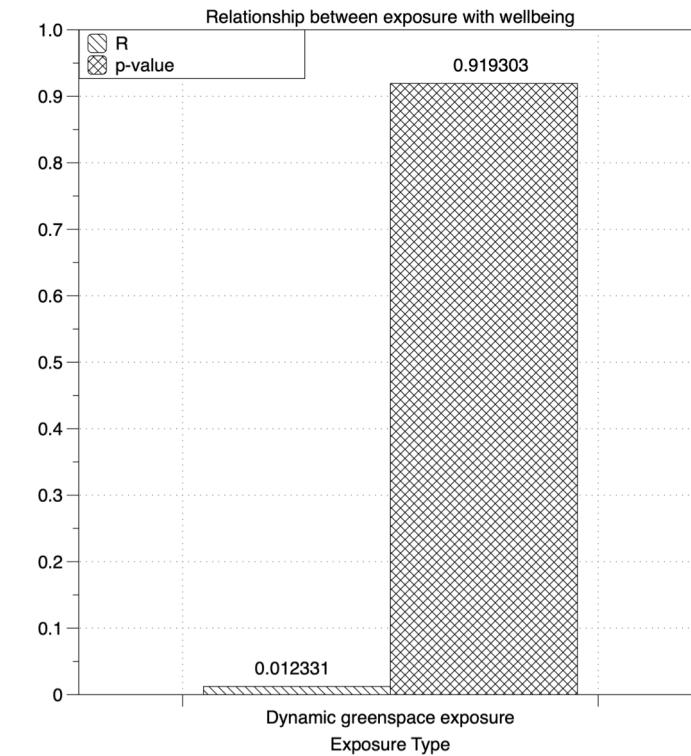
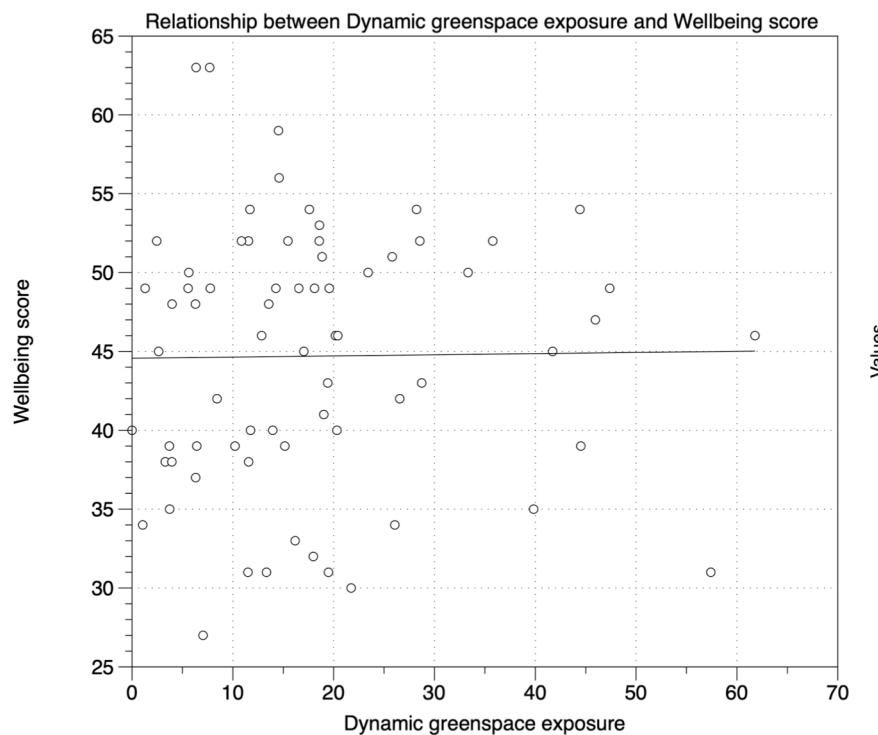
- » Green space may reduce the adverse effects of road traffic noise on the mental well-being of the population (Dzhambov et al. 2017)



Results (2/5)

