

Urban Climate Data Visualization and Exploration Tool

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Introduction

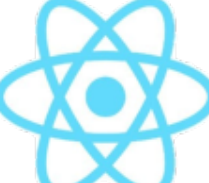

- Municipalities need a visualization tool to support heat mitigation efforts (e.g., to optimize tree planting)
- The tool should integrate heat, land use, and socio-economic data
- Decision-making tool will help minimize heat impacts on vulnerable populations

Research Goal

Develop a visualization and exploration tool that is

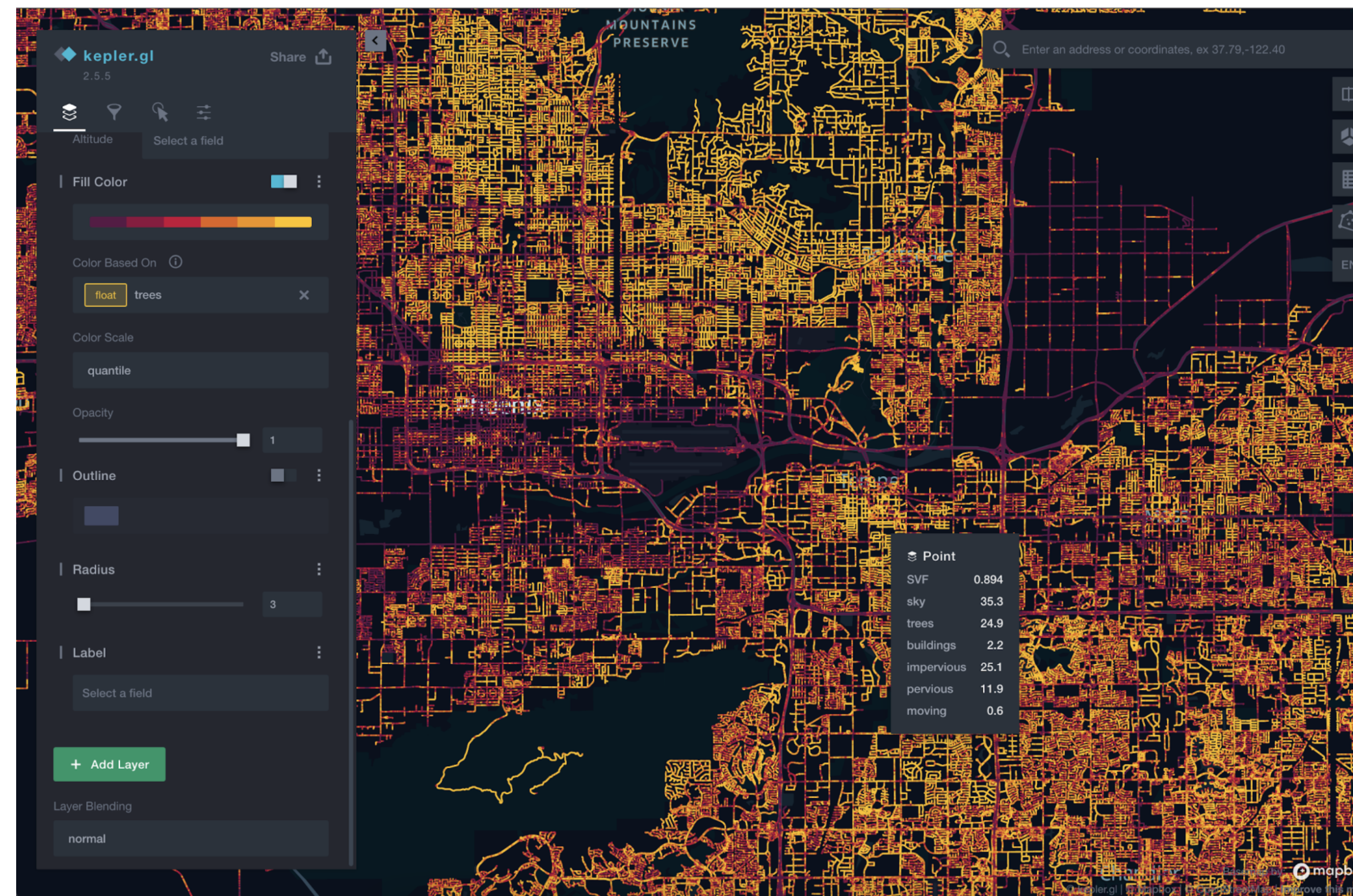
- easy to learn and use
 - open-source
 - web-based,
- so anybody can
- work with multiple datasets at a time
 - detect hotspots easily without expert knowledge

Technologies Used

Web interface:  React  kepler.gl

Server:  node  mongoDB

Results



Website URL: <https://shadelab.vercel.app>



References:

- [1] Ching, J., Aliaga, D., Mills, G., Masson, V., See, L., Neophytou, M., ... & Niyogi, D. (2019). Pathway using WUDAPT's Digital Synthetic City tool towards generating urban canopy parameters for multi-scale urban atmospheric modeling. *Urban Climate*, 28, 100459. <https://doi.org/10.1016/j.uclim.2019.100459>
- [2] Middel, A., Lukasczyk, J., Maciejewski, R., Demuzere, M., & Roth, M. (2018). Sky View Factor footprints for urban climate modeling. *Urban climate*, 25, 120-134. <https://doi.org/10.1016/j.uclim.2018.05.004>
- [3] Middel, A., Lukasczyk, J., Zakrzewski, S., Arnold, M., & Maciejewski, R. (2019). Urban form and composition of street canyons: A human-centric big data and deep learning approach. *Landscape and Urban Planning*, 183, 122-132. <https://doi.org/10.1016/j.landurbplan.2018.12.001>

Features

This tool assists the general public, local governments, and decision-makers in

- mapping and analyzing millions of urban climate data points (sky view factors, mean radiant temperature, surface types [1-3])
- merging, intersecting, and masking multiple available data layers
- creating overlays and heatmaps
- refining and filtering out residuals
- exploring data at fine spatial scales
- integrating vector and raster data
- accessing and displaying datasets that otherwise require special software
- identifying several key factors that impact cities' urban climate

Future Work

- Implement lazy-loading technique to increase map responsiveness and reduce client-side buffering time
- Add support for real-time data streams
- Integrate with other GIS tools to allow effortless data import-export