COMPUTER AIDED SYSTEM FOR THE INVESTIGATION OF BANK ROBBERY IN NIGERIA [COMPUTER AND CRIME]

BY

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DEDICATION

This project is dedicated to the glory of Allah (S.W.A.) for His mercies, guidance, and bounties. And to His messenger; prophet Muhammad (S.A.W.). To my mum; Hajiya Habiba Ayuba for her sacrifices.

CERTIFICATION.

This is to certify that this project work, **Implementation of Computer- Aided System for the investigation of Bank robbery in Nigeria** was produced by Abdullahi Ismaila in partial fulfillment of requirements for the award of Post-Graduate Diploma in Computer science.

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EXTERNAL EXAMINER DATE

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ABSTRACT

The issue of computer aided system in the investigation of robbery in banking sector is very current in the field of computer technology and perhaps no any other innovation of detecting and exposing the fraudulent act has received a wider accumulation than implementation of computer in the sector and other enforcement agencies.

Precisely, this project analyses the conventional method of banking robbing investigation and trial of cases in the law courts in Nigeria.

It has being carried out to take care of one of excessive data errors in the manual file system, capturing a large base of suspect(s), improve performance and providing quick response to question from the investigator. To provide intelligent aided which enhance efficient performance of human expert and provide computer aided learning for bank robbery,. To solve the bulky, paper work long period of investigation, rescues lapses in performance and control, also for data security and privacy.

The programming language used is Basic and Basic interpreter used to run the programme, because of range of data type to enhance modeling of different real life relation, interactive nature of the language, machine independence and wide scope, pseudo-natural programming language and control abstraction to take care of sequencing, recursion and enumeration.

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CHAPTER ONE

GENERAL INTRODUCTION

1.0 INTRODUCTION

The issue of computer and crime has received a lot of attention since its inception few years ago. Getting computer to detect and expose fraud opens up a new horizon in business, industry and banking sector. Chapter one serves as introduction section 1.1 presents the significance of the project, section 1.2 and 1.3 discusses the project, while section 1.4 discusses the objectives. The only way a computer Aided system will become a true success is for it to be totally integrated into the operations of the uses area.

1.1 SIGNIFICANCE OF STUDY

The age in which we now live is quite different from that of our parents. It is mainly characterized by rapid changes in technology, life styles and values. The computer is primarily, an electronic information processor that is rapidly changing the way we acquire, organize, recall, access, analyses, synthesize and apply information.
From 1940s to the present, computer technology has gone through several revolutions. Presently we have FOUR GENERATIONS of computer [the fifth still under construction]. The general design of the existing four generations is based on VON-NEUMAN machine architecture. The architecture is composed of a central processor, a memory, Arithmetic and logic unit and Input –output devices. The computer field has now reached a point of development where it no longer belongs to relatively few professionals.

We are rapidly approaching the state in which our pursuit of life everyone will depend on computer one-way or the other. The investigation of the crime is not an exception. It needs the help of to solve those of its new and old problems.

The concept of CRIME refers to a body of principles and rules that were believed to be uniquely fitting for and binding upon any community of rational beings. Any violation of these rules and principles were deemed to be CRIMINAL. There fore, crime could be define as an international act or omission in violation of criminal law committed against a person such as murder, rape, manslaughter and so on or against property such as bribery and corruption, unlawful possession, house breaking, armed or unarmed robbery, forgery and so on, or against the state in general.

Every nation has a department within its police force that is charged with the responsibility of criminal investigation. The department relies primarily on the information collected from complainants, witnesses and existing records of criminal cases in an attempt to investigate a case at hand. Criminal investigators have long used files giving the method of operation of known criminals, fingerprints, aliases and nicknames of criminals, and reports made by complainant to the investigating officers. The manual file system lacks standard procedure for data formatting, storage, retrieval, maintenance and documentation. In addition to these, there is no central control, thus, data security and privacy cannot be guaranteed.

This processing of criminal investigation is brought with a lot of pitfalls and is error prone. Limitations hampering the hundred percent efficiency of this conventional approach include the processing of file which is usually slow and a tedious task, particularly when the population of records to be searched is large, and the time lag between the time a bank robbery is committed and that by which the investigation is compelled is usually too long. Consequently, the society is characterized by prolonged period of detention of suspects awaiting trial and congestion in the prisons and law court.