Statistical characteristics

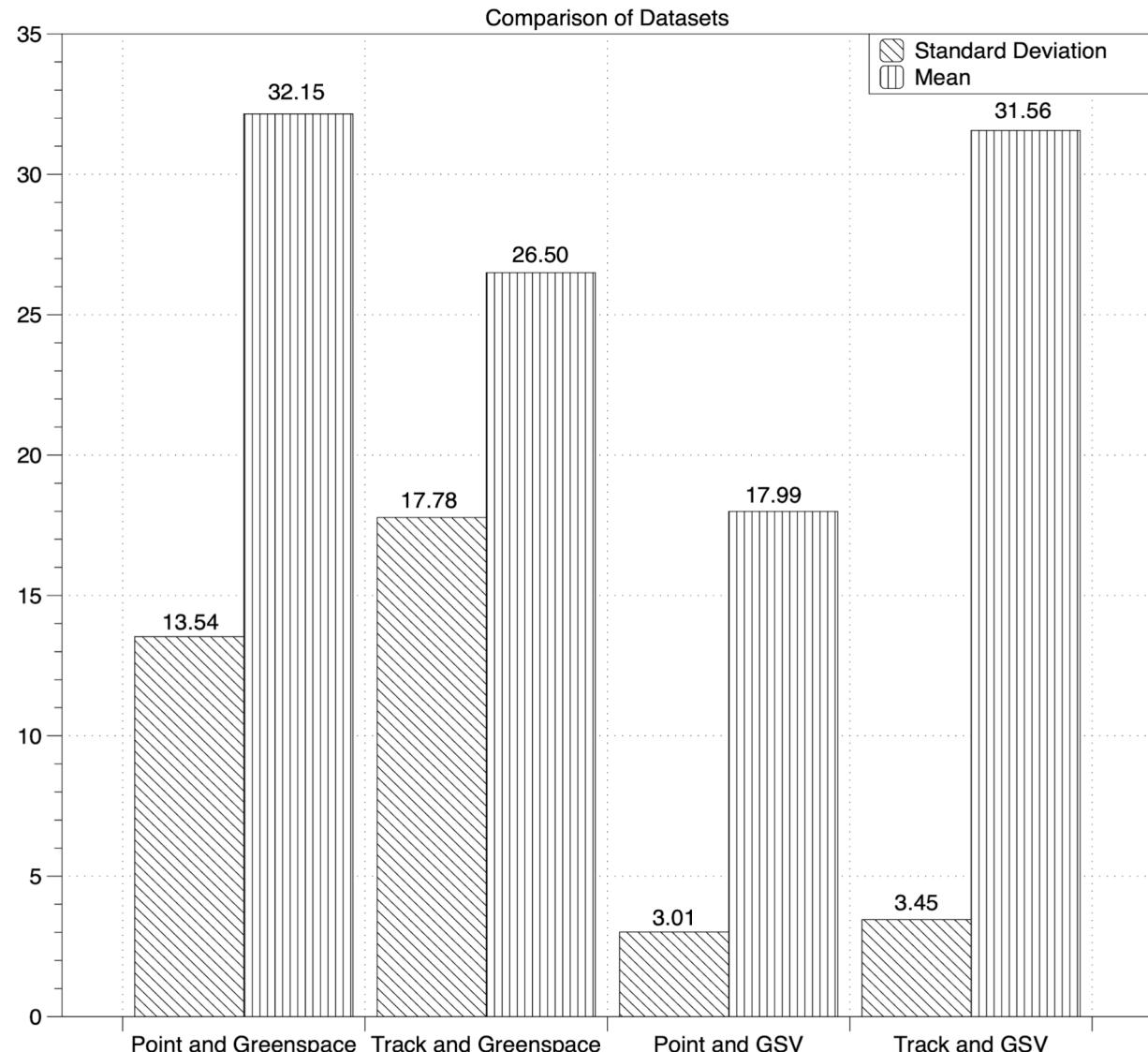
- » The distribution of sample points is almost random.
- » The correlation coefficient and P-value can prove that there is no statistically significant correlation between dynamic greening exposure and wellbeing.



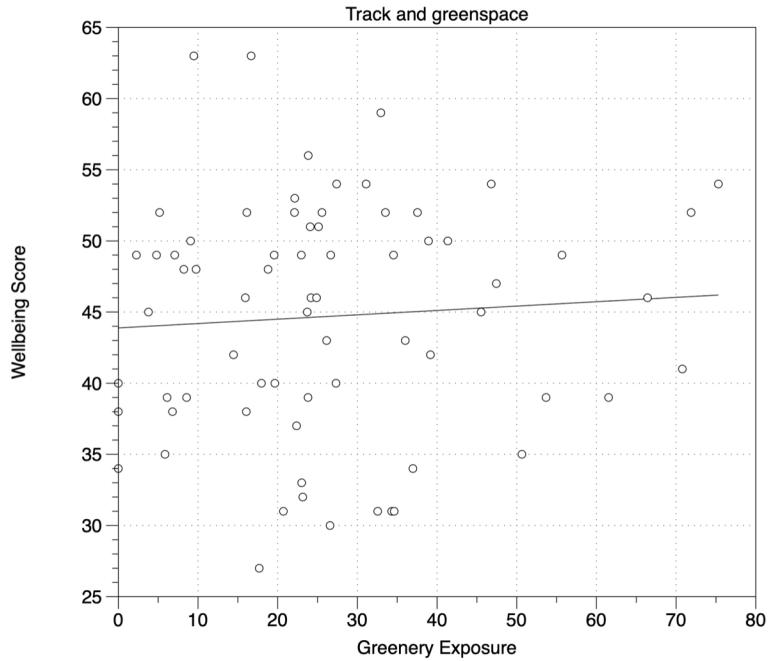
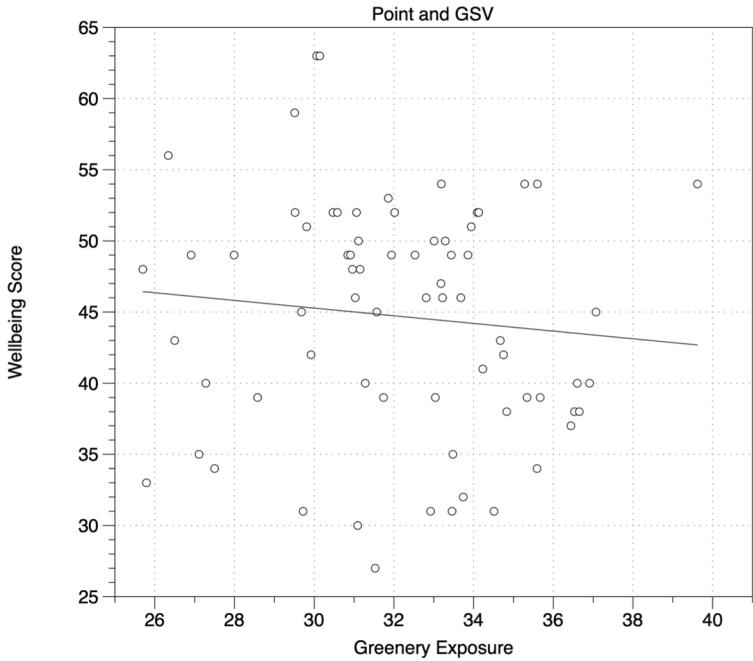
Results (3/5)

