

MULTI ATTRIBUTE APPROACH TO ADMISSION PROCESS EXPERT SYSTEM

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ABSTRACT

The current practice of tertiary admission selection process using the partially automated system, has constantly led to biases and errors as the applications are still processed manually. An alternative solution for the problem using artificial intelligence approach was applied in this research with the integration of Multi Attribute approach to Admission Process Expert System to make the processes more systematic, efficient and reliable.

This study deals the use of expert system in solving the problems inherent in the current system. Visual Prolog is used as the development tool because of its capabilities as an expert system programming language using a natural mode of expression.

This software considers students for admission with reference to specified requirements thus eliminating the problems of the current system. The findings of this research reveals that expert system can help to solve this problem effectively as it is easy to use and does not require any special hardware.

Keywords: *Artificial Intelligence, Expert System, Rule-Based System and Visual Prolog.*

1.0 INTRODUCTION

An Expert (Knowledge Based) System is a problem solving and decision making system based on knowledge of its task and logical rules or procedures for using knowledge. Both the knowledge and the logic are obtained from the experience of a specialist in the area (Business Expert). (Armstrong, 2002)

Artificial Intelligence (AI) is the part of computer science concerned with designing intelligent computer systems, that is, systems that exhibit the characteristics we associate with intelligence in human behavior – understanding language, learning reasoning, solving problems and so on. (Barr and Feigenbaum, 1981)

Chambers student learning dictionary defines admission as an acceptance into a place, a club or an institution. The cost of going into a place or gaining entrance into an organization. Process is defined as a series of action or events that will have a particular result, a series of change to undergo. Multi attribute however is a combination of two

words; multi and attribute. Multi refers to many ways; attribute means the feature or qualifies of something and approach is the way of getting things done.

Therefore a multi attribute approach to admission process can be defined as a series of actions or events to be performed based on some methods, techniques or approach to gain entrance into higher institution in many ways i. e multiple approach.

The study is thus based on the application of Artificial intelligence using expert system to solve the problems inherent in admission processing. i. e. The use of expert system in admission processing.

1.1 MOTIVATION FOR THE STUDY

The project was carried out because of the following reasons:

- a. The process of student registration in the school is done online and therefore consumes a lot of time as students have to queue long hours at the Cyber cafes to fill the online application.
- b. Students apply for courses for which they are not qualified to apply for.
- c. Students who do not possess the minimum requirement to apply into the institution are also allowed to apply by the system without any restriction.
- d. The system gives room for confusion as some admitted student may have their admission withdrawn because they lack the basic qualification for the offer.
- e. The system does not permit applicants to undo previous activities whenever there is a problem.
- f. Students are required to submit various documents during screening thus still resulting in piles of bulky papers.
- g. The infrastructure available does not effectively support the technology used in the present system. i. e there is usually internet service failure.
- h. The workload during a rush is usually high resulting in incomplete or loss of integrity of the information displayed.

1.2 AIM AND OBJECTIVES

The major objective of this project is to design and implement an expert system for admission process into any tertiary institution.

1.3 SCOPES OF THE STUDY

This project is limited to the Federal Polytechnic, Ede. It can however be acquired for use in other institutions with little or no amendment since all Nigeria institutions have virtually the same admission requirement.

1.4 METHODOLOGY

To actualize the objective of this project work, a visit to the admission office was made where questions were about the mode of admission in the institution.

Direct observation and study of publication of the admission requirements in the student handbook published by the institution was conducted.

Review of relevant literatures and journal articles was also made. Relevant information was also collected and extracted from the internet.

Furthermore, rule based expert system using forward and backward chaining is used. This was linked to the inference engine as well as the information database to enable making of decisions or conclusions.

2.0 LITERATURE REVIEW

In recent years, the methods of Artificial Intelligence have largely been used in the different areas including the medical applications, agricultural applications, computer application and many more. They are used in applications where the procedures or algorithms for the problem do not exist or are poorly defined, but good rules of thumb or heuristics are available. Expert systems are rapidly being accepted for use by the non-expert to solve problems when human expertise is expensive, untimely or unavailable.

Various expert systems have since been developed some of which have achieved tremendous success in their area of application. For example, MYCIN was actually the first successful expert system designed in 1970 at Stanford University with the purpose of assisting physician in the diagnosis of infectious blood disease and antibiotics. It was never actually used in practice not because of any weakness in its performance. (Fard, 2008)

In other to really understand and appreciate this study, it would be appropriate to review some past works that are based on decision making and selections.

