The Deep Image of the City by MIT Media Lab

Cityscapes — Edited dataset

DCGAN — Pix2pix at 16/32/64 filters

Keras API — Train/test on VM GPU

TFjs — Model

Node.js — Model Host Service

CityScope TUI

CityScope API — Urban modeler

cityIO — CS Backend

'Observe' viewpoint as input vector for the DCGAN model

DCGAN

THREE.js Model of the design space

cityIO JSON

CityScope TUI interactions
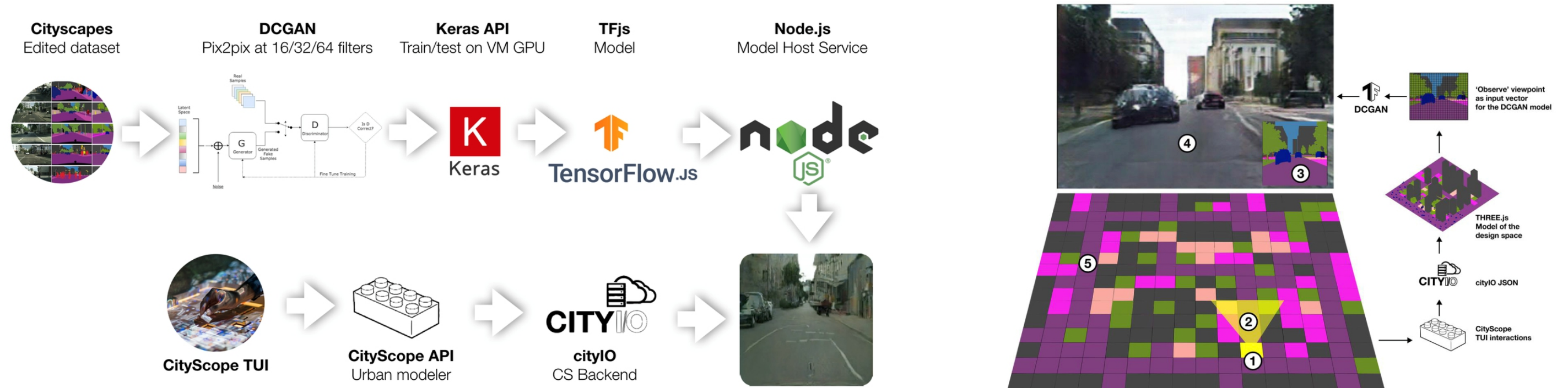
Deep Scope is a platform that allows designers to test multiple urban designs and observe the Image of the City in real time.

Inspired by Kevin Lynch's The Image of the City and The View from the Road, Deepscope helps designers think about urban imageability: readability, continuity, legibility, image of the city.

method & process:
1.With each design iteration, a 3D streetscape model is created; 2.the model is fed into a DCGAN neural network; 3.that generates a realistic street-view visualization.
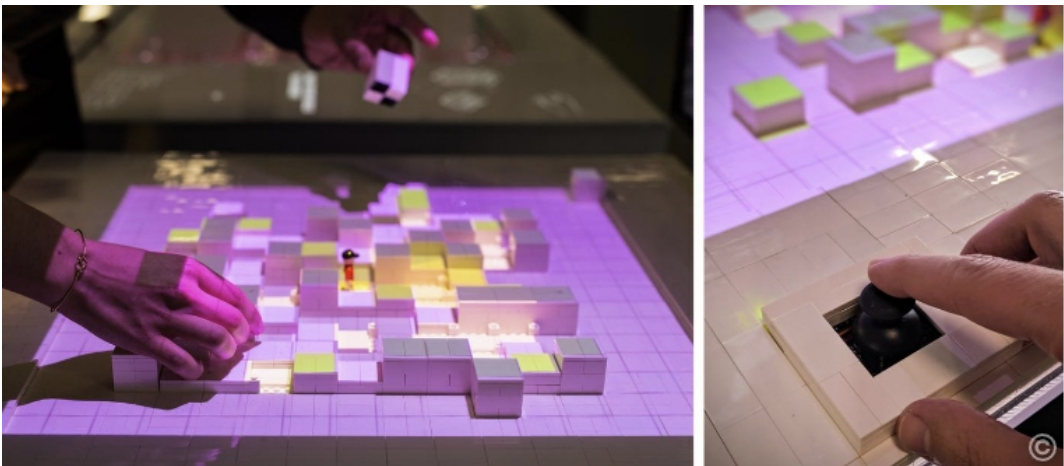
Leeside by KPF (Enhancing City Planning through Computational Design & Digital Twin)

