

ASSISTANT TOOL FOR ARCHITECTURAL LAYOUT DESIGN BY GENETIC ALGORITHM

PIYABOON NILKAEW
*Faculty of Architecture, Rangsit University,
Bangkok 10300 ,Thailand
tuan@mail.arc.cmu.ac.th*

1. Introduction

Architectural design is a very complicated process. It contains many sequences within the design process that the architects have to take into considerations. Within the process, the architect will look for every feasible schematic to make the best decision for developing the final design process. However, the preliminary design involves both conceptual and schematic design that concern about quantitative analysis and qualitative analysis. The objective of this research is to utilize an assistant method or tool to help form a preliminary design and a thinking process by using genetic algorithm to find the feasible solutions for conceptual and schematic design.

2. Research Model Study

The assistant tool has been developed under two main concepts (1) qualitative analysis process and (2) quantitative analysis process. This development of assistant tool follows the design process steps and the architect's nature. First of all, the architect must think about the room space. Next, the architect will need to think about the room relation. The last in the preliminary design process is that the architect will make the feasibility of image (Schematic) of the design.

In addition to the modeling study, the assistant tool will focus in two parts of the design method and it will compute or verify the global optimum of the schematic image.

2.1. THE QUALITATIVE PROCESS

The qualitative process focuses in the topological management of the architectural space and relation. The topological step is handled within the first step of the architectural design process. The architect will provide the face of imagination, functional requirement and space relation. The assistant tool will create the image of imagination and it will allow the architect to adjust in detail via its graphical user interface (GUI).

Figure 1. shows a study model of the assistant tool for architectural layout design. In this study model, bedroom1, bedroom2, living room, kitchen and bathroom are allocated on the project area. Each room has relation with each other (red or blue line). The architect can guide the assistant tool to compute schematic plan in the next step by managing the sizes, the relations and the orders.

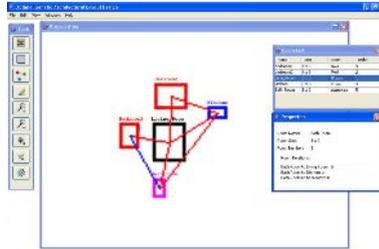


Figure 1. Assistant tool working with architect in the topological process

2.2. THE QUANTITATIVE PROCESS

The quantitative process focuses on the alternative schematic plan. This is an alternate to what is being generated from the Qualitative Process. The alternative schematic plans are computed and generated by the genetic algorithm process, which will find out the optimization of study plan. Each schematic plan will be different in the direction of functions and the orientation of room placement, but every schematic will still use the same condition of sizes, functions and relations (see Fig 2)

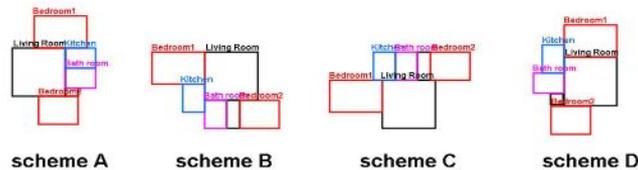


Figure 2. The alternative schematic plan by assistant tool generate in genetic algorithm process

Acknowledgements

The assistant tool for architectural layout design shows an alternative way of architectural designs. The tools can be used to assist the architects in the preliminary design stages with a significant help from the computational optimization algorithms. The tool assists the architect with design generation and evaluation, rather than using the tool in design completely without guiding from architect. The goal of this research is to understand the computational optimization algorithm process. This is still an on-going study and thus there are still some more modifications and improvements that can be made for it to be used in the preliminary design stage.

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