Ljubljana (1991) described DEX, An Expert Shell for Multi-Attribute Decision Making that support the decision makers in complex multi attribute decisions where many options have to be evaluated. Naser, (2008) proposed an expert system for guiding freshman students in selecting a major at the Al-azhar University, Gaza. The system is aimed at measuring student's mental abilities and capabilities accurately to suggest a suitable faculty/major for the student to be academically successful.

Zhang (2004) described the design and development of an agriculture expert system that is aimed at diagnosing diseases and pests, agricultural irrigation, variety breeding

and selection, production management, economic countermeasure and analysis, ecological environment, feed prescription of livestock, poultry etc. PASS: An expert system with certainty factors for Predicting Student Success was outlined by Loannis et al (2002).

The design of PASS was based on the analysis of demographic, educational and performance data of students from an available database. The system is to be used as an education support tool.

The design and development of an expert system for a tourist information center was outlined by Ma et al (2001). The expert system was built to recommend a suitable travel schedule that satisfies user input constraints such as time period, budget and individual preferences.

The designed expert system can as of now be implemented on a standalone system as it does not provide for online implementation thus cannot be accessed anywhere outside the premises where it is implemented.

2.1 ARCHITECTURE OF THE SYSTEM

The greatest obstacle to the development of expert system is the process of transforming and representing the knowledge extracted from the human experts to computer instructions. Thus the process of constructing and developing an expert system is called Knowledge Engineering and the system developer is referred to as Knowledge Engineers. (Barr & Feigenbaum, 1977)

Expert system development comprises of six components which are: Knowledge base, knowledge acquisition and engineering, inference engine, inference mechanism, explanation system, Knowledge Refinement Subsystem and user interface

2.2 Knowledge Elicitation

This is the process of collecting data from the domain expert. This stage involves the consultation of domain experts which are the most important individuals in an expert system design system. In this work, knowledge is acquired by consulting members of staff of the admission office. The knowledge acquired is represented using a set of IF-THEN rules and stored in the knowledge base. Visual Prolog was used to write the code in design phase. Prolog is a high programming language that is specifically designed for applications in AI such as ES. It is based on the predicate calculus. Prolog differs from traditional programming languages in that it tells the computer what to do (a technique called declarative programming) while programs in other languages tell the computer how to do it (procedural programming). Prolog does this by making

deductions and derivations from facts (assertions), rules (inference) and questions. Prolog uses a natural mode of representation for programming.

2.3 The System Rule Base

The knowledge elicited from the domain experts are used to produce the rule base for the system. For example a rule state that If Jamb Score < jamb Cutoff, Then Status is Disqualified, If Polytechnic=Black Listed School, Then Status is Disqualified.

2.4 System Design using Unified Modeling Language UML

The UML is an object oriented programming (OOP) tool for modeling objects and relationships between objects and classes in the design phase of a program. UML representation supersedes the flowcharts there are a lot of different diagrams (models) to get used to because it is possible to look at a system from many different viewpoints. It is a powerful tool for representing the structure of a program. The use case diagram is the description of the systems behavior forms a user's viewpoint. The use case diagram is shown in fig 1. The sequence diagram describes how the objects in the system interact over time. The objects identified in the system are the specific user, particular portion of the knowledge base, specific user interface and the admission subsystem. They interact in the sequence shown in fig 2 by passing messages across the timelines (represented by dotted lines). These messages are the actions carried out by the objects in the system in a chronological order.