|	CITY CENTER	INDUSTRIAL	MID-DENSITY RESIDENTIAL	LOW-DENSITY RESIDENTIAL
VACANT LOT	15%	70%	20%	25%
UNINHABITABLE BUILDING	2%	19%	5%	5%
INHABITABLE BUILDING	15%	11%	15%	15%
OCCUPIED	68%	0%	60%	55%
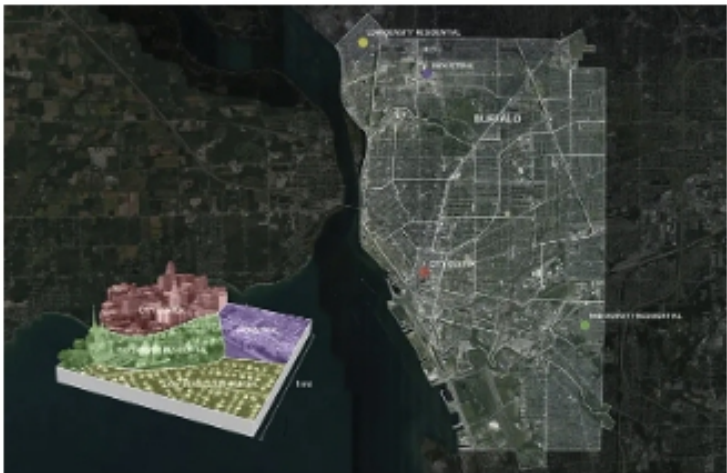
KPF UI utilized its interactive tool Scout and developed a '**digital twin**' to help understand how the **fictional rust-belt city of Leeside** could adapt its built environment to become a climate haven for **climate migrants** from the coasts of the United States by the year 2040..

One challenge was to consider the scale of the area we'd allow users to manipulate within the digital twin tool. We wanted to represent the city center, industrial areas, mid-density residential, and low-density residential within a **one-mile by one-mile area**. You would never find this mix in Buffalo, New York, for example, but the city we ended up with feels reasonable, so residents could understand the implications of their decisions within the tool's parameters.

