An Intelligent Career Advisor Expert System

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Abstract: No two persons are born exactly alike, each differs from each other in natural endowments, one being suited for one occupation and the other for another. All things will be produced in superior quantity and quality and with greater ease, when each man works at a suitable occupation in accordance with natural gifts. In today's technology driven world, with innumerable options available, students are generally confused on choosing the right suited career. This work design and developed an intelligent based expert career guidance system. The waterfall methodology was used and C# Programming language was used to develop the software while Microsoft access was used to develop the database. This system gives a counselling report using student skills and area of career interest. This system allow users to fill in their personal information, area of career interest, subject and grades. After the successful completion of the required information, the student will receive his/her advice along with a detail explanation stating the reason as to why certain career is better for him/her and why not the other. The opportunities provided by this electronic-medium are immense and many students can make use of this medium to choose a career more appropriate to their skills.

Keywords: Career, intelligent, Waterfall Methodology, C# Programming Language, Microsoft Access.

1. Introduction

The choice of a career is not to be taken for granted by any rational and reasonable person. This is due to the function an individual's work plays economically, socially and psychologically in his or her life and consequently to the society generally. Economically, it is obvious that one's salary at the end of the month is determined by nature of work one does. It is from one's income that expenditures are determined, savings and investments are made and this depends largely on the person's job(s). From the social point of view, an individual occupation determines who his friends are, relationship he keeps, where he lives, professional associations and to some extend the social class he belongs[1]. Psychologically, a person satisfaction is a function of his occupation or job. Happiness is derived from a number of environmental factors such as one's job, amount of salary etc. Vocational interest and choices should not be left to chance[2]. Some students tend to choose wrong professions and later regret choosing such profession all their lives. It is desirable that careers information and adequate guidance and counselling be provided in all over secondary schools to enable the Nigeria students arrive at a realistic choice with adequate realization of limits of their own potentialities and the available opportunities and social expectations of the community. Considering the fact that the youths are mostly affected when it comes to career choice, this works is specially design to give the youths proper and adequate guidance on how to make choice of their career to avoid regret in the future. The job of counselling in secondary school is not an easy job to be taking into consideration the number of students involved with respect to the number of staff involved. It is always very difficult to handle all the students and to remember everything about the students. This counselling exercise needs a sophisticated system the operation of counselling alliterates some of the problem associated with exercise. The need for this study was borne out of the fact that most students in the post-primary schools in our present society don't have proper counseling as to what area of specialty they will undertake. This has left them with no options other than what their parents, friends, and peer groups have to offer. As a result, they end up in a vocation, which does not correspond with their natural endowment. The effect of this is that:

- They graduate from the higher institution with poor results.
- They don't excel in their area of specialty.
- There is no job satisfaction.

The hope of many students has been frustrated by a wrong combination of subjects. Some students do not seek advice on what combination of subjects to sit for in examinations. Such students end up doing other courses which they do not really have interest in, and in the process going into another person's career in life. For instance, there is no need planning to be a medical doctor, if you are week in mathematics, chemistry and biology. Hence this research work is to develop counseling program for the youth and the society in general. In recent years, artificial intelligence-based computer program called Expert Systems (ES) have received a great deal of attention. The reason for all the attention is that, expert systems have managed to achieve fairly high level of performance in the task area, which requires a good number of specialized knowledge and training. Clearly, expert systems are the most mature and widely used commercial applications coming out of artificial intelligence. In expert system, the computer applies heuristics and rules in a knowledge-specific domain to render advice or make recommendations, much like a human expert would. Often, they perform tasks, which are physically difficult, tedious, or expensive to have a human perform. In addition Expert Systems of the present days have been made to be intelligent. Consequently, they have been used in highly human professional jobs like diagnosis and counselling as applied in this study. The job of counselling in secondary school is not an easy job to be taking into consideration the number of students involved with respect to the number of staff involved. It is always very difficult to handle all the students and to remember everything about the

students. This counselling exercise needs a sophisticated system the operation of counselling alliterates some of the problem associated with exercise.

