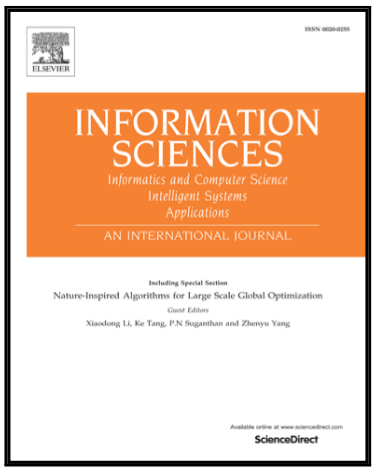

An HCI Paradigm Fusing Flexible Object Selection and AOM-based Animation

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Abstract: The use of three-dimensional (3D) gesture input devices is important and necessary in 3D systems, but such devices face considerable challenges posed by the high dimensionality of dexterous hand motion. The objective of this study is to achieve real-time interaction in object selection and direct manipulation in 3D application systems by capturing and visualizing the interaction intentions and probing the cognitive behavior models of users. An interactive operation procedure is divided into three stages: object selection, manipulation and reset. Trajectory scene interaction (TSI) is proposed for object selection starting from a fixed position called a forward point (FP). The manipulations exerted on the selected object include grasping and translation. After these manipulations, the gesture is reset to the FP. This work offers four novel contributions. First, flexible object selection and atomic operation model (AOM)-based animations are fused to form a uniform, real-time human-computer interaction (HCI) paradigm. Second, a cognitive behavior model is proposed for recognizing and reacting to hand gestures as captured by a monocular camera. Third, an approach to capturing, expressing, and probing a user's interaction intention is presented. Fourth, a 3D real-time gesture input interface is achieved. The use of the proposed HCI interface, which offers fast speed, satisfactory accuracy and a responsive user experience, is demonstrated in virtual assembly, a game of chess, dialing a cell phone number and menu operation.

CR Categories: H.5.2 user interfaces (D.2.2, H.1.2, I.3.6)

Keywords: gestural UI, 3D human–computer interaction, freehand tracking, user interface

1. INTRODUCTION

Touching, picking up and manipulating objects are the main ways in which humans interact with the physical world. From the moment we are born, we learn to manipulate objects around us using our hands.