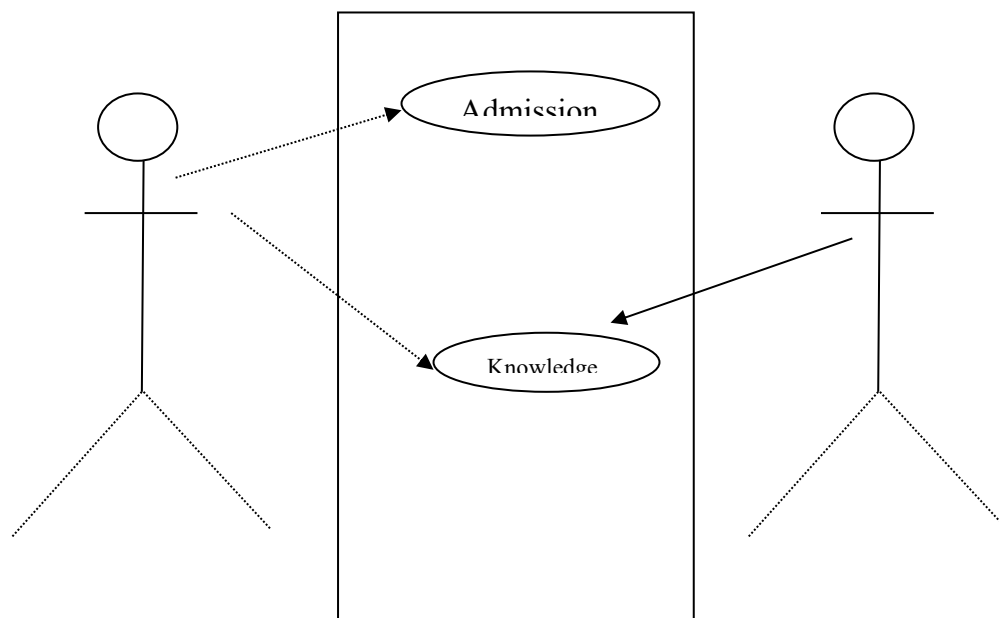


Fig 1: Use Case Diagram

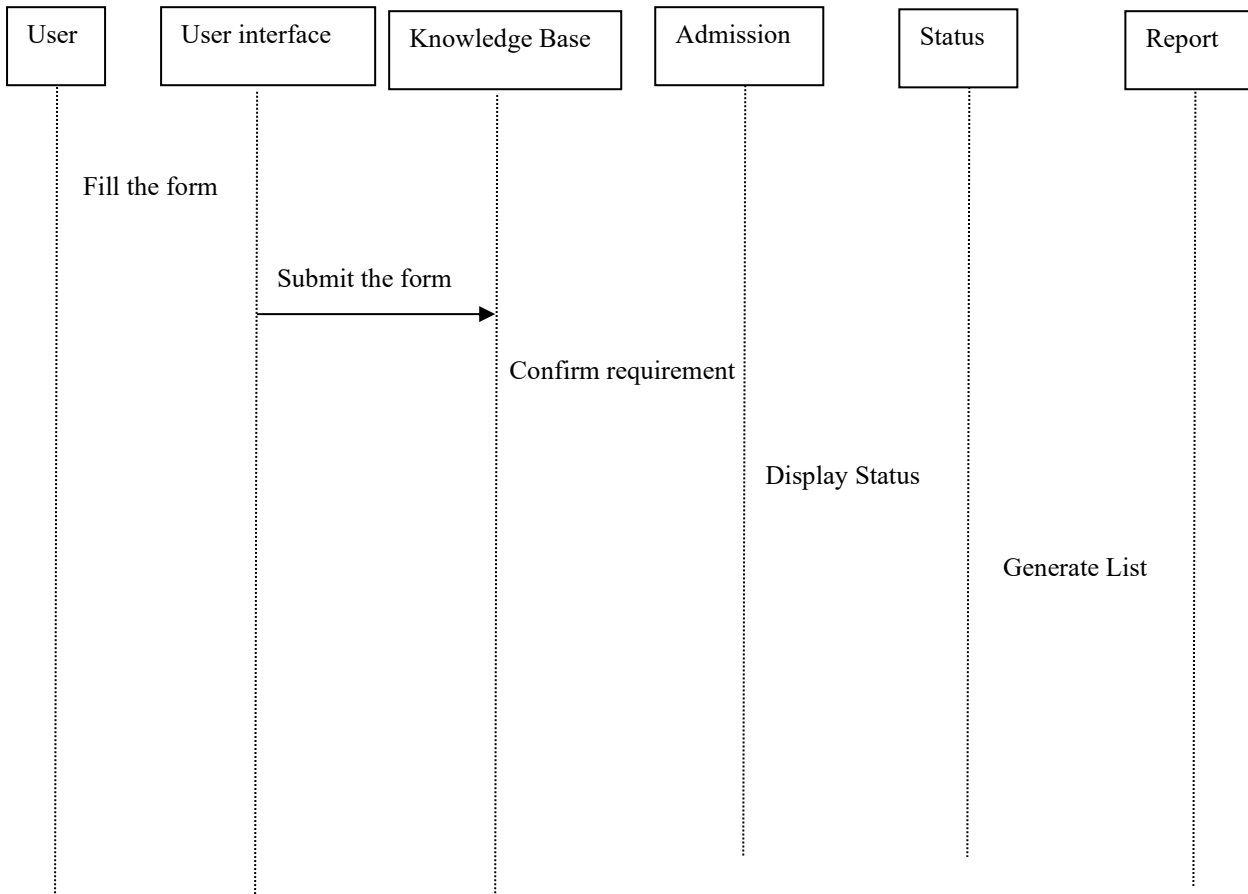


Fig 2: System Sequence Diagram

2.5 Reasoning and Problem Resolution of the System

The reasoning mechanism employed in this expert system is BACKWARD CHAINING (goal driven), the expert system have a goal (a hypothetical solution) and the inference engine attempts to prove it by going through the following processes:

- Find the rules that have the desired solution in the THEN parts
- It uses the sub-goal(s) to prove the IF parts
- Search for rules to prove the sub-goal.

The process is repeated until a desired result is obtained

2.6 User Interface Design

The system has been equipped with a user friendly interface provided by Visual Prolog. The system expects the users to fill in some information to the forms displayed by the system.