2. Related Works

The term intelligence covers many cognitive skills, including the ability to solve problems, learn and understand language; Artificial Intelligence (AI) addresses all of these. But most progress to date in AI has been made in the areas of problems solving- concepts and methods for building programs that reasons about problems rather than calculate a solution. Artificial Intelligence(AI) is the study of the computations that makes it possible to perceive, reason, and act[3]. It is the arts of creating machines that performs functions that requires intelligence when performed by people[4]. There are some related technologies, which fall within the framework of AI. They are Robotics, Natural language, Artificial Neural Networks, Speech, Vision, and Expert Systems[5]. Expert systems are computer applications developed to solve complex problems in a particular domain, at the level of extra-ordinary human intelligence and expertise. An expert is a person who has expertise in a certain area[5]. This specialized knowledge are extracted from domain experts by Knowledge Engineers and used to solve problems in that domain like a human expert. The general structure of an Expert System is shown in Figure1. A Knowledge based is an organized collection of facts about the system domain and an inference engine interprets and evaluates the facts in the knowledge based in order to provide an answer. Typical task of expert system involve classification, diagnoses monitoring design, scheduling and planning for specialized endeavors. In general, knowledge is acquired from human expert through interviews.

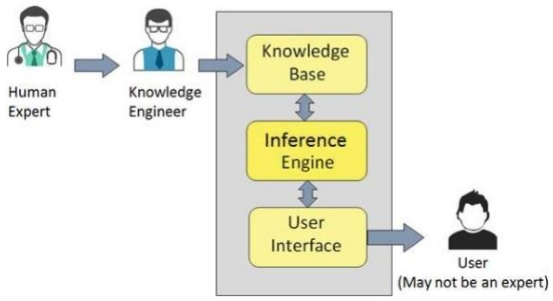


Figure1: *General Structure of an Expert System[6]*

xpert Systems consist of Knowledge Base, Inference Engine and User Interface as components. Knowledge Base contains domain-specific and high-quality knowledge. Knowledge is required to exhibit intelligence. The success of any ES majorly depends upon the collection of highly accurate and precise knowledge. The data is collection of facts. The information is organized as data and facts about the task domain. **Data, information,** and **past experience** combined together are termed as knowledge. The knowledge base of an ES is a store of both, factual and heuristic knowledge. **Factual Knowledge** is the information widely accepted by the Knowledge Engineers and scholars in the task domain while **Heuristic Knowledge** is about practice, accurate judgment, one's ability of evaluation, and guessing. Use of efficient procedures and rules by the Inference Engine is essential in deducting a correct, flawless solution. In case of knowledge-based ES, the Inference Engine acquires and manipulates the knowledge from the knowledge base to arrive at a particular solution. In case of rule based ES, it applies rules repeatedly to the facts, which are obtained from earlier rule application, adds new knowledge into the knowledge base if required and resolves rules conflict when multiple rules are applicable to a particular case. To recommend a solution, the Inference Engine uses Forward Chaining or Backward Chaining[6] A lot of studies proposing students advising systems have been developed but most of them concentrate on undergraduate student. An intelligent web-based application that provides a reliable, user-friendly interface for the handling of general advisory cases in special degree programs was developed. In addition to providing information on handling basic student issues, the system's core features include course advising, as well as information of graduation status and oral exam qualifications[7]. Student Course Planning Software (SCPS) package that guide students in selecting the most appropriate six courses suitable to register in the next semester using Python programming language was developed[8]. An intelligent Course Advisory Expert System (CAES) that uses a combination of rule based reasoning (RBR) and case based reasoning (CBR) to recommend courses that a student should register in a specific semester was developed by making recommendation based on the student's academic history[9]. A smart system that uses association rule mining to help both students and advisors in selecting and prioritizing courses was proposed. The system helps students to improve their performance by suggesting courses that meet their current needs and at the same time improve their academic performance. The system uses association rule mining to find associations between courses that have been registered by students in many previous semesters. The system successfully generates a list of association rules that guide a particular student to select courses registered by similar students[10]. Also developed was an expert system for advising postgraduate students instead of the traditional way in advising by the department's advisors. This system aims to assist postgraduate students of Computer Science to select the suitable courses during their postgraduate program(Al-Ghamdi et al., 2012).

