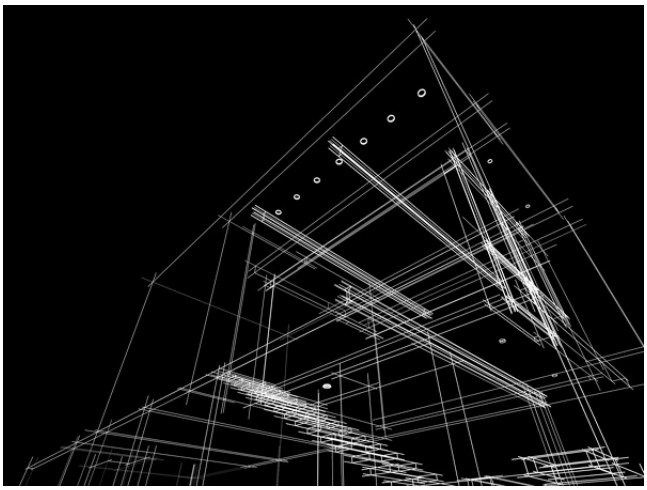
INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Common House: Semantic Plan Database for GAN's in Architecture

TECHNOLOGY NUMBER: 2024-585



OVERVIEW

Semantic architectural plan database and GAN streamline automated architectural design processes

- Enables AI-driven plan generation with labeled, structured architectural plan databases
- Automated floorplan design, architectural analysis, generative design education, design exploration

BACKGROUND

Automated architectural design using artificial intelligence has gained significant attention due to its potential to enhance creativity and efficiency. However, a major limiting factor is the lack of high-quality, semantically labeled databases tailored for architectural applications. Traditional datasets often lack meaningful annotations (e.g., distinguishing living rooms, bedrooms, or kitchens), which hampers AI models from understanding architectural layouts' functional nuances. Previous methods have relied on generic or poorly annotated plans, resulting in limited generative capabilities and unreliable plan analysis. Architects and researchers, therefore, face obstacles in leveraging advanced GANs (Generative Adversarial Networks) and other neural networks for automated plan generation and analysis. Bridging this gap requires curated databases and streamlined workflows to unlock AI's full potential in architecture.

Technology ID

2024-585

Category

Data

MOSS - Michigan Open Source Support

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INNOVATION

The Common House project establishes a workflow and proof-of-concept for a semantically annotated architectural plan database, specifically designed for training GANs and other AI models. By collaborating across architecture, computer science, and robotics, the initiative delivers a robust dataset where each plan includes room-type labels and relevant design parameters. The integrated pipeline enables GANs to generate new floorplans responsive to customized criteria such as size, function, and site orientation. This approach permits systematic exploration of conventional and experimental architectural solutions, enhancing design automation, fostering artistic innovation, and supporting architectural pedagogy. Potential real-world applications include automated residential design, rapid prototyping for architects, generative design education, and advanced architectural research.

ADDITIONAL INFORMATION

PROJECT LINKS:

DEPARTMENT/LAB:

- Matias del Campo, Taubman College for Architecture and Planning

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