Understanding the Impact of Social and Physical Environment Factors on Crime Using Urban Sensing and Machine-Learning

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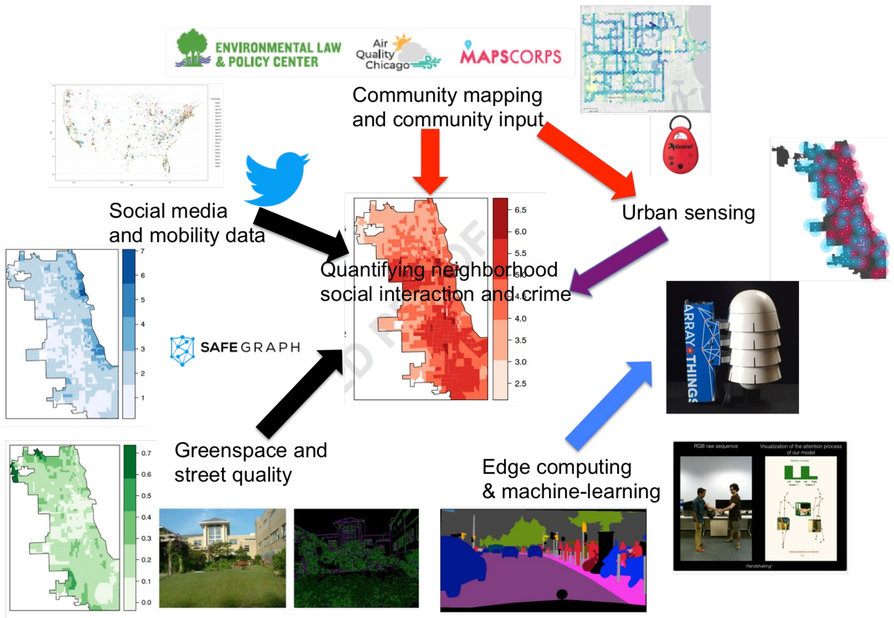
Project Goal: Understanding how different physical environment (e.g., greenspace, disorder, heat and air quality) and social environment factors (e.g., street activity) affect neighborhood social cohesion and crime



Intellectual Merit: 1) Testing extant sociological and psychological theories relating social cohesion and physical environment variables such as disorder and greenspace to crime; and 2) applying causal inference models and AI-optimized systems to examine to what extent ambient image and sound data can be used to determine the character of social interactions and overall neighborhood cohesion. This could transform social science research by measuring complex social and physical environment variables at scales never before investigated. This will also push the boundaries of ML algorithms embedded in intelligent distributed sensor networks.

Progress to date: 1) quantifying how number of park visits and neighborhood street activity relate to crime, 2) obtaining air quality, heat mapping, subjective measures of social cohesion from our community partners, 3) creating a modular, and thus interpretable, ML approach to quantify the nature of social interactions 4) beginning to quantify disorder and preference from Google Streetview images.

Immediate Broader Impacts: Results from our summer 2021 data collection are already uncovering relationships between park usage, park quality, air quality, and crime. We are also linking objective and subjective measures together that can be used to inform neighborhoods and to highlight potential points of community intervention.

Long-term Broader Impacts: Results of this research could inform ways in which the physical environment could be altered to improve social cohesion and to potentially reduce crime. In addition, we are hoping to develop interpretable AI that could be deployed to quantify social interactions in unbiased ways that protect privacy.

Next Steps: Labeling more videos for the nature of social interactions (either positive or negative). Then train the modular ML algorithm on these newly labeled videos. Link objective and subjective environmental measurements.

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