ReTUNE: Restoring Through Urban Nature Experience

THE UNIVERSITY OF CHICAGO

Kathryn E. Schertz, Omid Kardan, & Marc G. Berman

ENL Environmental Neuroscience Lab

BACKGROUND

Prior research has shown that exposure to natural environments can increase cognitive functioning, mood, and positive reflection [1-3]

Nearby greenspace is associated with improved physical and mental health [4,5]

Walking has cardiovascular and musculoskeletal health benefits [6]

Goal: Build an app to use walking as a way to maximize exposure to natural elements, to counter some of the disadvantages of urban living while completing daily errands or commuting

DATA SOURCES

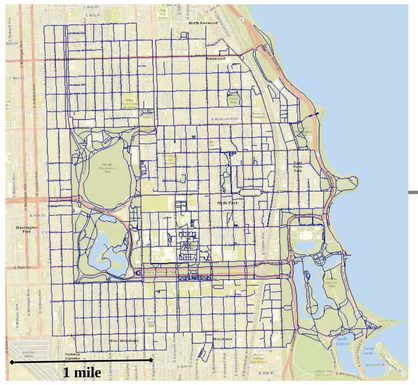
Greenspace: LiDAR with 2 ft resolution collected in 2010

Sound: SoundScore™ data for traffic, airplane, and local noise levels (HowLoud, Inc.)

Crime: City of Chicago Data Portal, all “visible” crimes reported in 2016

MODEL

Street Network



1) Downloaded OpenStreetMaps network of Hyde Park and surrounding neighborhoods

2) Created input maps
- A. Greenspace
- B. Sound
- C. Crime

3) In ArcGIS, buffered around each edge of network to calculate percent greenspace, average sound score, and crime count

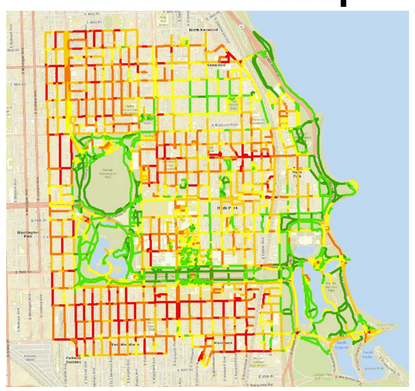
4) Each edge assigned Restoration Score (RS) by weighting the three input values using Eq.1

Extracting Buffer

Eq.1

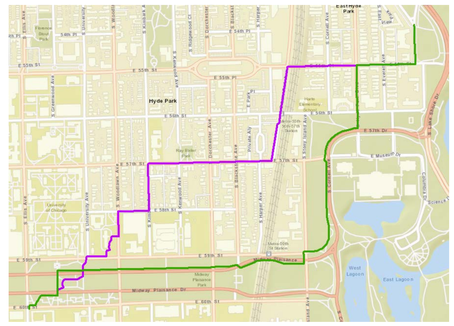
$$RS = \delta * \frac{1 + \alpha A + \beta B}{\gamma + C}$$

Restoration Map



5) Routes generated using an impedance model

SAMPLE RESULT



Shortest Route

Restorative Route

Restorative route is:
- 150 ft longer (~1%)
- ~45 sec additional walking
- 11% higher restoration score

FUTURE DEVELOPMENTS

User feedback to optimize model parameters (α, β, γ, δ) with subjective ratings and cognitive tests

Additional data sources in model such as sidewalk quality and storefronts

Model for time of day and season by adjusting crime & greenspace weights

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CONTACT

KES: kschertz@uchicago.edu
MGB: bermanm@uchicago.edu

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[1]: Berman, M. G., Jonides, J., & Kaplan, S. (2008). The cognitive benefits of interacting with nature. *Psychological science*, *19*(12), 1207-1212. **[2]:** Bratman, G. N., Hamilton, J. P., & Daily, G. C. (2012). The impacts of nature experience on human cognitive function and mental health. *Annals of the New York Academy of Sciences*, *1249*(1), 118-136. **[3]** Schertz, K.E., Sachdeva, S., Kardan, O., Kotabe, H.P., Wolf, K.L., & Berman, M.G. (2018). A thought in the park: The influence of naturalness and low-level visual features on expressed thoughts. *Cognition*, *174*, 82-92. **[4]** Kardan, O., Gozdyra, P., Misic, B., Moola, F., Palmer, L. J., Paus, T., & Berman, M. G. (2015). Neighborhood greenspace and health in a large urban center. *Scientific Reports*, *5*(11610). **[5]** Beyer, K. M., Kaltenbach, A., Szabo, A., Bogar, S., Nieto, F. J., & Malecki, K. M. (2014). Exposure to neighborhood green space and mental health: evidence from the survey of the health of Wisconsin. *International journal of environmental research and public health*, *11*(3), 3453-3472. **[6]** Morris, J. N., & Hardman, A. E. (1997). Walking to health. *Sports medicine*, *23*(5), 306-332.