Fig3a is the main menu bar and 3b is the menu bar of the Admin page. Fig 4a & 4b contains a sample of the form to be filled by the user. Fig 5a-j contains the input screens to be used by administrative users to specify various requirements. Based on the information filled by the user, fig 6a-d contains the output as presented by the system.

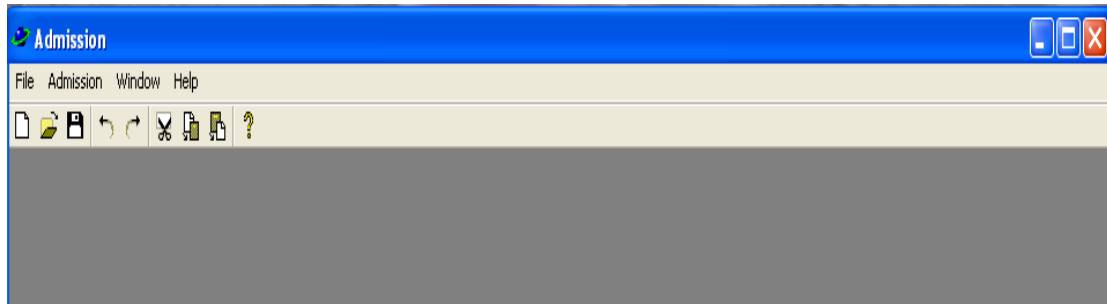


Fig 3a: main menu

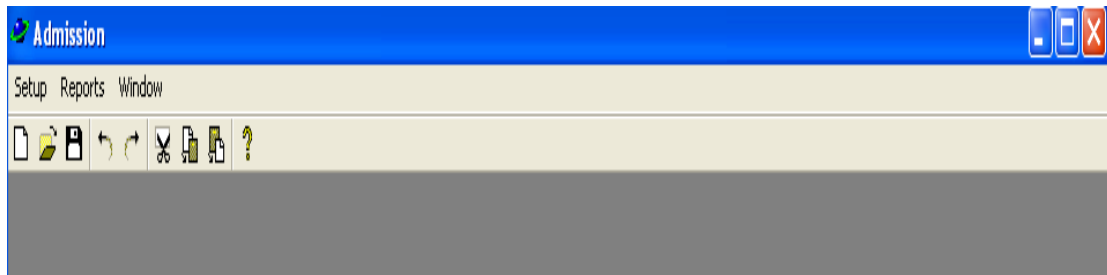


Fig 3b: Admin menu bar

Personal Info

Surname: TundeAlao Other Names: Tobi samuel

Address: No 15, Wakajaiye Street, Off Ajijola Ana Phone: 07068775503

GroupBox

1st Choice: Science Laboratory Tech 2nd Choice: Science Laboratory T

UTME Info

Registration No: 153778654A5 Score: 250

OLevel Info

Agricultural Science	A1		
Biology	A1		
Chemistry	A1		
Economics	A1		
English	A1		
Geography	A1		
Mathematics	A1		
Physics	A1		
Yoruba	A1		

Exam Type: Wassce M Exam Type:

Exam No: 40380198 Exam No:

Exam Year: 2011 Exam Year:

Submit Cancel

Fig 4a

HND

Personal Info

Surname: Other Names:

Address: Phone:

National Diploma

School: Result:

Department:

Industrial Training

Name	Address	From	To
<input type="text" value="ECB Microfinance Bank Nig Ltd"/>	<input type="text" value="3, Station rd, Oke gada, Ede"/>	<input type="text" value="2007"/>	<input type="text" value="2008"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

OLevel Info

<input type="text" value="Agricultural Science"/>	<input type="text" value="B3"/>	<input type="text"/>	<input type="text"/>
<input type="text" value="Biology"/>	<input type="text" value="C5"/>	<input type="text"/>	<input type="text"/>
<input type="text" value="Chemistry"/>	<input type="text" value="C6"/>	<input type="text"/>	<input type="text"/>
<input type="text" value="Economics"/>	<input type="text" value="B2"/>	<input type="text"/>	<input type="text"/>
<input type="text" value="English"/>	<input type="text" value="C4"/>	<input type="text"/>	<input type="text"/>
<input type="text" value="Geography"/>	<input type="text" value="C5"/>	<input type="text"/>	<input type="text"/>
<input type="text" value="Mathematics"/>	<input type="text" value="B2"/>	<input type="text"/>	<input type="text"/>
<input type="text" value="Physics"/>	<input type="text" value="A1"/>	<input type="text"/>	<input type="text"/>
<input type="text" value="Yoruba"/>	<input type="text" value="A1"/>	<input type="text"/>	<input type="text"/>

Exam Type: Exam Type:

Exam No: Exam No:

Exam Year: Exam Year:

Fig 4b

Login

Username:

Password:

Fig 5a

ScreeningScore

Pls Choose Level

ND

HND

Name/Regno: TundeAlao Tobi samue

Score: 47

Cancel OK

Fig 5b

NewUser

Name: Adebayo Adeoluwa

Department: Computer Science

Username: tosin

Password:

Confirm Password:

Cancel Submit

Fig 5c

Departments

Department: Marketing

Available at: HND&ND

OK Cancel

Fig 5d

Department: Marketing

Jamb Score Required: 180

Buttons: OK, Cancel

Fig 5e

Department: Computer Science

Cumpulsory Subjects:

Subject	Grade
English	C6
Mathematics	C6
Physics	C6
Chemistry	C6
Biology	C6

Additional Subjects:

Atleast C6 in 2 Subject chosen below:

- Geography
- Government
- Hausa
- History
- I.R.K
- Igbo
- Mathematics
- Physics
- Technical Drawing
- Yoruba

