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

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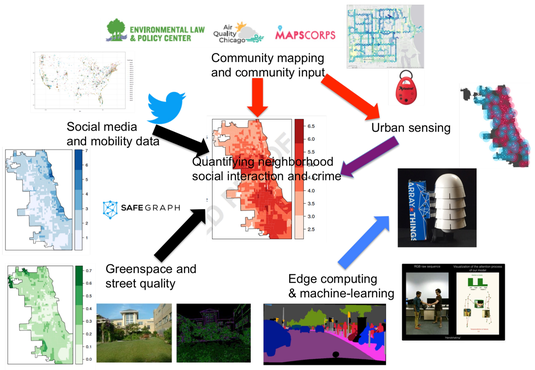
Project Challenge

We seek to quantify the nature of social interactions in different neighborhoods based on community input, social media data, mobility data, greenspace, street quality and urban sensing data. We want to understand how different environmental features are related to different social interactions and social behaviors.

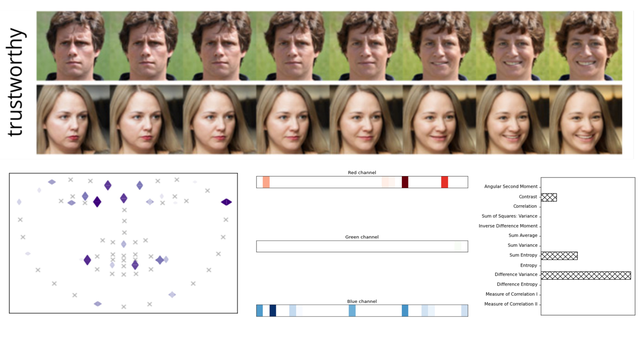


Intellectual Merit

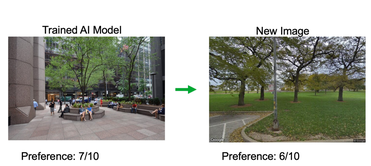
We test sociological and psychological theories relating social cohesion and physical environment variables. We apply AI-optimized systems to examine to what extent ambient image and sound data can be used to determine the character of social interactions and overall neighborhood cohesion. We do so using interpretable and explainable AI so that we can audit the models, which can help us to remove model bias. This will push the boundaries of ML algorithms embedded in intelligent distributed sensor networks and help us to study social interaction quality at very large scales.

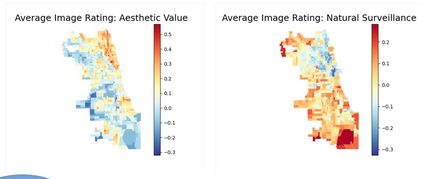
Major Outcomes/Progress

Trustworthiness

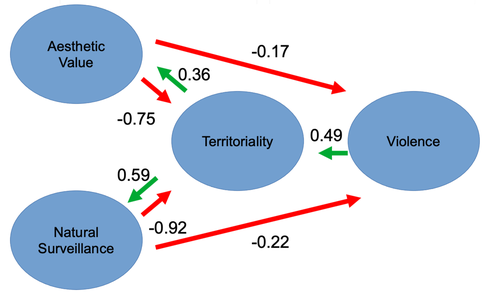


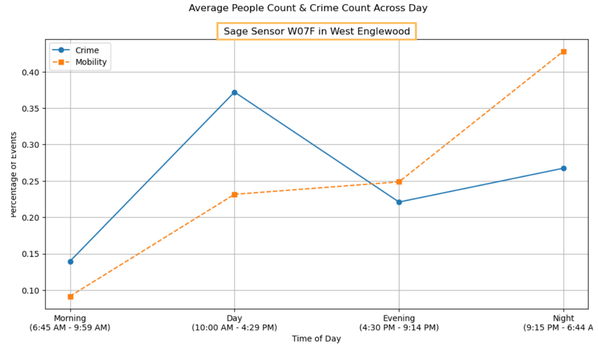
1) We developed an interpretable and explainable model of perceived trustworthiness





