

整合資訊檢索與醫學本體論之 SARS 知識管理系統

An Ontology-Based Medical Information Retrieval System for SARS Knowledge Management

中文摘要

醫學資訊散佈於期刊文獻、各類資料庫與病患的病歷之中，當臨床醫療人員面臨疾病的診斷、治療、預防與研究工作時，需要掌握整合且充足的資訊，尤其當面對急性傳染病時，臨床醫師需要完整且正確的資訊，才能及時地做出適當地診斷與治療的決策。

本研究以嚴重急性呼吸道症候群 (Severe Acute Respiratory Syndrome, SARS) 為主題，建置以本體論為基礎的 SARS 知識管理系統 (Ontology-based SARS KMS)，整合四種 SARS 相關的資料來源：生物醫學文獻、電子病歷、醫院標準作業程序與新聞。並依據三種資訊檢索模型 (Information Retrieval Model)：向量空間模型(Vector Space Model, VSM)、隱藏式馬可夫模型(Hidden Markov Model, HMM)以及主題式混合模型(Topical Mixture Model, TMM)應用於生物醫學領域的效果，建立知識管理系統的資訊檢索功能，用以協助臨床醫療人員快速地檢索到和病人真正相關的資訊。

另一方面，當新興疾病爆發時，大多數的臨床醫療人員通常對於疾病沒有充足的知識，因此會不清楚該用什麼關鍵字來檢索，而造成檢索不到任何結果或找不到相關的資訊，為了解決這樣的問題。本研究應用由胸腔科醫師所建置的 SARS Ontology，設計查詢擴展(query expansion)程序，將使用者的查詢展開為更多相關的關鍵字來進行檢索，並透過相關回饋(relevance feedback)輔助臨床醫療人員逐漸檢索到準確的資訊。

本研究以 SARS 為主題，應用本體論結構涵蓋 SARS 相關的生物醫學、疾病診斷、流行病學、管理和症狀等知識，並應用於資訊檢索上，用以幫助臨床醫療人員從生物醫學文獻、電子病歷、醫院標準作業程序與新聞中，獲得 SARS 相關的資訊。運用相同的概念與方法，經過適度的修正與調整後，可以將研究架構應用至其他的疾病主題上。

英文摘要

Medical information exists in scientific literatures, various databases, and patient data in the form of medical records, images and laboratory test reports, etc.

Sufficient information is important for clinician to complete the jobs such as disease diagnosis, treatment, prevention and research. This research is focused on the topic of severe acute respiratory syndrome (SARS) and the knowledge management system named Ontology-based SARS KMS has been developed to integrate SARS related data resources including biomedical literature, electronic medical records

(EMR), standard operating procedures (SOP) in a public hospital, and news reports. In addition, the performances of three information retrieval (IR) models: Vector Space Model (VSM), Hidden Markov Model (HMM), and Topical Mixture Model (TMM) for biomedical information retrieval were studied to design an IR procedure incorporated in the Ontology-based SARS KMS.

For a new disease breaking out, most clinicians don't have enough disease related knowledge so that they may not use correct keywords for searching. To solve this problem, the SARS Ontology structure was applied to design the query expansion procedure, which can expand user's query to include more related keywords to help them find relevant information.

In conclusion, this research used the ontology structure to cover the SARS related knowledge including biomedicine, diagnostics, epidemiology, management, and syndrome and applied IR methods to help clinical personnel retrieve information from biomedical literature, EMR, SOP, and news reports. Although this research is focused on the SARS topic, the same concepts and procedures with proper modification can also be applied to other diseases.