建立數位遊戲本體導向知識庫應用於認知復健

Ontology-Oriented Digital Game Knowledge Base Applied on Cognitive Rehabilitation

中文摘要

數位遊戲富有與生俱來的引人特質，其多樣化的種類與數量似乎在治療的應用上有著無限的潛力。綜觀現有的遊戲分類與職能治療活動分析方式，並不完全適合或足夠讓職能治療師從治療的觀點來擷取治療活動所需的遊戲元件，也沒有和數位遊戲設計領域共通的溝通詞彙，來分享與累積數位遊戲應用的臨床知識。

本研究之目的在以本體論為基礎，建構一個「數位遊戲治療知識本體」，用以分析現有的數位遊戲，再將分析後具有治療意義的遊戲元件知識實例儲存在該本體之中。並以職能治療認知訓練項目為例，評估此本體知識庫應用在臨床，提供治療師選擇個案適用之遊戲元件建議的可行性。

藉由 Prot?g?軟體，研究結果建構出一個結合職能治療與數位遊戲知識本體之「數位遊戲治療知識本體」。並利用知識本體架構中多重繼承的關係，以及反轉屬性的連結，將知識實例在兩領域知識本體間互相對應。從臨床治療師的問卷結果得知，此本體知識庫能合理地分析、儲存、連結，並擷取出知識實例，提供給治療師在安排臨床認知復健活動時參考。但因知識庫所收集的知識實例較少、治療師對於新分類法的不熟悉，以及缺乏詳細定義的共通知識敘述格式，知識庫中的知識實例並不具有臨床建議的效度。

研究結果所建立的職能治療知識本體，將可重複應用在未來職能治療專業領域的研究之中，例如應用於其他治療媒介分析、臨床路徑選擇的知識本體建構過程中，或是作為專業知識的資訊分析基礎。數位遊戲知識本體則能提供治療師一個完整的遊戲內容與遊戲互動模式的概念，作為遊戲活動分析時的參考。在本體知識庫臨床應用之前，仍需要更多領域專家在知識本體的深度、完整性與專業知識共通的描述法上繼續努力，以符合臨床的需求並便於普及。

英文摘要

The innate fascination and variety of digital games seem to possess infinite potential for rehabilitation applications. Though there are different kinds of classification methods for games, they are not tailored for occupational therapists to choose proper therapeutical elements of games by the traditional activity analysis process. Also, there is no common vocabulary between therapists and game designers for sharing and accumulating knowledge of clinical applications of games.

The purpose of this study was to construct a digital game-therapy ontology for analyzing digital games and storing their therapeutical components analyzed as instances of this knowledge base. Six common cognitive components were chosen as example queries for occupational therapy. The knowledge base was examined by the therapists with choosing therapeutical components of games for their clients to verify the applicability of the ontology for clinical use.

The knowledge base was built on Prot?g?. The author combined two modified ontologies, the occupational therapy ontology and the game ontology, to establish the digital game-therapy ontology. Taking advantage of the multiple inheritances and inverse slots in the ontology logic, the instances of these two ontologies were connected. Judging by the questionnaire responses answered by the clinical occupational therapists who helped in the evaluation of the ontology, the knowledge content, which could be analyzed, stored, linked, and retrieved in this ontology-oriented knowledge base, was reasonably chosen and organized for clinical applications. However, the knowledge instances built in this study were not suitable for real clinical decision making, because of the small sample size, the unfamiliarity of terminology for therapists, and the insufficiency and under-standardized knowledge expressions.

The results of this study provide a reusable ontology structure and could be used, for example, in the knowledge construction of other intervention modalities or clinical pathways in occupational therapy. And it offers therapists an integrated concept of digital games for game analysis. Before widely applying the knowledge base to clinical knowledge acquisition and decision support, it still needs domain experts to engage in the studies to improve the depth and integrity of the ontology and the normalization of clinical knowledge expression.