3. Material and Method

The model presents a system that integrates under a common user interface (UI), a Database (DB), and an Expert System (ES). The model incorporates under the expert system architecture the following main components: The User Interface (UI), A Database(DB), and an Intelligent Expert System (IES) as shown in the Model Architecture in figure2. The integration and interoperability of the components are done such that the User, after interaction with the UI is able to enter data into the database, to confer with the expert system and finally to obtain the results. The UI interacts with the Database and the ES, either one by one, as a link between them. Thus the user, through the UI, may consult the ES, or manipulate the Database.

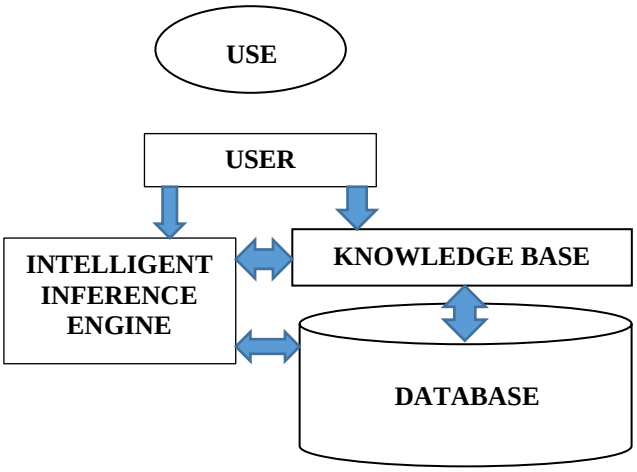


Figure2: *The Model Architecture*

The model has three main modules: Data Entry Module, Determine Placement Module, and Career Counseling Module. The Data Entry Module enables users to enter data into the database. This module is restricted to authorize users since every user must register to provide detail information about the user. For this reason a login is incorporated. This module is further divided into three sub-modules namely: The Aptitude Test Profile Module, The SS1 Result Profile Module and The SSCE Result Profile Module. These modules capture information about the student into the database. The Determine Placement Module enables users to determine student placement. The Career-counseling Module has two sub-modules namely: Encouraging Module and Career-Counseling Module. These modules use induction learning and quasimorphism knowledge mapping to generate a reasoning structure. Hence, it can to encourage the user based on user's likely areas of specialization base on the entries in the Subject Choice module and the Preferred Courses Module or counsel the user. The waterfall methodology was used and C# Programming language was used to develop the software while Microsoft access was used to develop the database. The system was designed to make use of menu driven technique in Windows XP environment.

4. Result and Discussion

All the subsystems in the program perform a specified task. Each module is tested before the final integration and testing of the whole system. The input forms are designs generally based on the necessary data that needs to be entered into the system. The data are captured through the keyboard and stored in a memory in an access database. The input design is as shown in figure 3 and 4 respectively.