The computer-Aided system proposed in this project is intended to overcome the limitations that characterized the conventional approach to criminal investigation. Moreover, the system will enhance the efficient performance of the human expert in the domain of investigation of bank robbery.

1.2 THE OBJECTIVE OF THE PROJECT

The major aim of any system development is to achieve efficient and accurate performance. This project will provide intelligent computer- based system which will enhance the efficient performance of human expert in the domain of criminal investigation. It is designed in form of human expert in such a way to provide numerous significant opportunities to improve the effectiveness and efficiency of accurate decision, judgment, elevation selection and communication. In addition to this, it shall provide a system for computer-Aided learning of criminal investigation.

Furthermore, the project will provide the information needed by the criminal investigation department in reasonable amount of time and elimination of the limitations or problems of the conventional approach to the criminal investigation in Nigeria as describe above. Moreover, an intelligent and interactive scheme for computer aided statistical analysis of crime shall be made possible.

1.3 THE PROJECT METHODOLOGY

The intended system is design to achieve all the above qualities that were lacking in the existing system, if the implementation of this was carried out.
The methodology used in this project encompasses two major strategies depending on the knowledge acquired by the studies that composed of the rules of thumb binding together the events, activities and objects associated with bank robbery.

This knowledge has semantic components but it is void of pragmatic. The semantic network exhibits a number of navigational paths whose straight forward method of enumeration leads to explosive number of possibilities. The semantic network describes four different points against which the bank robber targeted, namely: COSTUMER (CUST< CASHIER (CASH) CUUROUER (COUR), and STRONG ROOM (STRM).

The second strategy entails the type of knowledge that is concerned with that which is acquired by experience. In this project, experimental knowledge is assumed. It is exhibited in the case history of existing bank robbery. The conceptual model of the case history is formulated using the concepts of data abstraction, namely: classification, Generalization and Association.

The system supports an inference Engine that is coded in modules using the IF THEN clause of basic programming language. The modules are hierarchically structured and the details of the information content s increased downward. Thus, a module in the hierarchy can call another module at lower level thereby supporting the forward chaining strategy of inference engine. The upward chaining of modules in the hierarchy is allowed and this supports the backward chaining strategy of inference Engine. The factors taken into consideration in the investigation of Bank robbery are specified as constraints in the system prices. This leads only to the hastening of the processes of bank robbery investigation, but also enhances the performance of policy in the investigation of time.

1.4 ORGANISATION OF THE PROJECT

The organization of this project is not different from some of the existing computer Aided system from which references were made. The nature of the project has necessitated the grouping of the entire work into chapters and each chapter is again put into sections. Moreover, all related design issues are considered under the same chapter. The subsequent chapters of this project are highlighted below.

Chapter two, which is literature review, deals with the detailed analysis of crime in Nigeria, conventional approach to its investigation including the limitations and concluding remarks.

Chapter three, describes the information requirement of the computer-Aided system. Emphasis is on the operational data, the constraints and the inference modules.

Chapter four, presents the procedures for the system implementation. The input, inference modules and output reports are discussed. The results obtained from a case study are presented as well.

Chapter five, reviews the contribution of the system enhancement of bank robbery investigation and the recommendations for the research. In addition, a brief outlook is taken into the future direction of the project.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

A framework for computer-aided investigation for crime in developing countries has been proposed in paragraph under the motivation of the project.
The framework employs expert system (ES) technology that is an area of application of Artificial Intelligence (AI). It addresses the design of an intelligent computer based system for criminal investigation with emphasis on bank robbery. The architecture of the system has been presented and its functionality described

It has been shown that, there are many alternative paths that can be taken in the investigation of bank robbery. The alternative paths have been modeled using the concept of semantic network. Given the events, activities and object associated with a reported criminal offence and their relationships, the framework proposed provides the mechanism for the intelligent interactive processing of the corresponding semantic network of the crime and the history of the existing cases. The interactive processing considers a number of key factors that can be related, weighed and alternative deductive reasoning evaluated with the intention of identifying the set of culprits involved in a given case. This chapter further discusses classification of crime in section 2.1; section 2.2 focuses on the conventional approach to bank robbery where the investigation is described. Section 2.3 discusses the limitation of the conventional approach, the objectives of the project is in section 2.4. While concluding remarks are made in section 2.5.