method & process:
1.To analyze conditions in Rust Belt cities to create the fictional conditions of Leeside 1mile * 1mile); 2.To look into the physical characteristics of rust- belt city: street grid, building height, lot size etc; 3. To define the parameters that people can control through digital twin by Scout.
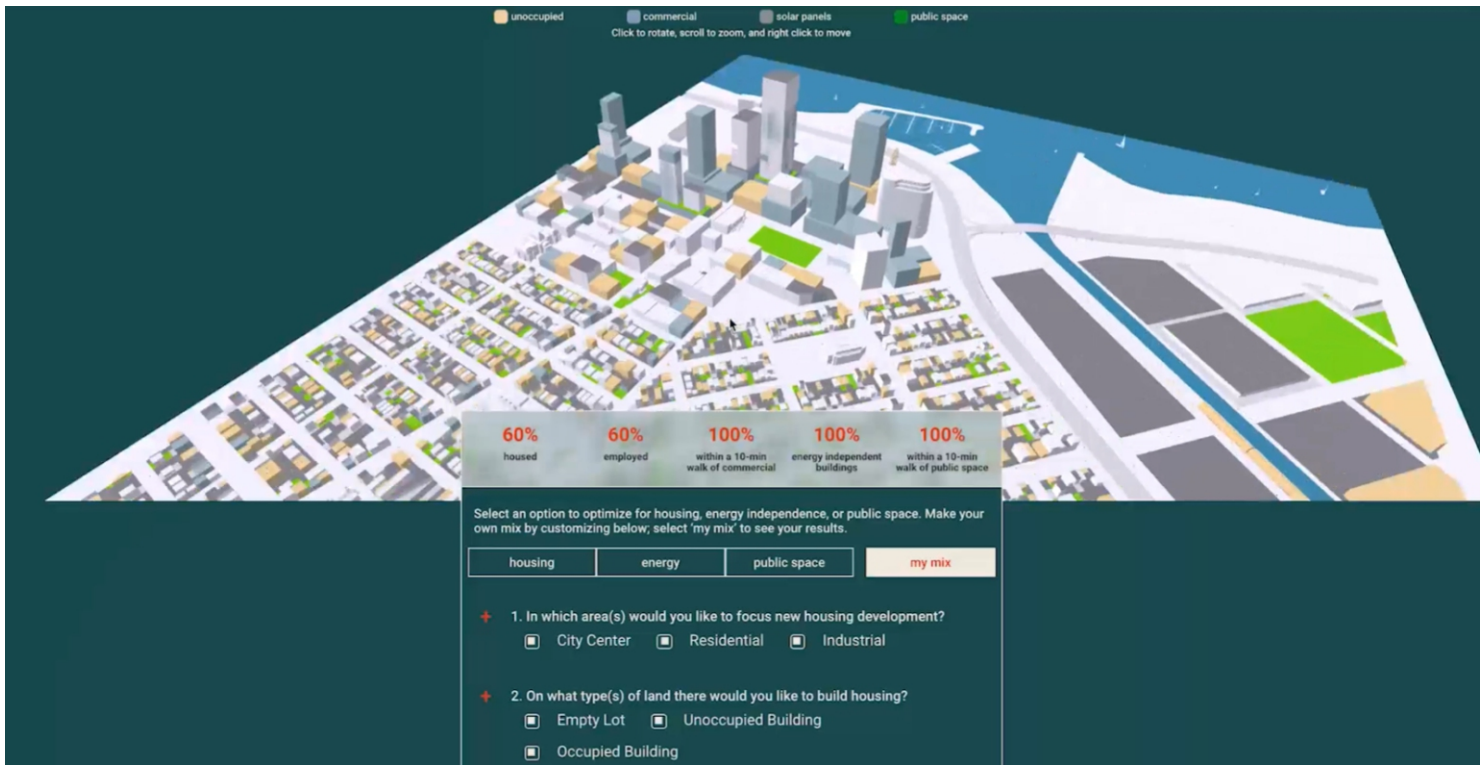
The interesting paper:
Automatic responsive-generation of 3D urban morphology coupled with local climate zones(LCZ) using GAN

highlights:1. A GAN-based generation framework in response to LCZ was proposed; 2. The accuracy of LCZ calculated from 3D models proved the robustness of the method.

Introduction: complex urban morphology can induce adverse effects when it comes to heat island, flooding etc. There is an urgent to optimize spatial configurations for urban morphology.

The LCZ relies on the attributes of urban structure, land cover, building materials, and human activity . The system comprises 17 land types, including 10 urban land types (LCZ 1–10) and the remaining seven are natural land types (LCZ A-G). LCZ was developed to accurately capture the heterogeneous morphology and physical characteristics of urban land

Conclusion:
This research proposed a design framework for generating urban 3D morphology that rapidly responds to LCZ changes. Due to the challenges associated with obtaining high-definition remote-sensing images and the limitation of traditional 3D platform in dynamically generating models, the GAN training methods between LCZ data and urban morphology is a innovative way to predict 3D models responsively and rapidly.

3D Urban Morphology ⟷ Local Micro Climate

GAN: as a surrogate model to facilitate the integration of LCZ and urban morphology

Develop a rapid/responsive 3D morphology prediction model fot LCZ classification