

An Expert System for Advising Undergraduate Students

Omankwu, Obinnaya Chinecherem, and Nwagu, Chikezie Kenneth,

**¹Computer Science Department,
Michael Okpara University of Agriculture, Umudike
Umuahia, Abia State, Nigeria
*saintbeloved@yahoo.com***

**² Computer Science Department,
Nnamdi Azikiwe University, Awka
Anambra State, Nigeria,
*Nwaguchikeziekeneth@hotmail.com***

ABSTRACT

Academic advising of the undergraduate students is playing a fundamental role and is one of the most important responsibilities for the academic staff in most of the leading universities. The expert system is considered as one of most achievement area in artificial intelligence. This research was motivated by the idea that successfully being able to develop an academic advisory system of this nature, will increase the breadth and scope of students and academic staff problems solved, and subsequently academic activities can successfully be achieved to an excellent level in the university learning process. However, the performance of any advisory system will be limited by the quality of the gained knowledge (i.e., knowledge acquisition). The aim of this research is to propose an expert system for advising undergraduate students in higher education institute; in pursuance of developing an expert system, dedicated for undergraduate students academic advising. The output of the system also provides the undergraduate students proposal courses that are precise and non-conflict, working as an advisor; it gives the undergraduate student a plan and advisee with the appropriate subjects according to the courses that have been taken, prerequisites, and project scope if it is already determined by him/her with the explanation. The Empirical results show that the implementation of proposed model for undergraduate advisory expert system leads to a significant improvement in performance.

Keywords: Rule-Based Expert System, Knowledge Acquisition, Knowledge Base.

INTRODUCTION

The expert system is one of most achievement areas in artificial intelligence. Expert system is based rule-based decision engine that helps the non-expertise users for improving their skills. It is the program that construct based on knowledge gaining from the experts [33].(Mohammad & Al Saiyd, 2010). The expert system is the program that stores the knowledge in a knowledge-base and executes asset of procedures and preconditions to arrive at the final results with the help of the specialists to be able to reach the optimal situation [11]. The expert system stores the knowledge from the expertise and self-knowledge which called Meta knowledge which has already found a place in market position. Normally, expert system consists of the following components: (i) end user interface, (ii) inference engine, and (iii) knowledge base ([4]; [9]; [11] ; [19]). Last decade, however,

shows that a growing number of organizations have shifted their informational

systems towards a rule-based expert system approach [33].

This fact generates the need for new tools and environments that intelligently port the legacy systems in modern, extensible and scalable knowledge-integrated systems [16].

The power of solving the problems in the expert system is to acquire the knowledge and structure to employ them in expert system services ([15]; [28]). Therefore the achievement of expert system completely depends ongoing on how it fits the element which works as one.

Undergraduate advising is one of the important responsibilities for the educational staff in institutions of higher education.

Similarly, new and registered students have to make appointments with their assigned advisors to plan and schedule their timetable. The advising system is very critical to students for the sake of preventing wrong choices based on trends or peers ([19]; [10]).

Furthermore, the present advising system places a vast load on the academic advisors, as it is time consuming and they could face a monotonous procedures by answering the same questions again and again.

The advisors may not know about the modifications that may apply on prerequisites, processes or curricula courses by the university.

Besides, the lack of knowledge regarding to the academic and learning process of newly appointed faculty members may cause them problems in the advising process ([17];[5]; [33]).

Laff et al. (1987) presented that the new advisors are not skilful enough to encourage the integration of individual and learning development of undergraduates (Aldahadha& Al-Bahrani, 2012) [5]. Academic experience represents the challenge to create an academic guidance system to serve the students, academic members and administrative departments

(Pajewski, 2006); Aldahadha& Al-Bahrani, 2012).

PROPOSED EXPERT SYSTEM

The proposed model include knowledge Acquisition method that quote from previous research such as Mohammad and Al Saiyd (Applied science university, Amman-Jordan (2010). He proposed a knowledge acquisition framework for student advisory expert system. The contributions of this research are two-fold. Firstly, to present a modification of an existing knowledge acquisition framework that from Mohammad and Al Saiyd paper to be more suitable and robust to use for IT department in the Al-Buraimi University College such as semi knowledge gaining and Students Information Database. Secondly, to develop a prototype rule-based

expert system, based on the modified framework, for the academic advising of the undergraduate students in IT department.

This model will cover several sections.

The first section includes domain knowledge and knowledge resource. The second section is about knowledge Acquisition method that used in our model and analysis consist of four components:

Domain knowledge determination, Knowledge resources determination, Acquisition knowledge methodology, Acquisition knowledge analysis and validation
Section three representation knowledge Acquisition and constricted rules. The fourth section is the export system resource and implementation that include the Knowledge base, Facts, rules and Students Information Database.

