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Towards language driven 3D content generation in building environments

Description

The text-to-3D method has made rapid progress in fields like gaming and entertainment due to recent developments in large-scale pretrained language models and diffusion models. The task of text-to-3D focuses on automatically generating corresponding 3D assets based on text descriptions. EXIM [1] introduced a two-stage hybrid framework, which first uses a text encoder and a 3D diffusion model to learn the rough 3D shape, and then employs a 3D convolutional model to predict the color of the object, ultimately producing high-quality 3D mesh models. Fantasia3D [2] also adopts a hybrid approach, generating detailed 3D models from text by separately learning the object's geometric shape and appearance.

This project is dedicated to applying these latest methods to our field, simplifying the workflow of designers in modeling, and ultimately moving towards generative design.

Task

To develop a framework that generates 3D design from text description:

- Perform literature review to identify state-of-the-arts methods that address similar research challenge.
- Constructing datasets suitable for text-to-3d tasks in building domain (e.g., using parametric modeling tools)
- Implement algorithms that performs the task.

Supervisor

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References

- [1] Z. Liu, J. Hu, K. H. Hui, X. Qi, D. Cohen-Or und C. W. Fu, „EXIM: A Hybrid Explicit-Implicit Representation for Text-Guided 3D Shape Generation,“ in *ACM Transactions on Graphics*, 2023.
- [2] R. Chen, Y. Chen, . N. Jiao and K. Jia, "Fantasia3D: Disentangling Geometry and Appearance for High-quality Text-to-3D Content Creation," in <https://arxiv.org/abs/2303.13873>, 2023.