

Mapping Urban Greenery Configuration: Insights from Street- and Satellite-Level Images in Washington DC

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Abstract: Urban greenery is essential for fostering healthy, resilient cities, particularly under the pressures of climate change. In this talk, I present a multi-scale analysis of street-level and top-down urban vegetation in Washington, D.C., exploring how greenery impact summer temperatures across different spatial scales and residential zones. To quantify street-tree greenery, we applied deep learning-based semantic segmentation with a pre-trained DeepLabV3 model to quantify the urban greenery configuration from Google Auto Arborist street-view images. We examine the relationship between urban greenery and land surface temperature (LST) at the individual tree, 500 m × 500 m grid, and census tract scales. Our results show that correlations between vegetation and temperature strengthen with increasing spatial scale, with census tracts providing the most consistent assessment unit. Street-view measurements are relatively scale-independent, whereas top-down indices are more sensitive to aggregation. We also observe uneven greenery distribution, with higher-density neighborhoods exhibiting lower Green View Index (GVI) values. These findings highlight opportunities for equitable, data-driven urban forest management. This work was also extended beyond deep learning-based image analysis to include street tree quality, species classification, and environmental equity, demonstrating how integrated street- and satellite-level analyses can inform sustainable urban planning and climate adaptation strategies.

Bio: Dr. Fang Fang is an Associate Teaching Professor at Northeastern University whose research focuses on using deep learning, semantic segmentation, GIS, and remote sensing to understand urban environment dynamics. She develops scalable, data-driven workflows that leverage street-view imagery and satellite data to quantify urban vegetation, map tree species, assess street tree quality, and study environmental equity. Her work integrates computational methods and spatial analysis to inform sustainable and climate-resilient urban planning. Her most recent research projects focus on scale-related considerations in applying deep learning to diverse image sources, ranging from street-level imagery to remote sensing data.

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