全球資訊網上分散虛擬實境環境下操作容積的手術模擬

Distributed Virtual Environment for Volume Based Surgical Simulation Via The World Wide Web

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摘要

外科醫師的教育及訓練耗時，因少有機會去對病患做練習。因此我們提出一低價、全球資訊網上可廣被使用的分散虛擬實境架構。在此架構，從伺服器下載的網頁驅動顧客端的虛擬實境用輸出輸入裝置，讓使用者能浸於虛擬環境中。這有別於傳統的伺服器需負責大部分工作及裝置的方法。為實現這構想，我們用全球資訊網這媒介驅動顧客端的裝置。我們著眼於以容積為基礎的手術模擬應用，這通常被認為需大量計算及使用高價電腦。但我們系統使用個人電腦及全球資訊網去達到分散虛擬環境的目的。本論文介紹手術模擬、同質面重建及立體顯像的演算法，和伺服器與顧客端合作的方法，也展示一個骨骼肌肉的手術模擬例。

Abstract

Educating and training a surgeon requires much time because a surgeon has few opportunities to rehearsal surgical modalities on patients. This study proposes a low-cost and widelyavailable distributed VR architecture via the WWW to solve this problem. In this architecture, Web pages from the server drive VR I/O devices on clients to enable users to immerse in avirtual environment. This process is different from the conventional approach that the server is responsible for most works and devices. Methods of driving the devices on clients and beingcalled by the Web page are introduced herein. This paper focuses on the application of volume based surgical simulations that is usually considered involving much computation and expensive workstations. A system that uses PC platforms and the WWW media was built to support the distributed VR surgical simulation. This paper introduces the algorithms for surgical simulation, isosurface reconstruction and rendition, and the methods by which clients can cooperate with the server. A simulation example of musculoskeletal surgery is present.