



# Collect a Large-scale Dataset to Support Data-driven Layout Planning in Architectural and Urban Scenarios

## Project Description

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## Introduction

Data-driven layout planning is a trending topic in computer graphics. It aims to enable models to learn key design principles from large-scale datasets, equipping them with design capabilities comparable to those of human designers. This approach has already been applied to a variety of layout planning tasks, such as user interface design [1], indoor scene synthesis [2] floor plan design [3], and urban planning [4]. Since the method is data-driven, a large, well-annotated dataset is essential, as it directly determines the performance of generative models. Therefore, this project aims to collect a large-scale, well-annotated, and information-rich dataset in architectural and urban scenarios to support the growth and development of the community of data-driven architectural and urban planning.

## Task Description

- To collect and analyze geospatial data from public data sources, such as utilizing open building and urban planning data from governments, or from satellite imagery and aerial photography, or scraping from online databases, with the ultimate goal of obtaining a large-scale, well-annotated dataset.
- To use GIS software, such as ArcGIS, to collect and analyze this geospatial data.
- To use Python libraries, such as pandas, to process and visualize vector geospatial data.
- To learn foundational knowledge of urban planning and architecture to gain a good understanding of city layouts, architectural design principles, and planning regulations.

## Requirements

- Proficient in GIS software, such as ArcGIS, for map making and spatial data analysis.
- Proficient in Python (especially the libraries Pandas and Geopandas), for data processing and analysis.
- Proficient in database management systems (optionally), such as PostGIS, for managing a large amount of spatial data.

## Work Load

- 20% theory
- 70% implementation
- 10% testing

## Project Type

This project can be done as Master thesis. Goals are adjusted depending on the project type.

## Supervision

- Prof. Dr. Renato Pajarola
- Shidong Wang (Assistant)

## Contact

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## References

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- [2] K. Wang, M. Savva, A. X. Chang, and D. Ritchie. Deep convolutional priors for indoor scene synthesis. *ACM Transactions on Graphics*, 37(4):1–14, 2018.
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