Buttons: Submit, Cancel

Fig 5f

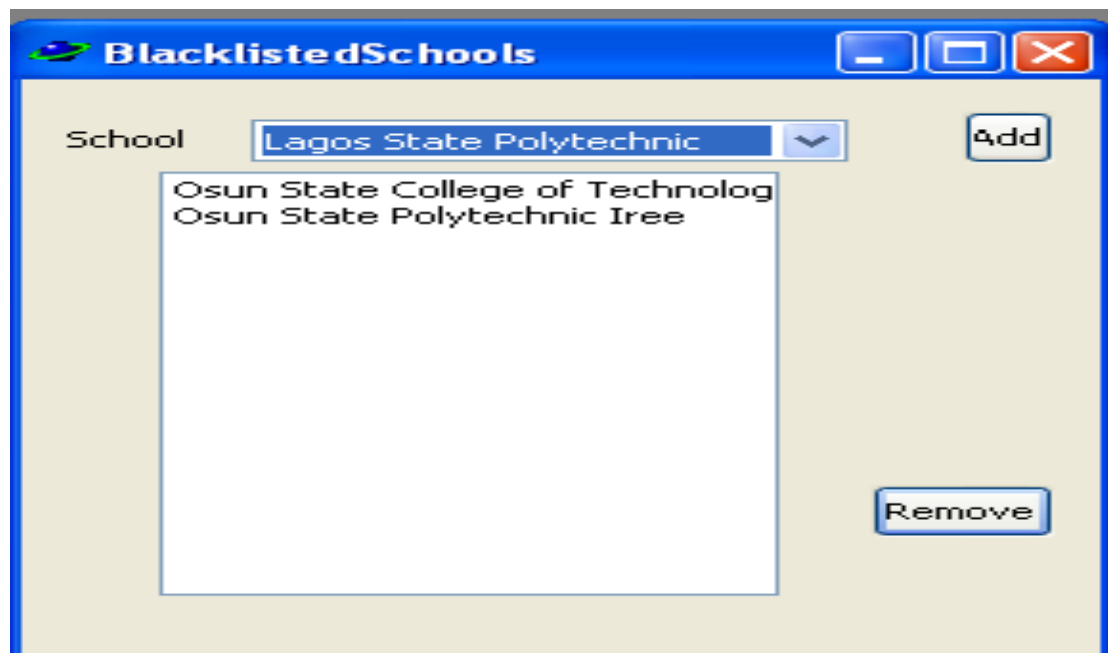


Fig 5g

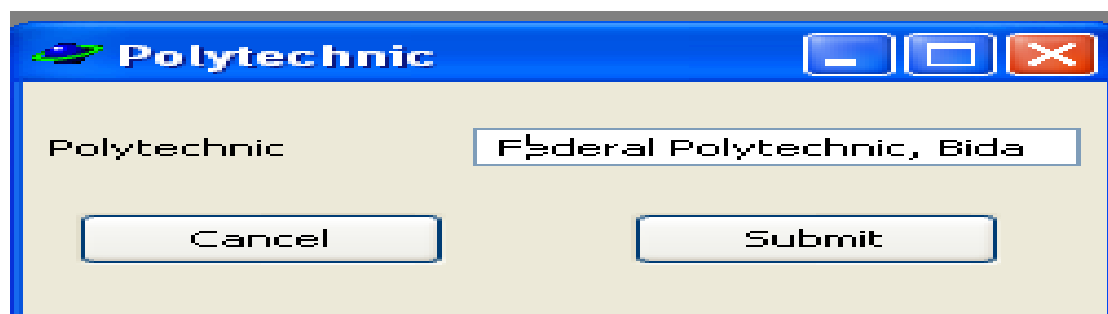


Fig 5h



Fig 5i

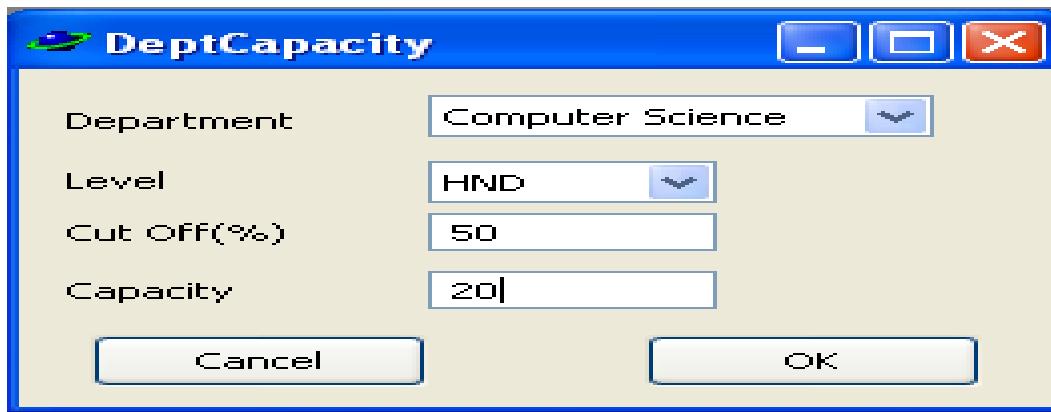


Fig 5j

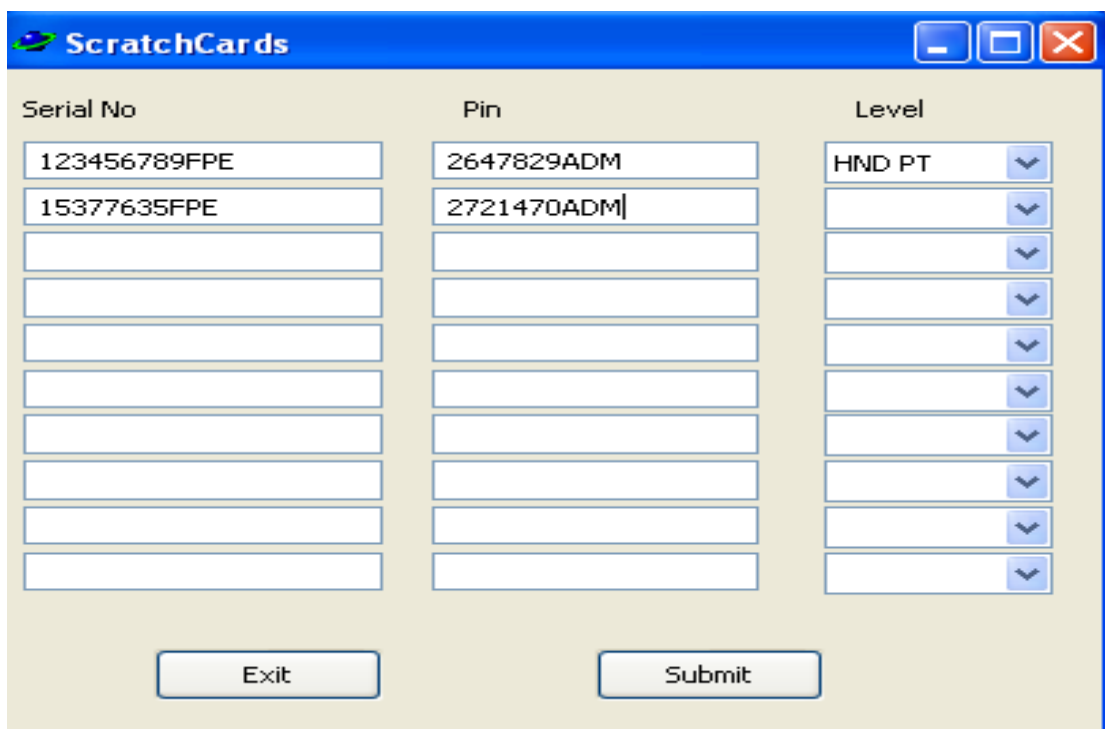


Fig 5k

2.7 Output Design

A quality output is one, which meets the requirements of the end user and presents the information clearly. It determines how the information is to be displayed for immediate need and also the hard copy output. These are results generated based on the input supplied to the system by the user. The output of this project are presented in fig 7a-d.

Federal Polytechnic Ede Computer Science Department Qualified List		
Name	Form No	Score
Adeyinka Ayefele James	FPE0003	80
Adewale John	FPE0002	78
Lawrence Toye	FPE0001	76
Abolade Samuel	FPE0009	74
Ayoola Folashade	FPE0011	74
Ayeni Dunsin	FPE0014	71
Awosika Ayodeji	FPE0015	69
Adegbite Adebayo	FPE0016	69
Orisatola Ranti	FPE0017	67
Oke Damilola	FPE0018	65
Oki Funmolola	FPE0019	64
Ogungbade Janet	FPE0021	64
Bello Abiola	FPE0023	63
Bello Abosede	FPE0025	61
Aroyehun Temitope	FPE0027	60
Olulana Stephen	FPE0029	59
Adejo Tayo	FPE0031	59
Akanbi Nike	FPE0035	58
Ganiyu Yemisi	FPE0039	57
Falodun Olajumoke	FPE0043	56
Uche Chigozirim Joy	FPE0004	55
Dolly Smart	FPE0005	55
Onyeheido Queen	FPE0006	54
Aina Tunmise M	FPE0007	52

