

## BASIC CONCEPTS OF APPLYING KNOWLEDGE-BASED SYSTEMS TO USER INTERFACE DESIGN

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### Abstract

As the progress of new computer technology, the design of good user interfaces becomes more important because good user interfaces support good user-system interactions. Since modern computers are equipped with many innovative features, it requires tremendous cognitive skills and efforts for an interaction designer to represent these features in the user interfaces. This is because user interface design can be affected by many factors, such as the use of colors, symbols, icons, graphics, texts, textures, lines, borders for tangible or intangible interactions, and the consideration of space layout. Very often, when designing a user interface, an interaction designer may not be able to handle all these factors at one time. This paper provides a new perspective on the meaning of user interface design in terms of knowledge-based systems (KBSs). KBSs can be used to simulate an interaction designer's problem-solving, decision-making, and design-reasoning processes. The application of KBSs can help an interaction designer incorporate all the complex user interface design factors and create easy-to-use user interfaces. In some sections of this paper, discussions about KBSs derived from Coyne et al.'s perspectives are provided.

In this paper, the authors first emphasize the concept of design knowledge and knowledge representation in developing KBSs. They then discuss the concepts of declarative knowledge vs. procedural knowledge, and specific knowledge vs. general knowledge. The authors also introduce three important concepts of building a knowledge-based model for user interface design, i.e., representation, reasoning, and syntax. In the end, they also explain that expert systems are the working systems of KBSs and further describe the concepts of design abstraction and design evaluation. It is hoped that in the coming future interaction designers can utilize KBSs to help create better user interfaces so that when users interact with the system, they can obtain a more pleasant and enjoyable experience.

### Keywords

Knowledge-based system, Design knowledge, Knowledge representation, Design reasoning, Syntax, Expert system

## Bridging Real World and Shared Virtual Space

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### Abstract

In this paper we propose a new method to link the real world with the related shared virtual three-dimensional space in real-time fusion.

We also have developed a system to realize the proposed method. The evaluation of the performance of the system is also reported in this paper.

We use VRML to construct three-dimensional model of the real world in the shared virtual space. We extended VRML so that it could obtain real-time sensor data concerning 3D coordinate and posture of the real world objects.

The extended system is called Interactive VRML below. Using Interactive VRML system, we have developed a virtual museum of an existing real museum. The movement of real objects of the real existing museum is reflected to the corresponding virtual object of the virtual museum in real-time fusion.

The real-time interaction between the real world objects and the corresponding virtual objects in the shared virtual space is the significantly demanded property in digital cities, which are regarded as the promising next generation social information infrastructure.

### Keywords

Interactive VRML, Digital City, 3D Virtual Space, Real-Time