2.1 THE CLASSIFICATION OF CRIME

Most of us feel that we have a reasonable understanding of what crime is all about. We are confronted with it almost daily as part of mass-media entertainment and news presentation, and we see commentaries on it on our local newspapers. We are also conscious of the fear of crime. We lock our homes and automobiles to protect our properties, and we avoid places and circumstances not considered safe

in order to protect our lives. Despite this, a lot of us are involved in crime or victims of criminals.

Crimes reflect a range of phenomena that have been subject to the interpretation of specialists from numerous fields such as sociology, psychology, and criminology. Among the earliest meanings applied to crime was that which was drawn from natural law. It referred to a body of principles and rules that were believed to be uniquely fitting for and binding upon any community of rational beings. Any violations of these principles (was) were deemed CRIMINAL. In this country, natural law comes from a source higher than man does, it is a higher law understood to be binding even in the absence of man-made.

As a country develops, there is an increase in robbery with violence, or the threat of violence to secure money or material objectives. Such as knives, firearms and other more specialized equipment are used in attacks of bank

Robbery could therefore be described a stealing or taking anything or value from the, custody or control of a person by force or by violence or by putting in fear, such as strong-arm robbery, and robbery.

In this emphasis is on bank robbery. The following reasons considered.

1. Assurance of money in the bank: robbers always have the feeling that a bank robbery operation will fetch then large sum of money rather than attacking individuals who are at times may not have money at the time of attack.

2. Low income- inability to achieve certain aspiration levels and attributes such as having things that are more luxurious, better housing, clothes can motivate people to result into robbery operation. They consider bank to be the best place of getting rich so quickly as they embark on bank robbery.

3. The spread and growth of industrial and enterprises require the transportation of large amount of money to local corporations whose security may be limited to a meager force of unarmed private guards. This can result into the premises being attacked by armed robbers.

The above-mentioned factors and others are largely responsible for the rampart ness of bank robbery in the country today. The result of which threatens the rate of economic growth and reduces the benefits of greater productivity for ordinary people. Above all, it creates a widespread sense of personal, public and social insecurity.

2.2 THE CONCENTIONAL APPROCH TO BANK ROBBERY INVESTIGATION

The section describes the conventional approach to bank robbery investigation in Nigeria. Every nation has a department within its police force, which is charged with the responsibility of criminal investigation. The department relies primarily on the information collected from complainants, witness and existing records of criminal cases in an attempt to investigate a case at hand. In or typical situation of

bank robbery, a complainant who is a person working at the bank goes to the criminal investigation department in his area to make a formal charge of the bank robbery. At the criminal investigation Department, a case file is then opened for the compliant. The compliant is then issued the case- number.

Following this, is the investigation procedure of the bank robbery that often last for several weeks, months or years. During this period, the existing records are searched in order to find out whether the bank robbery under investigation can be related to some cases in the past. The existing records are often kept piecemeal in file cabinets. The manual file system lacks standard procedures for data formatting, storage, retrieval, maintenance and documentation. Furthermore, there is no central control hence data security and privacy cannot be guaranteed. The processing of the manual file is usually slow and tedious task, particularly, when the population of records to be searched is large. The time lag between the times a crime is committed and that by which the investigation is completed is usually to long. The process of prosecution is often jeopardized. There is a chance of justice being switched unduly in the long process, after all, justice is delayed is justice denied. This approach to bank robbery investigation and trial of cases in the law courts is usually slow. Consequently, the society is characterized by prolonged periods of detention of the suspects awaiting trials and congestion in the prisons and law courts.

2.3 LIMITATION OF CONVENTIONAL APPROACH TO BANK ROBBERY INVESTIGATION.

Various factors limit the efficiency of the conventional approach to computer-based system for the investigation of bank robbery. Some of these limitations are discussed below:

i. Information collected over the years results in a pile of documents. There large volumes of documents are kept in files cabinets where security and privacy cannot be guaranteed.

ii. The manual file system lacks standard procedures for data formatting, storage, retrial, maintenance and documentation.

iii. The processing of manual file system is usually slow and tedious, particularly when the population of records to be searched is large.

iv. The time lag between the times a crime is committed and that by which the investigation is completed is usually to long because of the process involved.