Datasets for creative task

- » Lower Standard Deviation in GSV dataset compared with the Greenspace dataset.
- » Analysis based on trajectory data will get higher greenery exposure Mean value compared with point data.

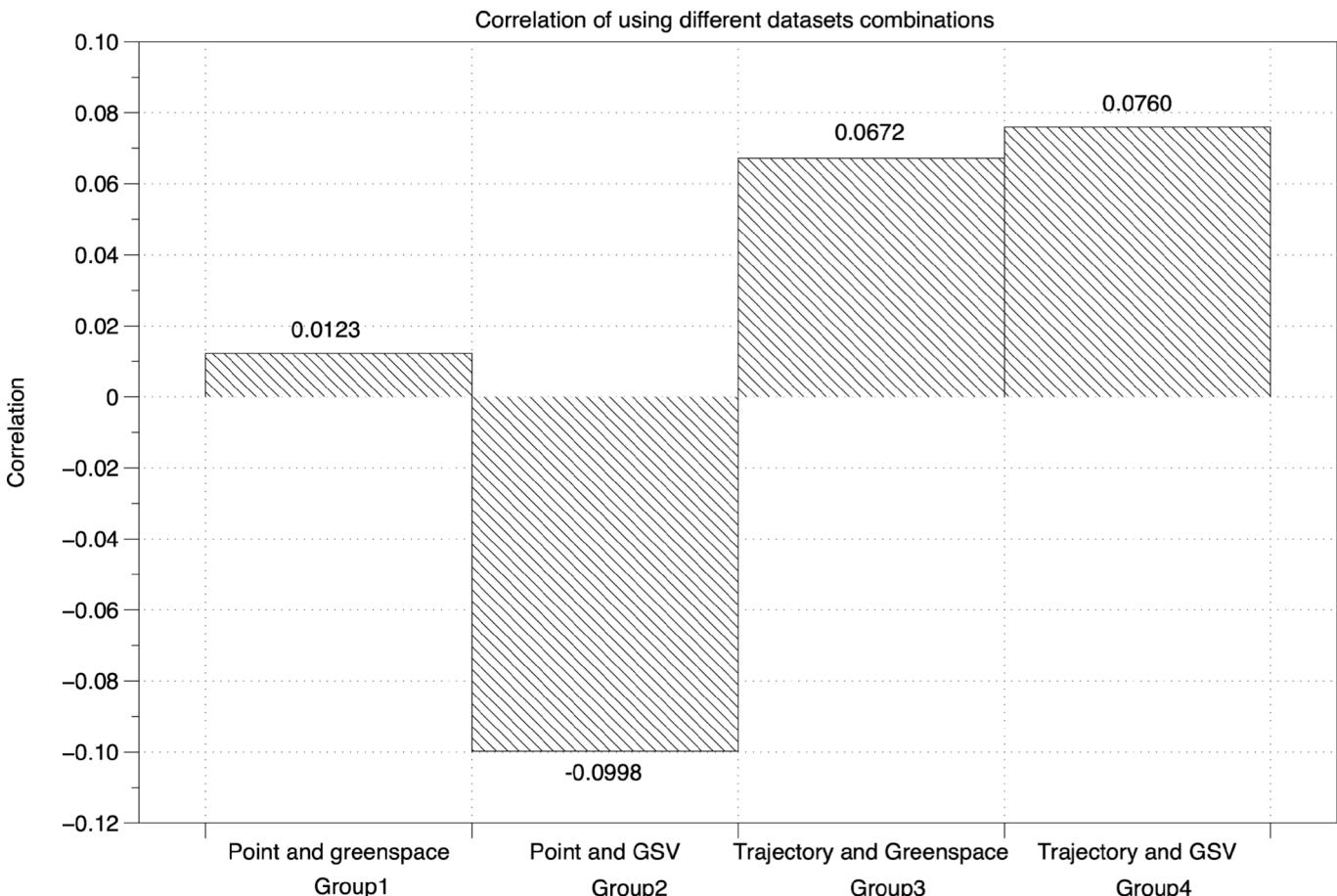


Results (4/5)



Results (5/5)

- Calculation method base on trajectory data represent higher correlation with wellbeing score compared with point data.
