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KotaView: simulating traditional Korean architecture interactively and intelligently on the web

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Abstract

Traditional architecture is an important topic, not only for finding local identities from traditional heritages but also for representing the traditional identities. It is especially true because locality issues are critical in this global era. Nevertheless, the structure of traditional Korean architecture has not been fully explored in a systematical or computational manner. Furthermore, this information is not managed efficiently even though the technology for managing information effectively is quite widely available and the information could be used in many application areas. Currently, all but a few experts keep their knowledge exclusively and transfer it to few people in a limited and traditional manner. This study thus selects the Internet as an educational environment for practical reasons and explores a way of structuring construction knowledge and building information of traditional Korean architecture. That will be the first step to manage information of traditional architecture. In order to simulate traditional buildings in advanced and intelligent ways, we apply a computer technique, called data modeling. We develop a robust data model to effectively represent the building. For data modeling, we select a well-known building, Buseoksa Muryangsujun as a prototype, which is one of the oldest wooden structures in Korea. We first build an accurate three-dimensional model of the building, and then analyze its building components and their connectivity by focusing on the capital order system, called Gongpo. We also suggest a user interface model operated through the data model. The interface provides several components and functionality such as viewing each architectural component, simulating the components' connectivity interactively, and retrieving architectural information. The study shows a diagram of the wooden construction data model and some rules to explain components' connectivity, and a user interface model. This is currently being integrated into the KotaView system based on two environments: a web-based solid modeler(called WebMod) and a web-based VR engine (Active World™, EON™).

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1. Introduction

New trends for this millennium include both globalization and localization at the same time. The new paradigm of localization requires local and national identities that have frequently been ignored during the

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modern industrial era of the last decades. Finding national identities from its traditional heritages might be an important research issue. In Korea, having 5000-year history, both historic preservation and inheritance are deserved to important issues.

1.1. Korean context

Most Koreans believe that they did not have much time to explore and deeply understand their ancestors' works during the last decades. In fact, on traditional Korean architecture, it is noticed that its information has not been fully explored in a systematic or computational manner, and also is not shared efficiently. Information sharing might be, we believe, an essential part or at least the first step to understand traditional architecture. Currently, all but a few experts keep their knowledge exclusively and transfer it to few people in a limited and traditional manner.

One of the reasons is due to the inheriting way of traditional architecture relying on the traditional craftsman's man-to-man way, rather than a more systematic manner. So it is not so easy to approach the information of the traditional Korean architecture even for architecture students and building experts. Another reason is related to the problem of media with which the information is incorporated. Traditional Korean architecture is based on the wooden construction complicatedly assembled by prefabricated components (Fig. 1). But currently the media of most architectural information consist of two-dimensional drawings, inadequate to present prefabricated three-dimensional components. Two-dimensional drawings also have obvious limitations in describing the joints and relations among the com-

ponents, so it is almost impossible to understand at a glance the whole construction process only referring to them (Fig. 2).

1.2. An innovate way to learn traditional architecture

The ultimate purpose of the study is to classify the information of traditional Korean architecture in a systematic and computational manner in order to share the information efficiently. Even though the most popular approach to present visual information on the Internet is to use still images and animation clips, we take a different, yet innovative approach. In order to simulate traditional buildings in advanced and intelligent ways, we apply a computational technique, called data modeling. A data model means a conceptual model that includes a mechanism to fully describe a certain domain of data in a semantically fluent way.

Also we investigate efficient media forms to present the information of traditional buildings. We already described the problem of the current media for architectural information—two-dimensional drawings. Such a media as fully delivers three-dimensional data could solve the problem mentioned above. If the information of traditional Korean architecture is presented in and shared with three-dimensional data, it is very helpful to understand the building information and to communicate the architectural knowledge with others. Moreover, a design tool can be developed to generate new types of buildings. Finally, on this study, we aim to supply the core technology of managing information of traditional Korean architecture with a prototype system with an effective user interface and a robust data model.



Fig. 1. The construction process by assembling prefabricated components.

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