# 以知識庫為基礎的個人化資訊推薦系統之研究

## 戴偉勝、陳振東

E-mail: 9020016@mail.dyu.edu.tw

### 摘要

網際網路所擁有的無遠弗屆傳播能力,讓使用者能以更有效與快速的方式取得各種資訊。然而,網際網路上急遽增加的資料量,卻讓使用者面臨資訊過載所帶來的種種困擾。為此,資訊推薦的應用提供了一個解決之道,透過資訊擷取技術的協助,使用者將可在豐富的網路資源中取得所需的資訊。 現今電子商務業者紛紛提出個人化服務,希望藉此增加業者與消費者間的雙向互動以提高經營績效與競爭力。為此,本研究利用模糊擷取與相似度衡量技術建立個人化資訊服務的推薦架構,以作為資訊推薦系統設計的基礎。藉由個人化資訊推薦系統將可以有效地讓使用者獲得有興趣以及真正符合需求的資訊;同時讓電子商務業者更能掌握消費者個別需求的差異,進而提供更好的資訊服務。

關鍵詞:資訊推薦、資訊擷取、個人化服務、相似度衡量

#### 目錄

第一章 緒論--P1 第一節 研究背景--P1 一、網際網路的興盛--P1 二、網路工具的發展--P1 三、個人化服務--P3 第二節 研究動機--P4 第三節 研究目的--P5 一、資訊分類--P5 二、資訊推薦與評估--P5 三、電子商務應用--P5 第四節 研究範圍--P6 第五節 研究流程--P6 第二章 文獻探討--P8 第一節 推薦代理器--P8 一、代理器特性--P8 二、推薦代理器的類型--P10 三、推薦代理器系統架構--P12 第二節 模糊資訊擷取--P15 一、萃取專有名詞--P16 二、調整專有名詞權重--P17 第三節 相似度衡量方法與比較--P19 一、相似度衡量方法--P19 二、相似度衡量方法的比較分析--P22 第四節 分類知識庫--P33 一、知識庫--P33 二、知識取得--P35 三、知識彙總--P35 四、知識表達--P37 第三章 資訊推薦系統架構--P39 第一節 專有名詞權重的調整方式--P39 第二節 調整後的相似度衡量方法--P40 第三節 個人化資訊推薦系統--P41 第四節 滿意度評估方法--P43 第四章 系統設計與實證分析--P45 第一節 系統開發環境與工具--P45 第二節 系統架構說明--P45 一、資訊推薦網站--P45 二、資訊推薦主系統--P46 第三節 實驗流程與結果--P51 第四節 問題探討--P66 一、資料樣本內容過短--P66 二、網頁樣本以財經方面較多--P67 三、專有名詞向量個數的取捨--P67 第五章 結論與建議--P68 第一節 結論--P68 第二節 後續研究建議--P69 一、分類知識庫的自我學習--P69 二、使用者偏好調整--P70 三、中文的斷詞--P70 參考文獻--P71