- Compared with using greenspace data for green exposure calculation, green exposures based on google street view images are more relevant with wellbeing score.

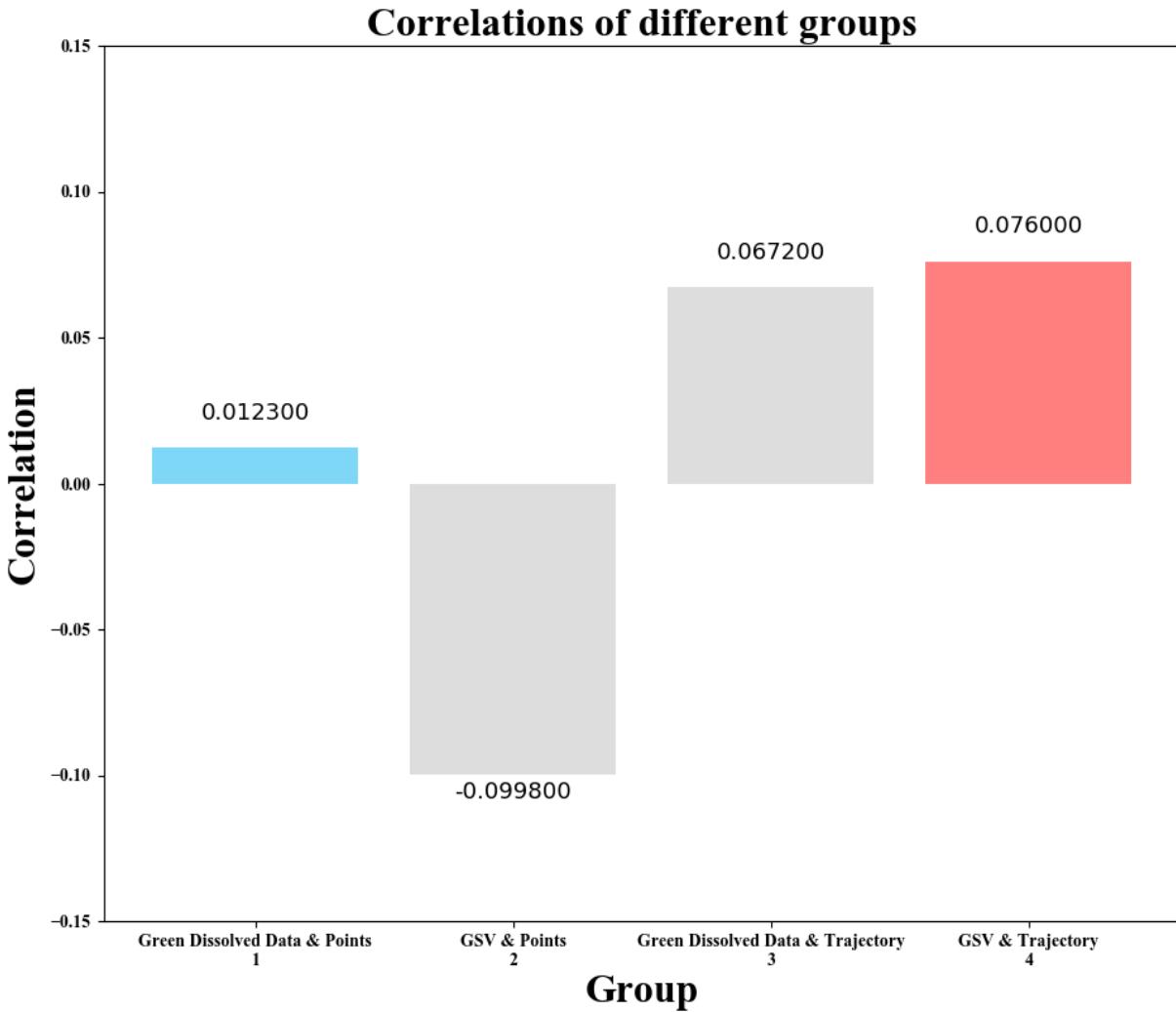


	Point and GSV	Track and greenspace	Point and Greenspace	Track and GSV
P-value	0.41	0.581	0.919	0.533