Section three explains the first two sections of the model the Knowledge Acquisition and Validation.

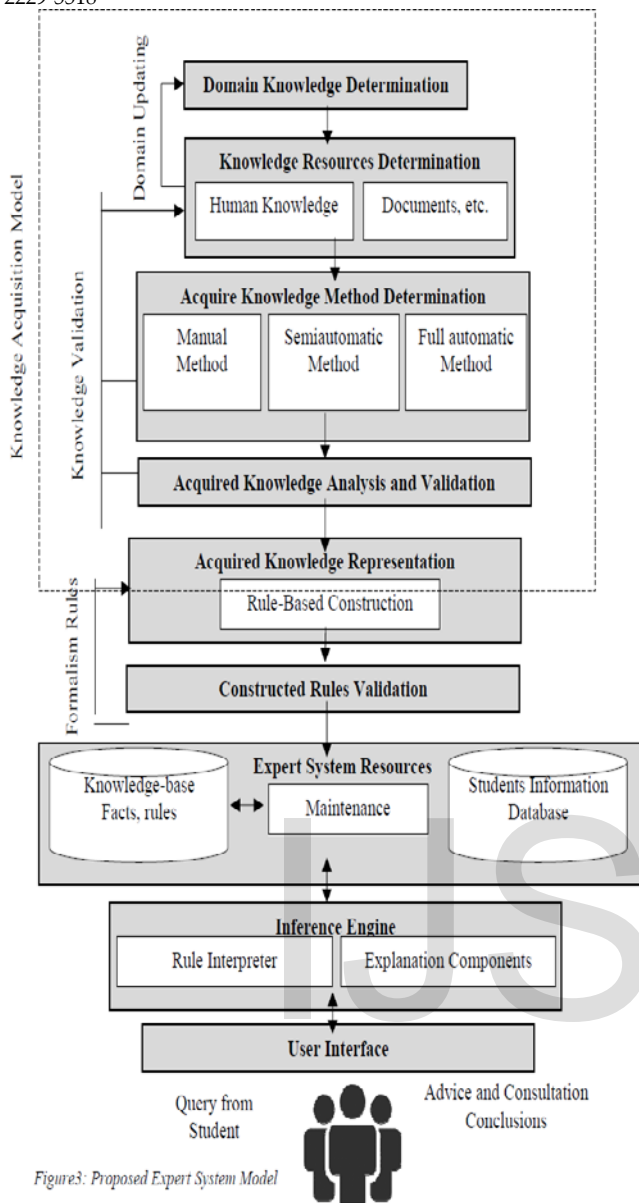


Figure 3: Proposed Expert System Model

CLASSIFICATION OF THE SYSTEM

There are many aspects in which academic advising expert system is like any other expert system or even like any piece of software. Our expert system use IF-THEN rules stored in an unstructured knowledge base. In this research classified our system on the basis of the following criterion.

Table 1: Classification of the system

No.	CRITERIA	EVALUATION
1	Reasoning Method	Simple rules
2	Knowledge representation technique	Trees
3	Structure of knowledge base	Linear
4	Title role of Expert system	Support to human Expert
5	Price	Middle
6	Software Requisite	Windows or Linux with Clips installed on it
7	Hardware Requisite	Few Mbs disk space required \ hand handled device Personal computer

IMPLEMENTATION

The representation of knowledge is the main factors to illustrate the expert's knowledge as it results from domain expert. It contains the structures and rules that distinct elements of the expert system. The knowledge decision maker gives the expert system the input and accepts the system's description of how it arrives at its end.

Generally, it includes the enchanting text from the knowledge base and appropriates them into a few predefined sentence layouts. The expert system is the system that stores the knowledge in a knowledge-base and executes a set of procedures and preconditions to arrive at the final results with the help of the specialists to be able to reach the optimal situation [11].

Students of the Information Technology study of Al-Buraimi University College were used as subjects in an undertaken case study. There are three possible scenarios for a student planning to register a course at the start of a new semester.

- The student could have only the current semester course to register.
- The student could have failed courses twice along with the other current semester registered courses.

- The student could have a warning of low GPA(s) three times along with the current semester registered courses.

Using the applicable scenario for a particular student, and with the set of rules outlined in the university policy for course registration (i.e. it is modeled as rules and stored in our developed knowledgebase), our proposed system CLIPS recommends for the current semester the set of courses to register. It of course puts into consideration the different course status (course prerequisites, compulsory or elective courses).

