行政院國家科學委員會補助專題研究計畫成果報告

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※應用人工智慧技術於知識管理系統以提升知識管理: 以整合醫療 ※
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計畫主持人：黃木榮

共同主持人：黃華山

執行單位：彰化師範大資訊管理學系（所）

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行政院國家科學委員會補助專題研究計畫成果報告

應用人工智慧技術於知識管理系統以提升知識管理：以整合醫療知識為例

Applying Artificial Intelligence (AI) Techniques to Knowledge Management Systems (KMS) for Advancing Knowledge Management: the Example of Integrating Medical Treatment knowledge

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共同主持人：黃華山　　彰化師範大學資訊管理學系（所）

計畫參與人員：李秀琴、廖小卷　　彰化師範大學資訊管理學系（所）

一、 中文摘要

知識經濟是企業競爭力的關鍵要素，更是企業未來的價值所在。然而與勞力、資本不同的是，知識是無形的、難以量化的，如何有效地「管理」知識成了企業的當務之急。知識管理被定義為「從組織的無形資產去創造價值的程序」。無論是在知識的分享、知識的轉換以及使組織成為有知識的組織上，應用人工智慧技術都有助於知識管理的提升。因此，本研究嘗試應用人工智慧技術於知識管理系統以提升知識管理，並以整合醫療知識為例。本研究將設計一個整合醫療知識管理系統模式。為了整合醫療知識的目的，本模式引用了人工智慧技術，譬如資料挖礦 (Data mining)、個案基礎推理 (Case-Based Reasoning; CBR)。本模式主要包含以下功能：(1) 收集和儲存知識，(2) 以人工智慧技術來開創知識，(3) 分享與擴散知識，(4)有效的管理與使用知識。本研究計劃以雛型法(Prototyping)來驗證有效性。

關鍵詞：人工智慧 (Artificial Intelligence; AI)、知識管理系統（KMS）、資料挖礦 (Data mining)、案例式推理(Case-Based Reasoning; CBR),

Abstract

Knowledge is a critical factor in organizational competitiveness and also the future value of an organization. Nevertheless, knowledge is intangible and difficult to be measured. Therefore, how to manage knowledge, knowledge management (KM), is the key for success to an organization. In looking at ways for sharing knowledge, transforming individual knowledge into organizational knowledge, and reincarnating organizations into knowledge organizations, the techniques of artificial intelligence (AI) can help push these basic

tenets of knowledge management. A knowledge management system (KMS) provides a way of formalizing and automating knowledge. One of the major challenges in medical domain is the extraction of comprehensible knowledge from medical data. How to effectively share experts' knowledge (or experience) is another important issue in medical treatment. Therefore, this study is trying to apply AI techniques to KMS for medical treatment. For the purpose of integrating medical treatment knowledge and improving the performance of medical treatment, this study adopts several AI techniques such as data mining and case-based reasoning (CBR). Prototyping is used for testing and validating.

Keywords: Artificial Intelligence (AI), Knowledge Management Systems (KMS), Data mining, Case-Based Reasoning (CBR)

二、緣由與目的

Over the years, however, there has been a growing interest in treating knowledge as a significant organizational source. Knowledge is a critical factor in organizational competitiveness and also the future value of an organization. Nevertheless, knowledge is intangible and difficult to be measured. Therefore, how to manage knowledge, knowledge management (KM), is the key for success to an organization. Consistent with the interest in organizational knowledge and KM, information systems (IS) researchers have begun promoting a class of IS, referred to as KMS.

KMS that refer to a class of information systems applied to managing organizational knowledge have been defined as "an emerging line of systems (which) target professional and managerial activities by focusing on creating, gathering, organizing and disseminating an organization's "knowledge " as opposed to "information" or "data" [1, 2]. The objective of KMS is to support create, transfer, and application of knowledge in organizations [1]. It has been observed that KMS currently underway at most organizations fall into three categories [2]:

1). Educational KMS. To elicit and catalog tacit knowledge, at the same time they serve as educational tools.
2). Problem-solving KMS. Organizations with significant intellectual capital require eliciting and capturing knowledge for reuse in solving new problems as well as recurring old problems.
3). Knowledge repositories. The majority of the KMS in place. Knowledge repositories themselves fall into three categories. The first category attempts to catalog organizational knowledge that exits in explicit form, for example a system to store marketing-oriented documents. A second category attempts to develop databases of employees' insights and observations, for example, discussion databases or lessons-learned systems. And finally, the third category is known as knowledge yellow pages, are repositories that attempt to manage knowledge by holding pointers to experts who possess specific knowledge within an organization.

In looking at ways for sharing knowledge, transforming individual knowledge into organizational knowledge, and reincarnating organizations into knowledge organizations, the techniques

of artificial intelligence (AI) can help push these basic tenets of knowledge management. One of the major challenges in medical domain is the extraction of comprehensible knowledge from medical data. How to effectively share experts' knowledge (or experience) is another important issue in medical treatment. Therefore, this study is trying to apply AI techniques to KMS for medical treatment. For the purpose of integrating medical treatment knowledge and improving the performance of medical treatment, this study adopts several AI techniques such as data mining and case-based reasoning (CBR). Prototyping is used for testing and validating.

三、結果與討論

Many organizations are developing KMSs to facilitate the sharing and integrating of knowledge. As organizational knowledge is derived from individual knowledge, KMSs must support for acquiring, organizing, creating, and communicating both explicit and tacit knowledge [3]. The development of KMS demands that knowledge,be obtained, produced, shared, regulated, and leveraged by a steady conglomeration of individuals processing information technology applications and a knowledge-sharing organizational culture. The AI techniques, such as data mining, CBR, EBL, SBL, and so on, could be deployed in the KMS and operated in integration or individual to improve the performance of KMS.

One of the major challenges in medical domain is the extraction of comprehensible knowledge from medical data. How to effectively share experts' knowledge (or experience) is another important issue in medical treatment. Therefore, this study is trying to deeply discuss the operation of applying the techniques of data mining and CBR in the KMS for medical treatment and build a prototype named "the chronic disease prognosis and diagnosis system" for testing the feasibility of applying AI techniques in the KMS. The reasoning results of the system display very helpful for supporting the treatments of the new case's problems because the case retrieved from the case library is most similar with the new case and the treatments of the retrieved case were successful and had been confirmed.

四、計畫成果自評

The content of this study is almost 100 % consistent with the planning content of the original proposal. This study deeply discuss the operation of applying the techniques of data mining and CBR in the KMS for medical treatment and build a prototype named "the chronic disease prognosis and diagnosis system" for testing the feasibility of applying AI techniques in the KMS. The reasoning results of the system display very helpful for supporting the treatments of the new case's problems because the case retrieved from the case library is the most similar with the new case and the treatments of the retrieved case were successful and had been confirmed. This study is supposed to be with high academic and application value, so we are going to submit the content of this study to the international Journal of Information Management (SSCI).

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