Analysis

macro level

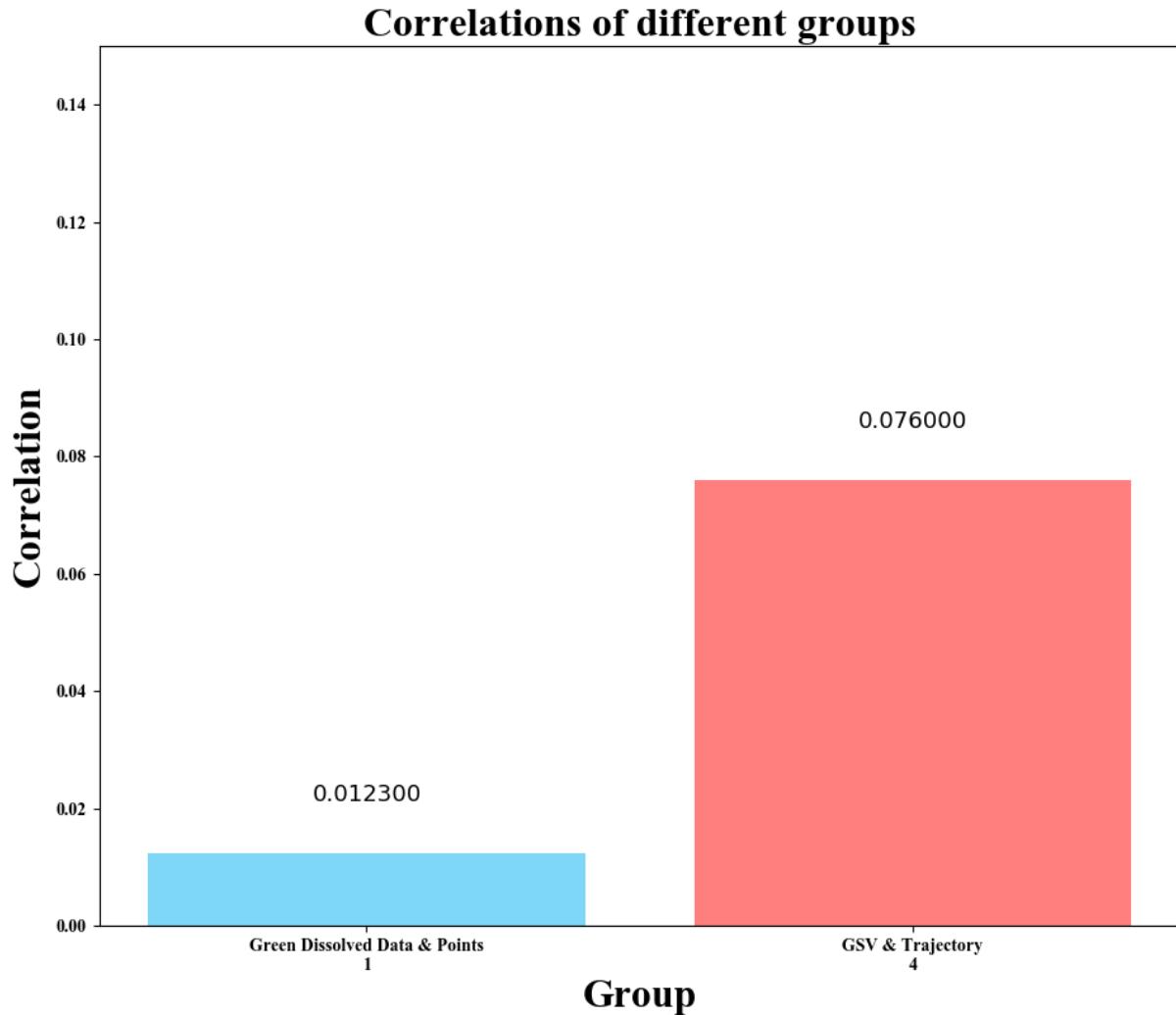
- » Subjective wellbeing scores cannot truly depict mental status of participants;
- » Sample size is relatively small and not representative;
- » The differences between potential green exposure and integration with green space.



