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How Does Urban Design and Heat Influence Our Cycling Choices?

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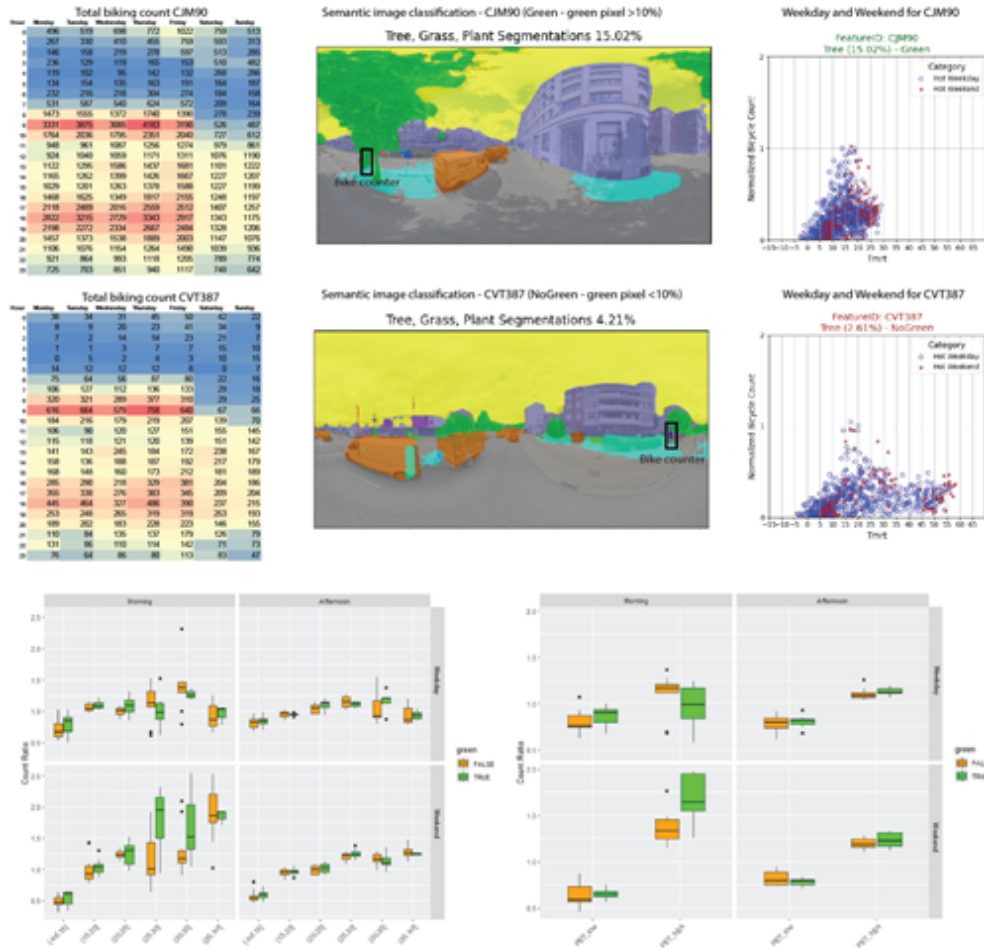
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Urban heat stress is a growing public health concern, particularly for soft mobility users such as cyclists and pedestrians. Understanding how urban and green infrastructure design, together with local micrometeorology, influences cycling behavior, is essential for developing effective heat mitigation strategies and promote sustainable urban mobility.

Using the Brussels Capital Region (BCR) as a case study, this research utilizes data collected by Brussels Mobility, which deployed 18 monitoring stations to continuously record bicycle count and speed at 15-minute intervals. For the year 2023, the data was aggregated into hourly intervals, and Mean Radiant Temperature (T_{mrt}), Universal Thermal Climate Index (UTCI), and Physiologically Equivalent Temperature (PET) were computed for a 25 m × 25 m area surrounding each monitoring station. Additionally, the stations were classified as either green or non-green (<10% green pixel coverage) using semantic image classification. To evaluate the influence of greenery, heat exposure, and time of day on cycling behavior, two-way ANOVA and contrast eta-squared analyses were conducted.

The findings show that cycling behavior was significantly higher during the summer season and on warm days in general, with no noticeable decline on days with high heat exposure (e.g., >26°C UTCI; >23°C PET). In warmer months, greenness also influenced cycling behavior, with a higher count ratio, especially on weekends and in the mornings. However, this effect was not observed when PET exceeded 35°C.

Overall, thermal comfort, greenness and time of day have shown to affect cycling behavior. These findings highlight the need for further research to examine the role of greenery in cycling behavior, particularly given the limited route options available to cyclists.



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