**Panel:** Science of Decarbonising Cities

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**Sidewalk the Talk: Translating street view imagery to correct perspectives to enhance bikeability and walkability studies**

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**ABSTRACT**

The recent surge in the utilization of street view imagery (SVI) and deep learning technologies has catalyzed numerous studies evaluating active transportation infrastructure on a large scale. However, a significant limitation is potential biases originating from diverging perspectives: conventional SVI, captured from vehicles, versus the perspectives of cyclists and pedestrians. Until now, research has not quantified these biases nor suggested any methodologies for adjusting perspectives to mitigate them. In a novel approach, this study investigates these perspective biases using semantic segmentation and trains Generative Adversarial Networks (GAN) models using Pix2Pix and CycleGAN architectures. A notable methodological enhancement in our study was the introduction of the mean intersection over union of semantic segmentation as a partial loss function, coupled with the utilization of perspective images as input. This was aimed at achieving a more accurate representation and understanding of the biases. While CycleGAN offers a more general approach by supporting unpaired image datasets and allowing bidirectional translations (from dataset A to B and vice versa), Pix2Pix necessitates more curated paired-image datasets and permits only unidirectional translation (from dataset A to B). A Singapore case study scrutinizes these innovative techniques' strengths and weaknesses. Our results reveal notable biases when comparing conventional SVI to cyclists’ perspectives (R2: 0.45-0.52). Notably, the Pix2Pix model demonstrates promise in diminishing these biases by fabricating compelling images that echo actual ones (R2: 0.47-0.83). While CycleGAN maintains high-level components from a vehicular perspective, Pix2Pix outperforms in accurately translating the essence of semantic details. As SVI ascends to mainstream prominence in evaluating the active transport and urban environment, the findings of this study serve as critical insights for decision-making. By quantifying perspective biases and rectifying them for the specific street user categories, we ensure a balance of scalability and enhanced reliability in SVI analysis. This advancement paves the way for cost-effective active transport infrastructure assessments, fostering timely and precise urban planning policies. Such policies can amplify walkability and bikeability, nudging citizens towards greener transit options, thereby aiding in urban transport decarbonization. The study also identified future research opportunities to improve the reliability and scalability of this approach, focusing on enhancing input data quality and refining the generalizability of the GAN model.

**Keywords:** Active Transport, Bikeability, Generative Adversarial Networks, Street View Imagery, Walkability