Analysis

micro level

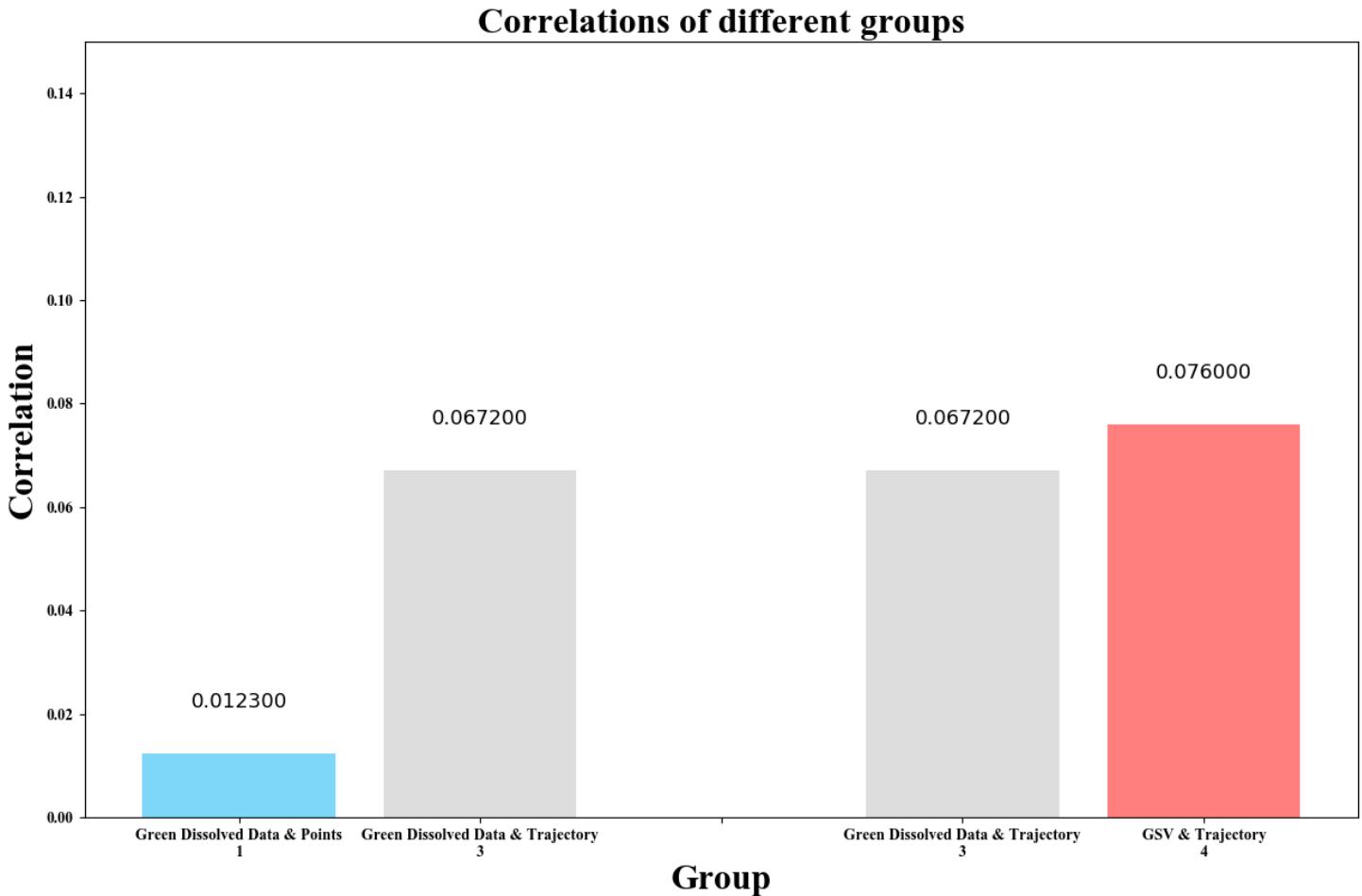
- » Trajectory dataset and Google Street View images can help depicting the interaction between participants and green space;
- » Google Street View image can be used as expansion and supplement of green dissolved dataset.