Fig 6a

disqualified - Notepad		
File Edit Format View Help		
Federal Polytechnic Ede Computer Science Department Disqualified List for HND		
Name	Form No	Reason
Uche Chigozirim Joy	FPE0004	Incomplete IT
Dolly Smart	FPE0005	Olevel Result
Onyehedo Queen	FPE0006	Olevel Result
Aina Tunmise M	FPE0007	Incomplete IT
Adegoke Joy	FPE0008	Black Listed School
Akanni Seye	FPE0010	Olevel Result
Mercy Johnson	FPE0012	Blacklisted School
Oyewale Ronke	FPE0013	Olevel Result
Adedeji Adedayo	FPE0020	Incomplete IT
Abiona Lara	FPE0022	Blacklisted School
Oyedemi Lawrence	FPE0024	Olevel Result

Fig 6b

admissionList - Notepad			
File Edit Format View Help			
Federal Polytechnic Ede Computer Science Department Admission List			
Name	Form No	Screening Score	Total
Adeyinka Ayefele James	FPE0003	50	100
Adeyinka John	FPE0002	48	93
Lawrence Teye	FPE0001	46	91
Abolade Samuel	FPE0009	44	89
Ayoola Folashade	FPE0011	34	87
Ayeni Dunsin	FPE0014	41	86
Awosika Ayodeji	FPE0015	39	85
Adegbite Adebayo	FPE0016	43	85
Orisatola Ranti	FPE0017	32	84
Oke Damilola	FPE0018	41	82
Oki Funmolola	FPE0019	39	81
Ogungbade Janet	FPE0021	43	80
Bello Abiola	FPE0023	39	80
Bello Abosede	FPE0025	41	79
Aroyehun Temitope	FPE0027	44	79
Olulana Stephen	FPE0029	45	78
Adejo Tayo	FPE0031	43	77
Akanbi Nike	FPE0035	39	76
Ganiyu Yemisi	FPE0039	40	76
Falodun Olajumoke	FPE0043	41	76