#### 參考文獻

- [1] 陳稼興、謝佳倫、許芳誠 , "以遺傳演算法為基礎的中文斷詞研究" , 資訊管理研究 , 第二卷 , 第 二期 , 2000 , 27-44頁。
- [2] ADALI, S. AND V. S. SUBRAHMANIAN, "AMALGAMATING KNOWLEDGE BASES, III: ALGORITHMS, DA -TA STRUCTURES, AND QUERY PROCESSING," THE JOURNAL OF LOGIC PROGRAMMING, VOL.28, ISS -UE: 1, 1996, PP.45-88.
- [3] ADORF, H. M., "RESOURCE DISCOVERY ON THE INTERNET," VISTAS IN ASTRONOMY, VOL.39, ISS -UE: 2, 1995, PP.243-253.
- [4] BOGONIKOLOS N., D. FRAGOUDIS AND S. LIKOTHANASSIS, "ARCHIMIDES: AN INTELLIGENT AGENT FOR ADAPTIVE-PERSONALIZED NAVIGATION WITH WEB SERVER," SYSTEM SCIENCE, PROCESSING OF THE 32ND ANNUAL HAWAII INTERNATIONAL CONFERENCE, 1999, PP.1-9.
- [5] BROGLIO, J., J. P. CALLAN, W. B. CROFT AND D. W. NACHBAR, "DOCUMENTS RETRIEVAL AND RO -UTING USING THE INQUERY SYSTEM," PROCEEDINGS OF THE THIRD TEXT RETRIEVAL CONFERENCE, NIST SPECIAL PUBLICATION, 1995, PP 20-38
- [6] BUM, R. Y., J. Y. JAE AND D. K. SOO, "COPEN: A COBRA-BASED INTELLIGENT PUSH-ENGINE," SOFTWARE ENGINEERING CONFERENCE IN ASIA PACIFIC, 1998, PP.330-337.
- [7] BUCKLEY, C., J. ALLAN, G. SALTON AND A. SINGHAL, "AUTOMATIC QUERY EXPANSION USING SMA-RT," PROCEEDINGS OF THE THIRD TEXT RETRIEVAL CONFERENCE, NIST SPECIAL PUBLICATION, 1995, PP.69-80.
- [8] BOWMAN, C. M., P. B. DANZIG, U. MANBER AND M. F. SCHWARTZ, "SCALABLE INTERNET RESOUR -CE DISCOVERY RESEARCH PROBLEMS AND APPROACHES," COMMUNICATIONS OF THE ACM, VOL.37, NO.8, 1994, PP.98-107.
- [9] CHANG, C. H. AND Y. CHEN, "AUTONOMOUS INTELLIGENT AGENT AND ITS POTENTIAL APPLICATIO -NS," COMPUTERS & INDUSTRIAL ENGINEERING, VOL.31, ISSUE: 1-2, 1996, PP.409-412.
- [10] CHEN, C. T., "EXTENSIONS OF THE TOPSIS FOR GROUP DECISION-MAKING UNDER FUZZY ENVIRON -MENT," FUZZY

