ENG EC601 Name: Ronghao Ye
BU ID:79547297

Project 1: Architect co-pilot

1 Target Users or Applications

The “Architect co-pilot” project, which is like GPT, aims to help architects, interior designers, and urban planners. By integrating machine learning models, this tool would simplify the design process, offering automated suggestions for floor plans, building structures, and room decorations, reducing manual labor while encouraging creativity, etc.

1.1 Target Users

Architects: To streamline design processes for buildings and create optimized, structurally sound designs.

Interior Designers: To quickly generate and explore room layouts and decorations.

Urban Planners: To assist with large-scale designs like city layouts or infrastructure planning.

1.2 Applications

Applications could range from small residential projects to large commercial constructions, helping save time and effort while boosting innovation. For instance, BU is going to build a new ENG building like CDS, which has become a landmark of BU. Another situation is an interior designer receives a commission to redesign a floorplan for an old house, so he can use Architect copilot to help him figure out wonderful ideas.

2 Outcome of Using ChatGPT or LLM

2.1 Outcome

ChatGPT can offer insights into design principles, architectural styles, and best practices by generating detailed descriptions, suggesting modifications, or improving efficiency in the design process. For example, when tasked with generating design

ideas, ChatGPT can propose various layouts and room arrangements, optimizing space utilization and style.

2.1.1 Design Suggestions

When prompted, ChatGPT can propose layout improvements, offer suggestions on room configurations, or even recommend decorative themes and color schemes.

2.1.2 Architectural Rules

By asking for guidelines, it can help architects understand rules or building codes required in certain regions or projects.

2.2 Limitations

For instance, while ChatGPT can generate ideas, it lacks the capability to validate these suggestions from a structural and engineering standpoint, which is essential in the actual design process. And GPT can’t access to many data resources likes Google Scholar or some professional searching engine for architect.

3 Analysis of Outcome

ChatGPT’s outcome offers several creative suggestions, but the results need to be critically analyzed before being implemented in a real-world context. The examples are as follows:

3.1 Creativity

LLMs bring new ideas and a fresh perspective, but may lack specificity in terms of architectural feasibility. I requested GPT to generate a headquarter of Google, and it finished quickly. Although it looks incredible, it actually lacks architectural feasibility. ChatGPT was unable to analyze the feasibility of the building in structural or mechanical detail.

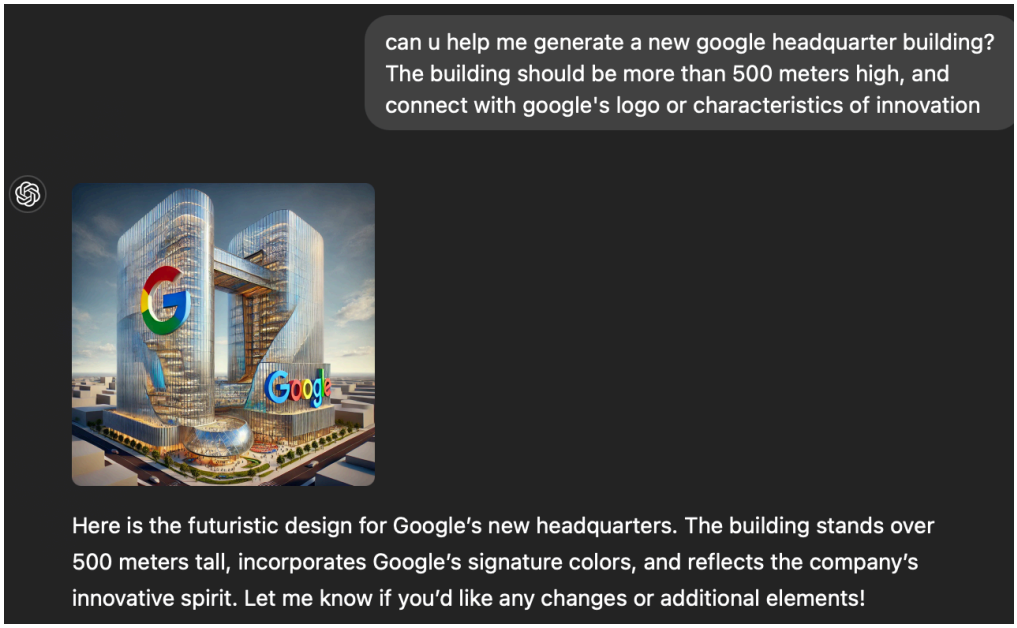

Figure 1. Conversation with ChatGPT and outcome generated

3.2 Criticisms

There is a lack of accuracy in technical details, such as specific measurements or structural considerations that are crucial in architecture. When I ask ChatGPT to generate a floor plan, it actually didn't meet my request. There were 4 bedrooms and no bathrooms.

Figure 2. Conversation with ChatGPT

Figure 3. Floor plan generated by ChatGPT, which seems feasible but literally unreliable

3.3 Next Steps

Combining the creativity of LLMs with robust machine learning models, trained on architectural data, could offer a more complete “co-pilot” for architects, which can suggest and validate designs simultaneously.

4 Scientific Papers

1. A review of AI image generator: influences, challenges, and future prospects for architectural field

Link: https://ojs.uajy.ac.id/index.php/JARINA/article/view/6662/2893

2. Is Midjourney-AI a new anti-hero of architectural imagery and creativity

Link: https://www.researchgate.net/profile/Mohesh-Radhakrishnan-2/publication/367252933_Is_Midjourney-Ai_the_New_Anti-Hero_of_Architectural_Imagery_Creativity/links/63c8e5abd9fb5967c2ea3611/Is-

Midjourney-Ai-the-New-Anti-Hero-of-Architectural-Imagery-Creativity.pdf

3. Floor plan recommendation system using graph neural network with spatial relationship dataset

Link: https://www.sciencedirect.com/science/article/pii/S2352710223005570