Analysis

micro level

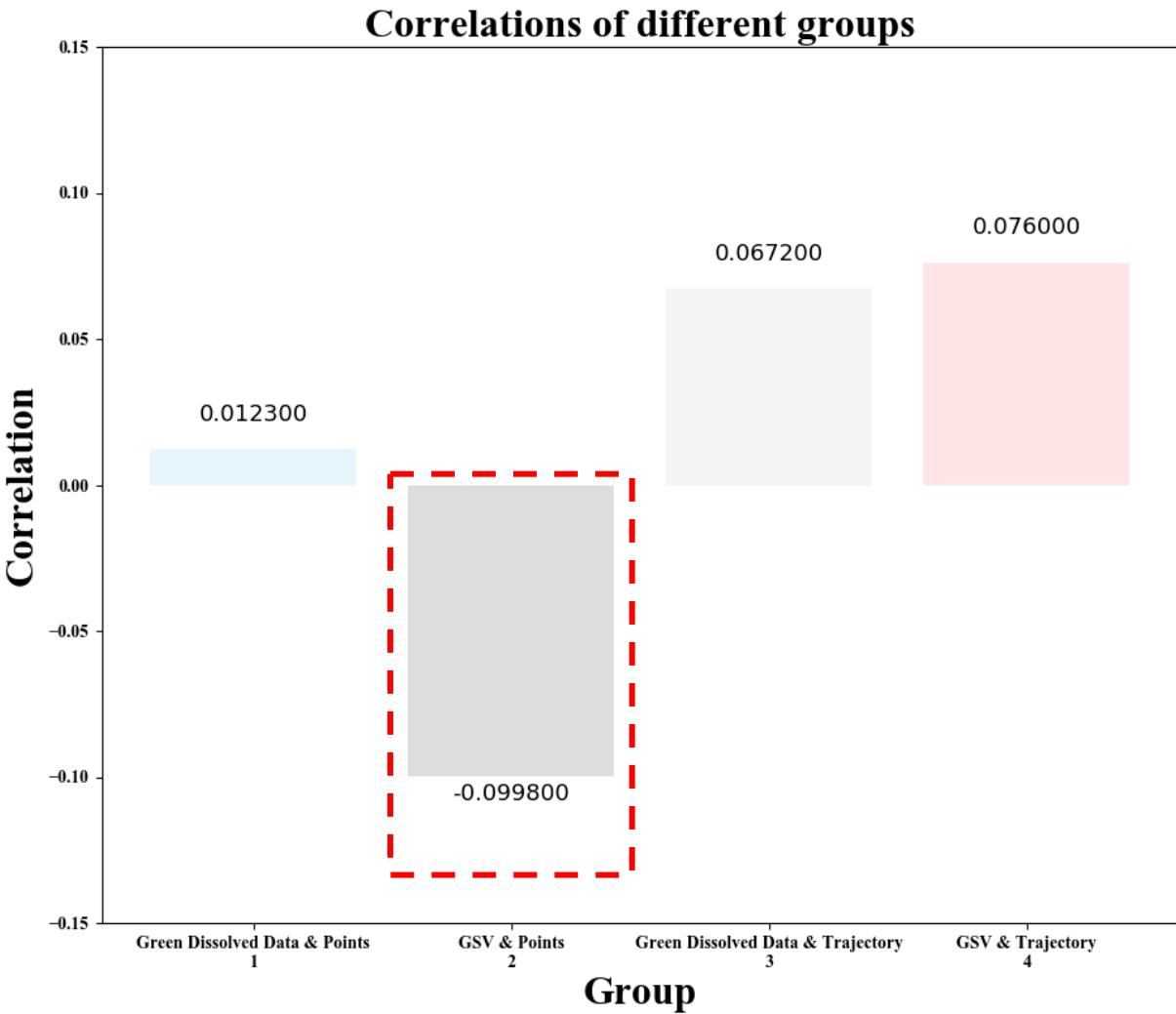
- » Trajectory better **simulate daily movements** and reflect the activities of the participants;
- » GSV **quantifies street greenery enclosure** and **reveals the perception** of participants.



Analysis

micro level

- » Buffer distance;
- » Extreme values.