- SETS AND SYSTEMS, VOL.114, ISSUE: 1, 2000, PP.1-9.
- [11] CHEN, S. M., M. S. YEH AND P. Y. HSIAO, "A COMPARISON OF SIMILARITY MEASURES OF FUZZY VALUES," FUZZY SETS AND SYSTEMS, VOL.72, ISSUE: 1, 1995, PP.79-89.
- [12] CHEN, S.M., "A NEW APPROACH TO HANDING FUZZY DECISION MAKING PROBLEMS," IEEE TRANS. SYSTEMS, MAN, CYBERNETICS, VOL.18, 1988, PP.1012-1016.
- [13] CHEN, H. C., Y. M. CHUNG AND C. C. YANG, "AN INTELLIGENT PERSONAL SPIDER (AGENT) FOR DYNAMIC INTERNET/INTRANET SEARCHING," DECISION SUPPORT SYSTEMS, VOL.23, ISSUE: 1, 1998, PP.41-58.
- [14] CHEUNG, D. W., B. KAO AND J. LEE, "DISCOVERING USER ACCESS PATTERN ON THE WORLD WIDE WEB," KNOWLEDGE-BASED SYSTEMS, VOL.10, 1998, PP.463-470.
- [15] ETZIONI O. AND D. S. WELD, "INTELLIGENT AGENTS ON THE INTERNET: FACT, FICTION, AND FO -RECAST," IEEE EXPERT, VOL.104, 1995, PP.44-49.
- [16] FRAGOUIDIS D. AND S. D. LIKOTHANASSIS, "RETRIEVER: A SELF-TRAINING AGENT FOR INTELLIG -ENT INFORMATION DISCOVERY," INFORMATION INTELLIGENT AND SYSTEMS INTERNATIONAL CONFER -ENCE, 1999, PP.594-599.
- [17] GERSTENKORN, T. AND J. MAN'KO, "CORRELATION IF INTUITIONISTIC FUZZY SETS," FUZZY SETS AND SYSTEMS, VOL.44, 1991, PP.39-43.
- [18] GREY E., P. M. BERANEK AND P. THOMAS," AN INTELLIGENT AGENT COMMUNITY APPROACH TO KNO -WLEDGE SHARING," DECISION SUPPORT SYSTEMS, VOL.20, 1997, PP.83-98.
- [19] HAL B., "CYBERSPACE 2000 DEALING WITH INFORMATION OVERLOAD," COMMUNICATIONS OF THE AC -M, VOL.40, NO.2, 1997, PP.19-24.
- [20] HAMILTON, D. M., "KNOWLEDGE ACQUISITION FOR MULTIPLE SITE, RELATED DOMAIN EXPERT SYST -EMS: DELPHI PROCESS AND APPLICATION," EXPERT SYSTEMS WITH APPLICATIONS, VOL.11, ISSU -E: 3, 1996, PP.377-389.
- [21] HAMMER, P. L. AND K. ALEXANDER, "ESSENTIAL AND REDUNDANT RULES IN HORN KNOWLEDGE BASE -S," DECISION SUPPORT SYSTEMS, VOL.16, ISSUE: 2, 1996, PP. 119-130.
- [22] HONG, D. H., "A NOTE ON CORRELATION OF INTERVAL-VALUED INTUITIONISTIC FUZZY SETS," FU -ZZY SETS AND SYSTEMS, VOL.95, ISSUE: 1, 1998, PP.113-117.
- [23] HYUNG, L. K., Y. S. SONG AND K.M. LEE, "SIMILARITY MEASURE BETWEEN FUZZY SETS AND BET -WEEN FUZZY ELEMENTS," FUZZY SETS AND SYSTEMS, VOL.62, 1994, PP.291-293.
- [24] JIULUN, F. AND W., XIE, "SOME NOTES ON SIMILARITY MEASURE AND PROXIMITY MEASURE," FUZ -ZY SETS AND SYSTEMS, VOL.101, ISSUE: 3, 1999, PP.403-412.
- [25] KAZEM, S. Z., "FUZZY GENOMES," ARTIFICIAL INTELLIGENCE IN MEDICINE, VOL.18, ISSUE: 1, 2000, PP.1-28.
- [26] KIM, J. G. AND E. S. LEE, "INTELLIGENT INFORMATION RECOMMEND SYSTEM ON THE INTERNET," PARALLEL PROCESSING INTERNATIONAL WORKSHOP, 1999, PP.376-380.
- [27] KLIR, G. J. AND B. YUAN, FUZZY SETS AND FUZZY LOGIC: THEORY AND APPLICATIONS, PRENTIC -E HALL, 1995.
- [28] LEVY, A. Y. AND M. C. ROUSSET, "VERIFICATION OF KNOWLEDGE BASES BASED ON CONTAINMENT CHECKING," ARTIFICIAL INTELLIGENCE, VOL.101, ISSUE: 1-2, 1998, PP.227-250.
- [29] LIANG, T. P. AND J. S. HUANG, "A FRAMEWORK FOR APPLYING INTELLIGENT AGENTS TO SUPPORT ELECTRONIC TRADING," DECISION SUPPORT SYSTEMS, VO.28, ISSUE: 4, 2000, PP.305-317.
- [30] LIU, S. H., "BUSINESS ENVIRONMENT SCANNER FOR SENIOR MANAGERS: TOWARDS ACTIVE EXECUTI -VE SUPPORT WITH INTELLIGENT AGENTS," EXPERT SYSTEMS WITH APPLICATIONS, VOL.15, ISSUE: 2, 1998, PP.111-121.
- [31] MAK, B., "AGGREGATING AND UPDATING EXPERTS' KNOWLEDGE: AN EXPERIMENTAL EVALUATION OF FIVE CLASSIFICATION TECHNIQUES," EXPERT SYSTEMS WITH APPLICATIONS, VOL.10, ISSUE: 2, 1996, PP.233-241.
- [32] MATSUURA S., J. OZAWA, S. ARAKI AND T. IMANAKA, "AN EXTENSION OF ECA ARCHITECTURE AND ITS APPLICATION TO HTML DOCUMENT BROWSING," SYSTEMS, MAN, AND CYBERNETICS IEEE INTERN -ATIONAL CONFERENCE, VOL.1, 1999, PP.738-743.
- [33] MATTTHEW C., K. RODDEN AND D. BRODBECK, "THE ORDER OF THINGS: ACTIVITY-CENTERED INFOR -MATION ACCESS," COMPUTER NETWORK AND ISDN SYSTEMS, VOL.30, 1998, PP.359-367.
- [34] NOH, J. B., K. C. LEE, J. K. KIM, J. K. LEE, S. H. KIM, "A CASE-BASED REASONING APPRO -ACH TO COGNITIVE MAP-DRIVEN TACIT KNOWLEDGE MANAGEMENT," EXPERT SYSTEMS WITH APPLICA -TIONS, VOL.19, ISSUE: 4, 2000, PP.249-259.
- [35] OUDERKIRK, J. P., "TECHNICAL SERVICES TASK ASSIGNMENT: FROM MACROS TO COLLECTION MANA -GEMENT INTELLIGENT AGENTS," THE JOURNAL OF ACADEMIC LIBRARIANSHIP, VOL.25, ISSUE: 5, 1999, PP.397-401.
- [36] ROBERTSON, S. E., S. WALKER, S. JONES, M. M. HANCOCK-BEAULIEU, AND M. GATFORD, "OKAPI," PROCEEDINGS OF