CONCLUSIONS

The results of this research assist the undergraduate students in the department of information technology in The system also provides an accurate and non-conflict proposal courses for the undergraduate student. It works as an advisor as it gives the undergraduate student a plan with the appropriate subjects according to the courses that have been taken. The system referred to dissimilar clusters of undergraduates, counselor for assess its outcomes in addition to evaluate it among manual structure.

REFERENCES:

- [1] B. W. Boehm, "Spiral Development: Experience, Principles, and Refinements," *Special Report CMU/SEI*, vol.008, 2000.
- [2] M. Edward, N. Latorre and H. John G, "A Natural Language Conversational System," in *Twenty-Seventh International Florida Artificial Intelligence Research Society Conference*.
- [3] B. Chandrasekaran, "Generic task in

knowledge based reasoning. High level building blocks for expert system design," *IEEE Expert*, vol. 1, no. 3, pp. 23-30.

[4] M. A. A. Ahmar, "A Prototype Student Advising Expert System Supported with an Object-Oriented Database," *International Journal of Advanced Computer Science and Applications*, pp. 100 - 105, (2011).

[5] B. Aldahadha and M. Al-Bahrani, "Academic Advising Services among Sultan Qaboos University and University of Nizwa students in light of Some Variables," *International Journal for Research in Education (IJRE) No. 32, 2012*, no. 32, pp. 23-44, (2012).

[6] A. Al-Ghamdi, S. Al-Ghuribi, A. Fadel, F. Al-Aswadi and T. AL-Ruhaili, "An Expert System for Advising Postgraduate," *International Journal of Computer Science and Information Technologies*, vol. Vol. 3 (3), no. 0975-9646, pp. 4529 - 4532, (2012).

[7] B. W. Boehm, "A Spiral Model of Software Development and Enhancement," *IEEE*, vol. 5, no. 21, pp. 61-72, (1988).

[9] J. Cernik, "Framework For An Expert System Generator," may 2009. [Online]. Available: https://etd.ohiolink.edu/!etd.send_file?accession...disposition. [Accessed 10 oct (2014)].

[10] R. M. Choudhari, "Expert System For Student Advisement," Department of Mathematics and Computer Science, South Carolina State University, Orangeburg, SC 29117, 2009. [Online]. Available: http://www.sedsi.org/2009_Conference/proc/proc/p080911001.pdf. [Accessed (2014)].

[11] O. Daramola, O. Emebo, I. Afolabi and C.

Ayo, "Implementation of an Intelligent

Course Advisory Expert System," (*IJARAI International Journal of Advanced Research in Artificial Intelligence*, vol. 3, no. 5, pp. 6-12, (2014).

[12] S. P. David, "Knowledge Acquisition in the Development of Large Expert System," *ManchesterSpang Robinson on AI*, vol. 8, no. 2, pp. 43-51, (1987).

[13] T. Feghali, I. Zabib and S. Hallal, "A Web based Decision Support Tool for Academic Advising," *International Forum of Educational Technology & Society (IFETS)*, vol. 14, no. 1, pp. 82-94, (2011).

[14] S. Frost, "Development advising: Practices and attitudes of faculty advisors," *NACADA Journal*, vol. 13, no. 2, pp. 15-21, (1993).

[15] B. R. Gaine, "Social and Cognitive Processes in Knowledge Acquisition," *Elsevier*, vol. 1, no. 1, p. 39-58, (1989).

[16] A. Kara and A. Karahoca, "Developing An Expert-System For Diabetics," (2008).

[17] A. Khali and J. Williamson, "Role of Academic Advisors in the Success of Engineering Students," *Universal Journal of Educational Research* 2, no. 10.13189, pp. 73-79, (2014).

[18] K. Makhubele, "A Knowledge Based Expert System for Medical Advice provision," (2012).

[19] B. McMahan and R. Bates, "An Automatic Dialog System for Student Advising," *Journal of Undergraduate Research*, (2010).

[20] P. Meseguer, "Towards a Conceptual Framework for Expert System Validation," *Spanish National Research Council*, pp. 1-31, (1992).

[21] A. H. Mohammad and N. A. M. Al Saiyd, "A Framework for Expert Knowledge Acquisition," *IJCSNS International Journal of Computer Science and Network Security*, vol. 10, no. 11, pp. 145 - 151, (2010).

[22] L. Mostafa, G. Oatly, N. Khalifa and W. Rabie, "A Case based Reasoning System for Academic Advising in Egyptian Educational Institutions," in *2nd International Conference on Research in Science, Engineering and Technology*, Dubai (UAE), (2014).

[23] L. Mostafa and N. Khalifa, "The Role of Semantic Expansion Network in E-advising," in *International Conference on Management and Education Innov*, Singapore, (2012).

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