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. Consider 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 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 to say, which everyone, 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
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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 Figure 1. A
Knowledge base is an organized collection of facts about
the system domain and an inference engine interprets and
evaluates the facts in the knowledge base 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.

![Figure 1: General Structure of an Expert System[6]](Image)

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 figure 2.
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.
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.

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 figure 5 and figure 6.
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 grade 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 pursuit 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.

References

Author Profile
Ledisi G. Kabari received B.Sc degree in Mathematics/Computer Science in 1991, M.Sc. and PhD degrees in Computer Science from University of Port Harcourt, Nigeria. He is presently a Chief Lecturer in Ken Saro-Wiwa Polytechnic, Bor at the Department of Information Technology and a Visiting Senior Lecturer in Ignatius Ajuru University of Education, Port Harcourt, Nigeria.