

## REPRESENTATION TECHNIQUE FOR STRUCTURE AND PROCESS OF 3D CONSTRUCTION MODEL

GUI-HYUN LEE<sup>1</sup>, EUN-JOO SIN<sup>2</sup>, SO-YOUNG KIM<sup>3</sup>, SUNG-HO WOO<sup>4</sup>, SOON-BUM LIM<sup>5</sup>

*Department of Multimedia Science<sup>1235</sup>, Department of Architectural Design<sup>4</sup>, Sookmyung Women's University, Seoul, Korea  
{ghlee<sup>1</sup>, kiki75<sup>2</sup>, sykim712<sup>3</sup>, shwoo<sup>4</sup>, sblim<sup>5</sup>}@sookmyung.ac.kr*

### 1. Research background and purpose

With the recent developments in computer technology studies on how to digitally restore traditional buildings to their original state are being pursued. It is highly important that the public can be educated by digitally restoring these buildings online and/or offline. However, it is necessary to develop several techniques to understand a structural order and construction process in traditional buildings. We propose new techniques that we can better understand them and fit them into society in the education and the publicity.

### 2. Representation of 3D Construction Model

The buildings are structured by various materials, also there is close correlation between materials in structure, procedure and form. Thus, we design the Technique of Structure Modeling for the expression of a structure, and the Technique of Process Modeling for recording a procedure of a construction work. Storage type for recording the structure of 3D buildings, the relational information between objects and the operational process was based on XML which is easy to search, and store, and has good extensibility.

#### 2.1. STRUCTURE MODELING

We study a technique to express relationship between materials in order to express 3D buildings as a structure rather than a mere concept of picture. We defined DTD(Document Type Definition) for expression of 3D buildings' structure and relationship, and express its structure and relationship based on XML(eXtensible Markup Language). The relationship of 3D buildings is

represented as an attribute classified according to the structure and relationship that have an effect on the objects during the operation.

## 2.2. PROCESS MODELING

We study a technique to record the operation of 3D buildings by Annotation and regenerate the recorded operations afterwards. We defined DTD for basic operations and recording the operational procedure meaningfully. Basic Operations are Select, Release, Translate, Rotate, etc. Meanings of operation include entire process of operation and small movement such as connection or separation. In this way, it is possible to regenerate the recorded operation if that operation is recorded based on XML.

## 2.3. IMPLEMENTATION OF USER INTERFACE

We implement User Interface for the Technique of Structure Modeling and the Technique of Process Modeling as previously proposed.

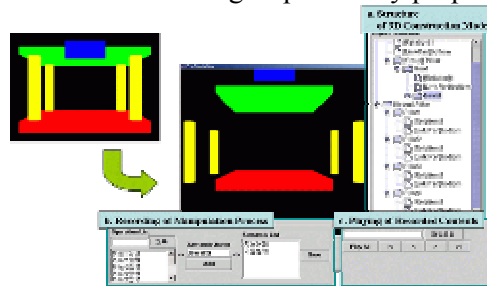


Figure 1. User Interface

‘a’ in Figure 1 is an expression for structure and relationship of buildings as a tree type, and so user can confirm the structure and relationship between materials of a building. ‘b’ is an user interface for recording operational process of a building, which is recorded by giving meaning to basic operation. ‘c’ is an user interface for regenerating the recorded content, which regenerates and shows the content of previously recorded operation.

## 3. Application Area

For restoration and utilization of traditional buildings, technology for expressing 3D object structure and procedure will be developed as a solution for utilizing virtual building of different types. Operational technology utilizes more virtual space and can be effective in various fields. We can develop more interactive learning data in introduction manuals, electronic manuals and etc. by this technology. As an industrial utilization plan, this can provide a cooperative solution using operational annotation and be used for building

publicity by generation a virtual model house and can be utilized for simulation of an interior or townscape. In conclusion, further studies in digital construction modeling should be conducted.

### References

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