- THE THIRD TEXT RETRIEVAL CONFERENCE, NIST SPECIAL PUBLICATION, 1995, PP.109-126.
- [37] SALTON, G., "ANOTHER LOOK AT AUTOMATIC TEXT-RETRIEVAL SYSTEMS," COMMUNICATIONS OF THE ACM, VOL.29, NO.7, 1986, PP.648-656.
- [38] SALTON, G. AND C. BUCKLEY, "PARALLEL TEXT SEARCH METHODS," COMMUNICATIONS OF THE ACM, VOL.31, NO.2, 1988, PP.202-215.
- [39] SEOYOUNG P. AND C. WU, "INTELLIGENT SEARCH AGENT FOR SOFTWARE COMPONENTS," SOFTWARE E NGINEERING CONFERENCE SIXTH ASIA PACIFIC, 1999, PP.154-161.
- [40] SINGHAL, A., G. SALTON AND C. BUCKLEY, "DOCUMENT LENGTH NORMALIZATION," INFORMATION PROCESSING & MANAGEMENT, VOL.32, NO.5, 1996, PP.619-633.
- [41] STEELS, L., "WHEN ARE ROBOTS INTELLIGENT AUTONOMOUS AGENTS?" ROBOTICS AND AUTONOMOUS SYSTEMS, VOL.15, ISSUE: 1-2, 1995, PP.3-9.
- [42] SUN W. AND C. C. LIAO, "VIRTUAL PROXY SERVER FOR WWW AND THE INTELLIGENT AGENT ON THE INTERNET," SYSTEM SCIENCE, PROCESSING OF THE 30TH ANNUAL HAWAII INTERNATIONAL CONFERE -NCE, VOL.4, 1997, PP.200-209.
- [43] TAK, W. Y, J., MATTEW, G. M., HECTOR AND D., UMESHWAR, "FORM USER ACCESS PATTERN TO DYNAMIC HYPERTEXT LINKING," COMPUTER NETWORK AND ISDN SYSTEMS, VOL.28, 1996, PP.1007- 1014.
- [44] TOLL, D. G. AND A. GIOLAS, "REPRESENTING GEOTECHNICAL PROPERTIES IN A KNOWLEDGE-BASED SYSTEM," ADVANCES IN ENGINEERING SOFTWARE, VOL.29, ISSUE: 7-9, 1998, PP.627-636.
- [45] TU, H. C. AND H. JIEH, "AN ARCHITECTURE AND CATEGORY KNOWLEDGE FOR INTELLIGENT INFORM -ATION RETRIEVAL AGENTS," DECISION SUPPORT SYSTEMS, VOL.28, ISSUE: 3, 2000, PP.255- 268.
- [46] TUNG, B. AND J. LEE, "AN AGENT-BASED FRAMEWORK FOR BUILDING DECISION SUPPORT SYSTEMS, " DECISION SUPPORT SYSTEMS, VOL.25, 1999, PP.225-237.
- [47] WALCZAK, S., "KNOWLEDGE ACQUISITION AND KNOWLEDGE REPRESENTATION WITH CLASS: THE OBJE -CT-ORIENTED PARADIGM," EXPERT SYSTEMS WITH APPLICATIONS, VOL.15, ISSUE: 3-4, 1998, PP.235-244.
- [48] WANG, C. H., "SELF-INTEGRATING KNOWLEDGE-BASED BRAIN TUMOR DIAGNOSTIC SYSTEM," EXPERT SYSTEMS WITH APPLICATIONS, VOL.11, ISSUE: 3, 1996, PP.351-360.
- [49] WANG, W. J., "NEW SIMILARITY MEASURES ON FUZZY SETS AND ON ELEMENTS," FUZZY SETS AND SYSTEMS, VOL.85, ISSUE: 3, 1997, PP.305-309.
- [50] WU, X. D., "EXPLICIT SCHEMATIC INFORMATION IN KNOWLEDGE REPRESENTATION AND ACQUISITIO -N," EXPERT SYSTEMS WITH APPLICATIONS, VOL.15, ISSUE: 3-4, 1998, PP.215-221.
- [51] YANG, C. C., J. YEN AND H. C. CHEN, "INTELLIGENT INTERNET SEARCHING AGENT BASED ON HY -BRID SIMULATED ANNEALING," DECISION SUPPORT SYSTEMS, VOL.28, ISSUE: 3, 2000, PP.2