

More than Anything: Advocating for synthetic architectures within language-image models

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Introduction

Large-scale language-image (LLI) models have the potential to open new forms of critical practice through architectural research. Their success enables designers to research within discourses that are profoundly connected to the built environment but did not previously have the resources to engage in spatial research. The design of text-driven latent spaces extends the histories of typological design to synthetic environments including non-building data into an architectural space. More than synthesizing quantic ratios in various arrangements, the architect contributes by assessing new categorical differences into generated work. The architects' creativity can elevate LLI models with a synthetic architecture, nonexistent in the data sets the models learned from.

Research Goal

The research goals of the paper are to contextualize the use of large-scale language-image (LLI) models in architecture, explore the affordances and challenges of diffusion models in architectural design, draw upon aesthetic histories to approach LLI models architecturally, and advocate for synthetic architectures within LLI models as a way for architects to contribute to complex issues related to the built environment.

Methods

The paper's methods include a comparative analysis of approaches to diffusion models in architecture, drawing from aesthetic theories and histories to approach LLI models architecturally, and advocating for synthetic architectures within LLI models as a way for architects to contribute to complex issues related to the built environment. Additionally, the paper draws upon examples of existing applications of large-scale data sets in architecture and discusses their potential implications for architectural design. The paper also reflects on the limitations and challenges of using AI-generated renderings in architectural practice, emphasizing the importance of critical engagement with these tools.

Figures and Results



When one can draw architecture as quickly as words, architecture can contribute to anything made from words with anything but words. The illustrations show generated building designs developed with Midjourney and Stable Diffusion. Top: "Forested Architecture:" architecture articulating research goals for synthetic materials. Bottom: "Designing Cities with Cities:" compressed typologies from specific cities to inform data-centric approaches to architecture.



Outlook

The recent research seeks to identify synthetic qualities and their objective grounds. This encompasses the reverse-engineering of synthetic images and the fine-tuning of LLI models for future applications. By analyzing stochastic representations of latent spaces, these studies aim to pinpoint synthetic features associated with location-specific features and to comprehend the impact of AI-generated artifacts, such as the integration of vegetation for environmentally inclusive architecture.

The anticipated outcome is an enhanced understanding of synthetic city representations produced by LLI models, resulting in the development of innovative building typologies that tackle modern challenges in urban planning and sustainability. This advancement will be exemplified by a set of fine-tuned LLI model capable of generating architecture-specific representations.

Acknowledgments

This work was supported by Good Systems, a research grand challenge at the University of Texas at Austin.

Related Publications:

D. Koehler. "The Advent of Trees in Architecture: The new features of data-centric building typologies." Book chapter in *Diusions - A Taxonomy of Synthetic Imaginations in Architecture Design*, ed. Matias del Campo, Wiley, forthcoming May 2023.

D. Koehler. "More than Anything: Advocating for synthetic architectures within large-scale language image models." In: *International Journal of Architectural Computing*, Sage, peer reviewed, accepted forthcoming April 2023.

"Architecture after AI", Symposium & Exhibition of generated architecture with 74 participants, organized by Kory Bieg, Daniel Koehler, Clay Odom, Mebane Gallery, University of Texas at Austin, February 2 – March 3 2023.

D. Koehler, "Communal Physics: Building Synthetic Data Sets or How to Learn from Future Architectures?", peer-reviewed, Acadia conference 2022, October 26-29, 2022, University of Pennsylvania, Philadelphia, PA.