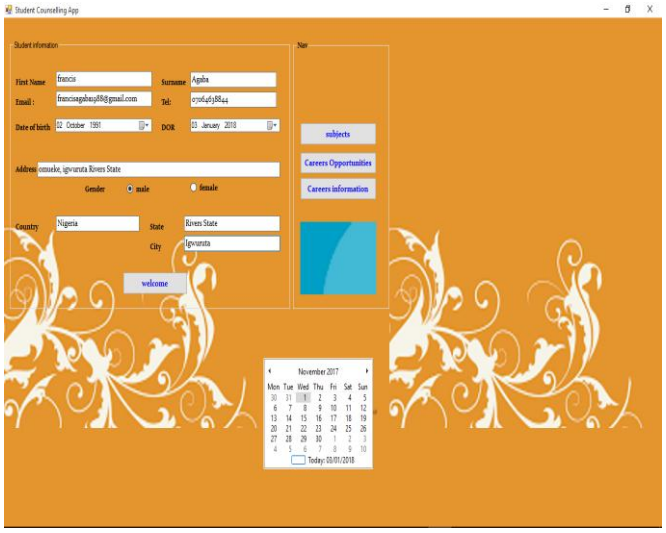


Figure3: *Student Information Form*

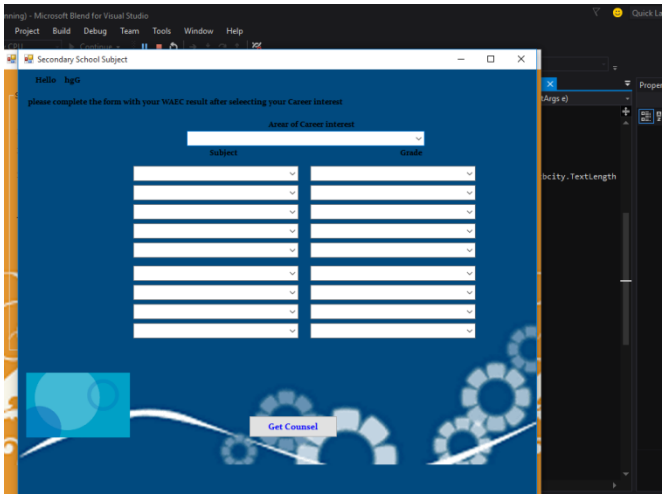


Fig4: *Area of Career Interest and Secondary School Subject Form*

The design of the outputs was done using web page report formats and grid controls. The system is designed to generate outputs on the career counseling report. The output design is as shown in figure5 and figure6.

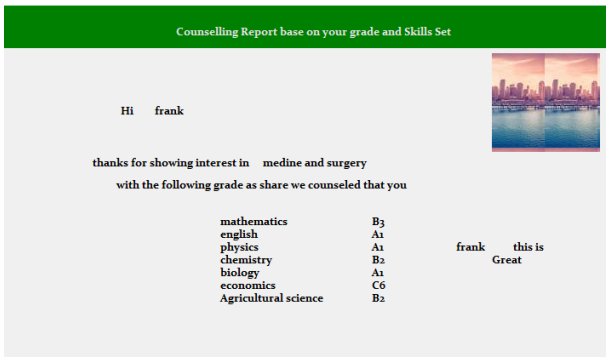
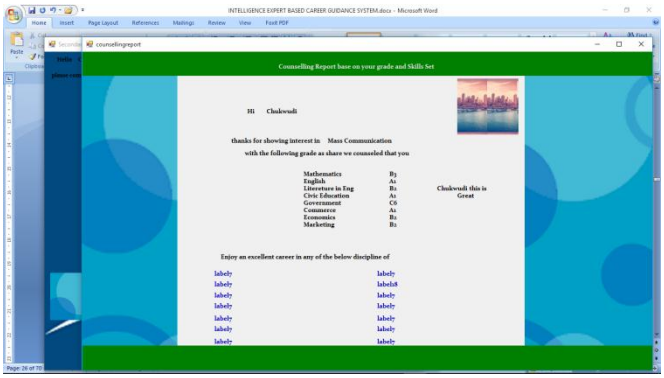


Figure5: *Career Counseling Report*

The system demonstrates reasonable intelligence by congratulating the user or counseling the user. When by induction learning and quasimorphism knowledge mapping that generate a reasoning structure, the user's areas of specialization base on the entries in the Subject Choice

module and the Preferred Courses Module matches, the user is congratulated. If subjects combinations and grades are not satisfactory based on the reasoning structure, the system will either advise the user to take another examination(SSCE) or suggests other course possible with the subject combination and grades. This is demonstrated in figure6 and figure7.



5. Conclusion

The hope of many students has been frustrated by a wrong combination of subjects. Some students do not seek advice on what combination of subjects to sit for in examinations. Such students end up doing courses which they end up not performing well in it. Developing an intelligent based expert career guidance system for career guidance and counseling will help improve the mode of guidance and counseling by making it easier, more accurate and reducing the stress involved. The presented model intelligent based expert career guidance system for career guidance have the ability to accepts the user's preferred course with respect to inputted courses and grades or counsel the user. The results obtained from the implementation are encouraging and promising for the development or more complex systems in the future as the determine placement module can be made more knowledgeable. Counseling application is recommended to be online for easy accessibility by people. Counseling application is also recommended to all Information and Communication Technology laboratories in secondary schools across Nigeria to test their skills and ability using their mock examination to determine the perfect subjects and career selection in a pursue of a better career. As its contribution, this work offers a demonstration of application of artificial intelligence technology (AI) to support Career Guidance, which is very crucial to the academic well-being of students.

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