Chapter XVII
Urban and Architectural 3-D Fast Processing

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ABSTRACT

The main goal of this chapter is to present a research project that consists of applying automatic generative methods in design processes. The initial approach briefly explores early theoretical conjectures, starting with form and function balance within former conceptual investigations. The following experiments describe original techniques introducing integrated 2-D and 3-D generators for the enhancement of recent 3-D Earth browsers (Virtual Terrain©, MSN Virtual Earth©, or Google Earth©) and cellular-automata processes for architectural programmatic optimization.

INTRODUCTION

Present computer-aided design (CAD) tools should be able to assist the former exploration that leads the entire design process. However, present software often calls for an immediate actualization of geometrical intentions by forcing the user to use preset intentional clusters—geometric primitives, textural resources, design procedures—often uncompromising with poor intuitive feedback and generally restraining the imagination: “most of CAD software act like over-equipped hand-drafting assistants, assuming the maturity of the designer as much as the maturity of the project itself” (Chupin & Lequay, 2000).

We must quote Donald Shön, who remarks that research should concentrate on computer environments able to enhance the users ability to comprehend, store, manipulate, organize, and speculate over a project’s matter. Many research projects explored this concept, introducing new operating methodologies able to schematize introductory project investigations long before any possible geometric formalization.
What we aim to achieve is a computer-assisted generation process of architectural and urban plausible geometries. These self-generated objects are intended to act like imagination enhancers serving the conceptual exploration of architectural design or providing credible 3-D environments in given historical context. In the next step, this pre-object could not only be the completion of a multidisciplinary integration process, but, in an autonomous-evolution Darwinian paradigm, the actualization of the most efficient genotype.

Some of the research tasks depicted hereby take advantage of recent generative methods developed within the MAP-ARIA research team. They are able to quickly produce architectural and urban geometric simulations, bringing to life wide 3-D databases connected to some of the most recent 3-D terrain browsers (Virtual Terrain©, MSN Virtual Earth©, or Google Earth©).

INTRODUCING GENERATIVE PARADIGM

Form vs. Function

In architecture, a modern acceptance of spatial interdependencies states that form should rise from function. Since the architectural thought of Frank Lloyd Wright (1869-1959), Robert Mallet-Stevens (1886-1945), and Ludwig Mies van Der Rohe (1886-1969), enlightened by their sublime work, we have believed in such a Manichean dogma, which could be, to be simple, the main contrast to centuries of academism, and a brand new unrestricted field of investigation.

Conversely, most examples of classical architecture appear to be in complete conceptual opposition to recurring high-geometric prevalence regarding function. The question is obviously not

Figure 1. Villa Almerigo (also known as La Rotonda, 1567-1569) designed by Andrea Palladio (1508-1580; image: Renato Saleri Lunazzi)
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