Fig 6c

WaitingList - Notepad			
File Edit Format View Help			
Federal Polytechnic Ede			
Computer Science Department			
Waiting List			
Name	Form No	Screening Score	Total
Alabi Temitope	FPE0045	46	75
Alolade Samson	FPE0046	38	73
fawale Temitayo	FPE0047	47	73
Ogunmokun Abosede	FPE0048	40	73
Fashade Emmanuel	FPE0049	39	71
Ajimati Olusola	FPE0050	48	70
Akinleye Tominiyi	FPE0051	33	69
Adebayo Tayo	FPE0053	39	69
Adetokunbo Adetutu	FPE0054	36	68
Adewoyin Dayo	FPE0055	43	67
Bello Sakirat	FPE0056	41	66
Aderinwale Israel	FPE0057	49	65
Arowolo Samsudeen	FPE0058	42	65
Alao Tobi	FPE0059	39	63
Oyerinde Morufat	FPE0060	45	62
Oyegoke Fatai	FPE0061	47	62
Olomo Feranmi	FPE0062	40	61
Akinloye Adeola	FPE0063	48	61
Akinwale Matthew	FPE0064	42	61
Oyesode Stephen	FPE0065	32	59
Oyelana Dare	FPE0066	31	58
Feranmi Roseline	FPE0067	32	58
Adeola Matthew	FPE0068	34	57
AbdulRasaq Maryann	FPE0069	37	56
Anwuli Gloria	FPE0070	35	54

Fig 6d

2.8 Rule Design

The rules are used to act on the inputs. It uses IF, THEN and ELSE. It works to link the forms with the facts that are supplied. This rules are series of instructions and serves as commands as to what the program should do or not i.e. how reasoning operation to be performed. Visual prolog is used in developing these rules which reasons logically with the supplied facts which is then used to solve a well defined task in a specific domain.

predicates

onOkClick : button::clickResponder.

clauses

```
onOkClick(_Source) = button::defaultAction:-
  if dept_ctl:getText() <>"" then
    if avail_ctl:getText()=="HND&ND" then
      Depts=dept_ctl:gettext(),
      admission::insertDepts(Depts,"HND"),
      admission::insertDepts(Depts,"ND"),
```

```

admission::saveDeptsDB(),
vpiCommonDialogs::note("Records Added Successfully")
else
Depts=dept_ctl:gettext(),
Avail=avail_ctl:gettext(),
admission::insertDepts(Depts,Avail),
admission::saveDeptsDB(),
vpiCommonDialogs::note("Records Added Successfully")
end if
end implement departments

```

3.0 EVALUATION OF THE SYSTEM

Fifty (50) applications were presented to the system based on information gathered from domain experts. The expert system responses to the 50 entry were the same with that of the domain expert. The reports generated by the system were also the same with the domain expert showing its efficiency and effectiveness.

4.0 SUMMARY

The study multi attribute approach to admission process using expert system based on “Federal Polytechnic, Ede” as its case study has been presented and the system has been designed to consider various conditions in conducting admission process.

The new system is accurate, efficient and versatile compared to the existing system in operation. It relieves the staff of monotonous routine jobs as well as the stress of the rush during application due to its versatility.

4.1 CONCLUSION

In conclusion, this system will go a long way to reduce the time it takes to apply for admission. The system if implemented will help student during application for admission and reduce the stress experienced during registration and admission process. It will also reduce the stress experienced by staffs during the process. The efficiency of the system will reduce the manpower required during admission process thus lowering processing cost on the part of the school.

4.2 RECOMMENDATION

Having explored all avenues and possibilities to ensure effective operation, it is recommended that this system be implemented so that the students and admission staffs can enjoy its full potential. The system can be implemented in other polytechnics with little or no amendments since they have virtually the same requirements while the OND module of the system can be implemented for use by universities and other tertiary institutions other than the Federal Polytechnic, Ede.

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