Discussion

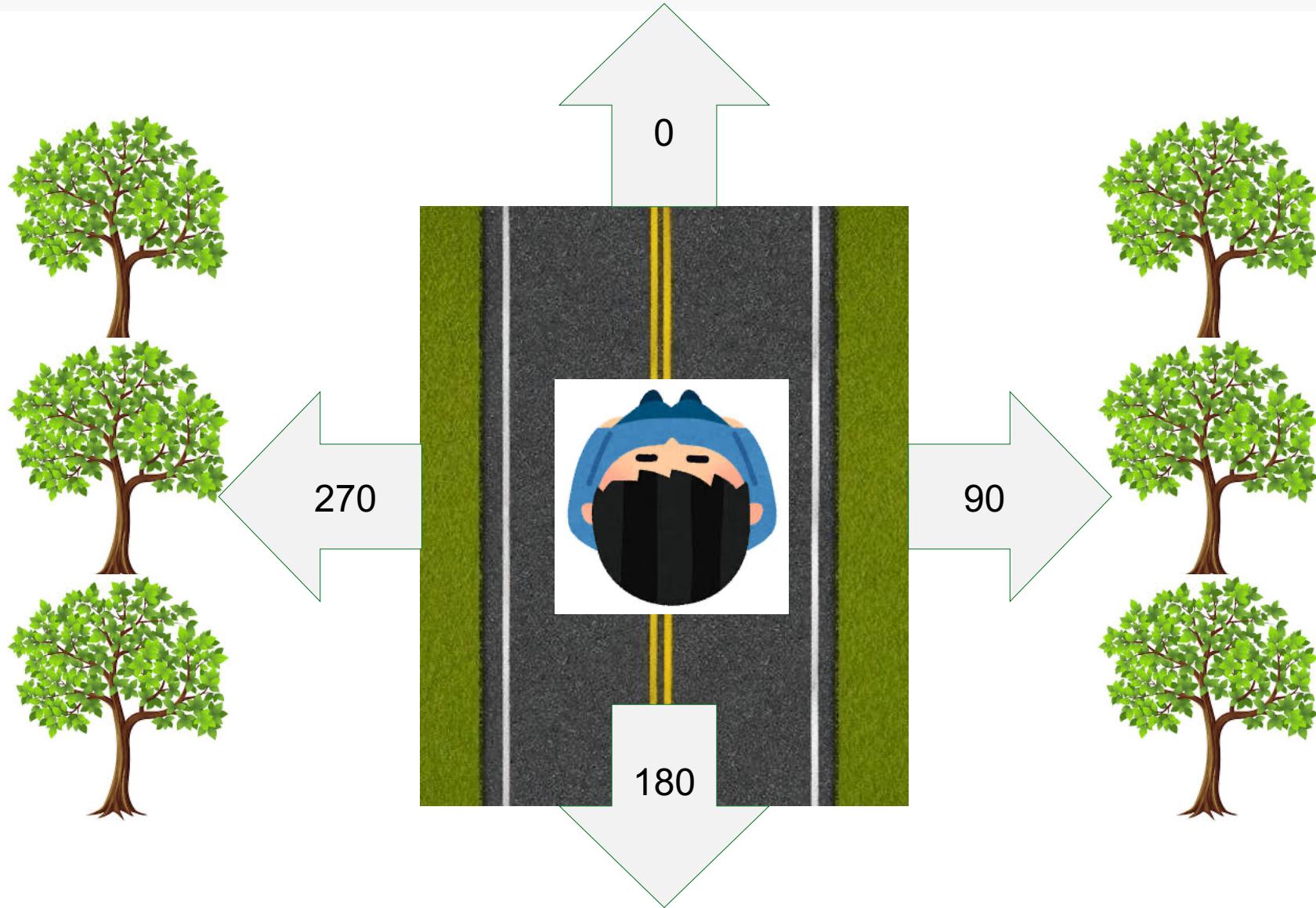
Limitation

- » Data quality;
- » Indoor and outdoor status.

Outlook

- » Trajectory duration;
- » Static exposure v.s. dynamic exposure;
- » Different types of greenery;
- » Different types of land use.

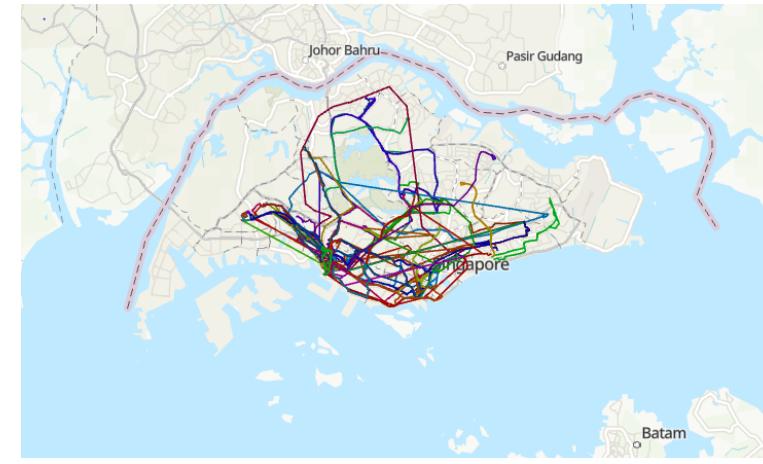
Appendix



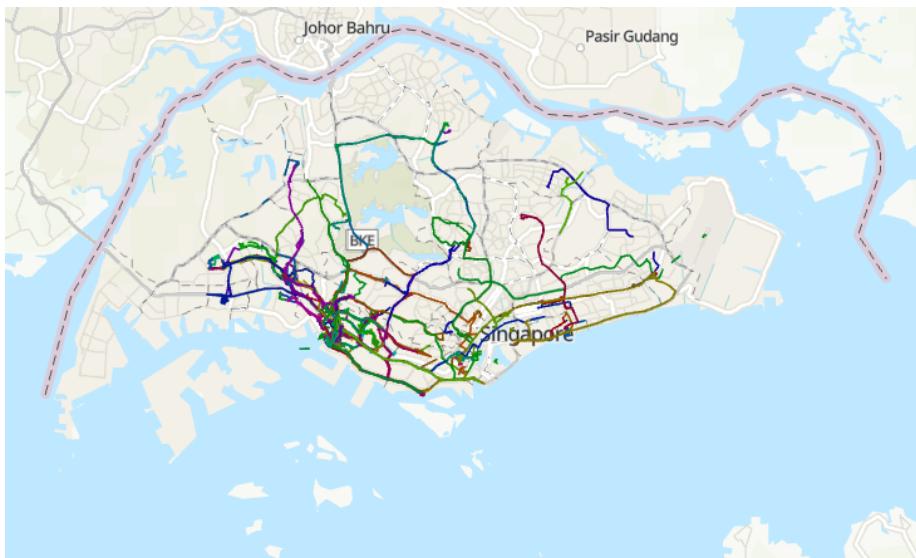
Appendix



Link Data in September



Link Data in October



Trajectory Data in September



Trajectory Data in October