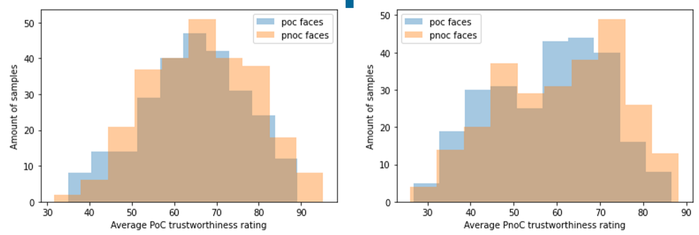
2) With transfer learning we created maps of preference and natural surveillance and related it to crime. We found that both significantly predict crime.

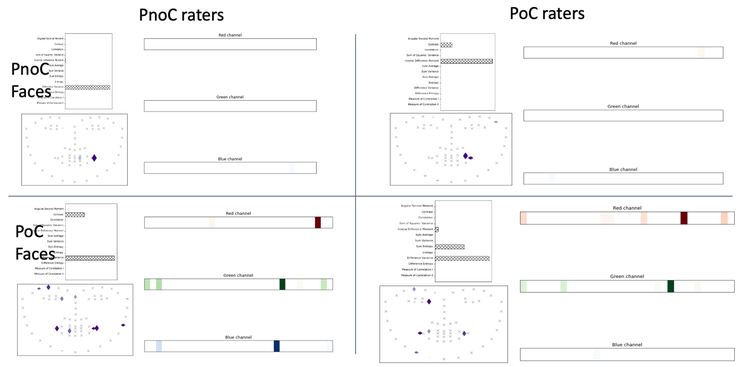




3) We analyzed SAGE node data from different nodes. Data from West Englewood is shown. We find some relationships between pedestrian counts and crime. We are wondering if there is some error in the algorithm at night.

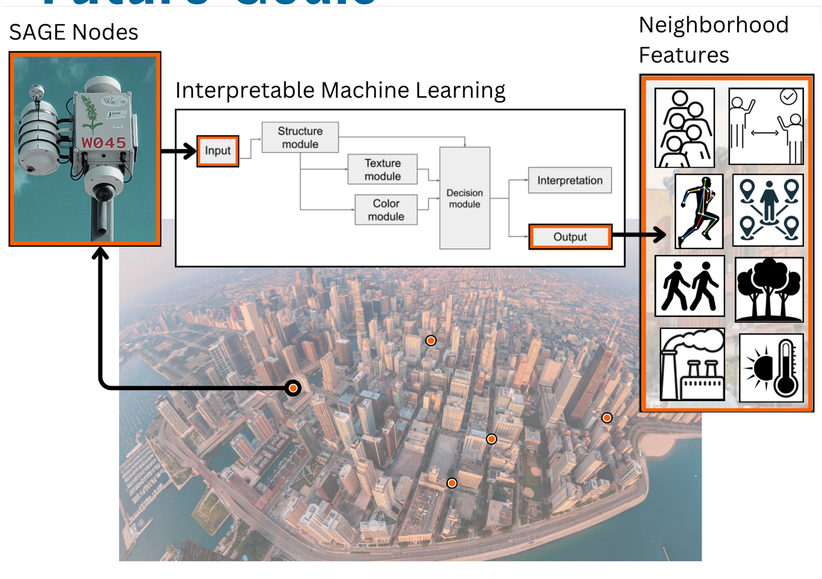
Broader Impacts





People of no Color (PnoC) rate computer generated faces of color less trustworthy that faces of no color. Our explainable models shows that PnoC raters use color channels when making ratings of PoC faces. With this approach we can remove these features/channels from the model to reduce model bias.

Future Goals



We want to combine the GSV work with the interpretable ML approach to understand how people may be making their decisions about whether a neighborhood looks safe or whether a neighborhood is preferred. We would also like to advance our interpretable models of social interaction quality and have them be able to be run at the edge, such as on a SAGE node.