2.4 THE CONCLUDING REMARKS

As a result of the inherent limitations exhibited by the conventional approach, an intelligent computer- aided system, which will aid the police and other personnel to investigate and detect those who robbed the bank automatically replaces the conventional method and proposed to be implemented. This new method will not only eliminate or reduce the problems it will also offer additional facilities to enhance the performance of criminal investigation. Department or the financial institution to bring he culprits to judgment. The design of the proposed system now follows.

CHAPTER THREE

THE INFORMATIONAL REQUIREMENTS FOR THE SYSTEM

3.0 INTRODUCTION

This chapter describes the information requirement of the computer-aided Systems. Emphasis is on the operational data, integrated view of the operation Data, constrains and the inference modules. The information requirements of the system can be classified into the information Perspective Structure (IPS) and the information perspective usage (IPU).

The information Perspective Structure (IPU) describes the natural and Conceptual relationships among the Operational Data. It depicts the mapping of the real world referents into entities and attributes and all mapping of the relationships between the real world into relationship among data elements. Information Perspective Usage (IPU) defines the data processing requirements. It Reflects the processing requirements of known future applications and the estimated Requirements of known future applications.

3.1 THE INFORMATION PERSPECTIVE STRUCTURE

Presented have are the Operational Data in terms of the files and their attributes. The integrated view of the operational data and data constraints are described As well.

3.2 THE OPERATIONAL DATA

The operational data is described using the relational dtmode .relation is similar to what is customarily referred to as a Flat File and in generally represented by a set of Structured Turtles. Each Turtles of a Relation corresponds to a file record and attributes correspond to the fields within a file record. The general forms of the

relational representation Is given by: R (A1, A2, A3, ----AK +1----AN-1, AN] where R represents the name of the relation. The set Aj J = 1,2,3-----n represents the attributes of the relation R. The set of attribute(s) underused constitute the unique key if the relation R[3]. The relations described below are those that are identified pertinent to the Computer-aided system for bank robbery investigation. However, more relations Can be formulated to support further research in this area. BANK [BANK-no bank-name, bank-address, bank Telephone-no]

a. WITNESS-SUSPECT [Person-no, Complainant-no, Case-no Date, Time, Place Where complain is made, complain]
b. WITNESS-SUSPECT [person-no, Witness-no Evidence-no Suspect-no, Evidence]
c. EXHIBIT [Person-no, Evidence-no, Case-no, Evidence]
d. CIRCUMSTANTIAL EVIDENCE A [Person-no, Evidence-no, Case-no, Exhibit description]
e. INVESTIGATION PROCEDURE [Bank-no Case-no, Complain-no, Witness-no, Evidence-no, Exhibit, Evidence]
f. COURT JUDGEMENT [Case-no, Court-no Court-Name, Court Location, Findings Judgment]
g. CASE HISTORY [Bank-no, Robbery Target, Mode of attack, Case-no, Complain-no,
Witness-no, Suspect-no, Evidence-no]
h. PERSON [Person-Name, Sex, State, Age, Address, Occupation, Marital-Status,
Nationality, Employer Rank/Position, Employer-address, Salary per annum]

3.2 THE INTEGRATED VIEW OF THE OPERATIONAL DATA

The integrated view operational data of the system is discussed as below. of the graphical representation of the semantic network for the system Implementation which is concerned with the knowledge acquired by study is shown In fig. 3. 1 below. It exhibits a number of navigational paths whose straight forward Method of enumeration leads to explosive number of possibilities. The semantic network

describes four different points against which the bank robbery can be targeted, namely: CUSTOMER (CUST), CASHIER (CASH), COURIER (COUR) and STRONG ROOM (STRM). The categories, of persons that may be connected with A bank robbery and subject to interrogation are: BANK-MANAGRE (BKMG), POLICE (POL), COURIER-DRIVER (CRDV), GATE-MAN (GTMN), ROBBERS Caught in the screen (BKRB) and OTHERS (OTHR). The graphical representation of the conceptual model for the system Implementation that is concerned with knowledge acquired by experience is shown in Fig 3.2 below. Anode in the graph describes the semantic relationships between two entities types.

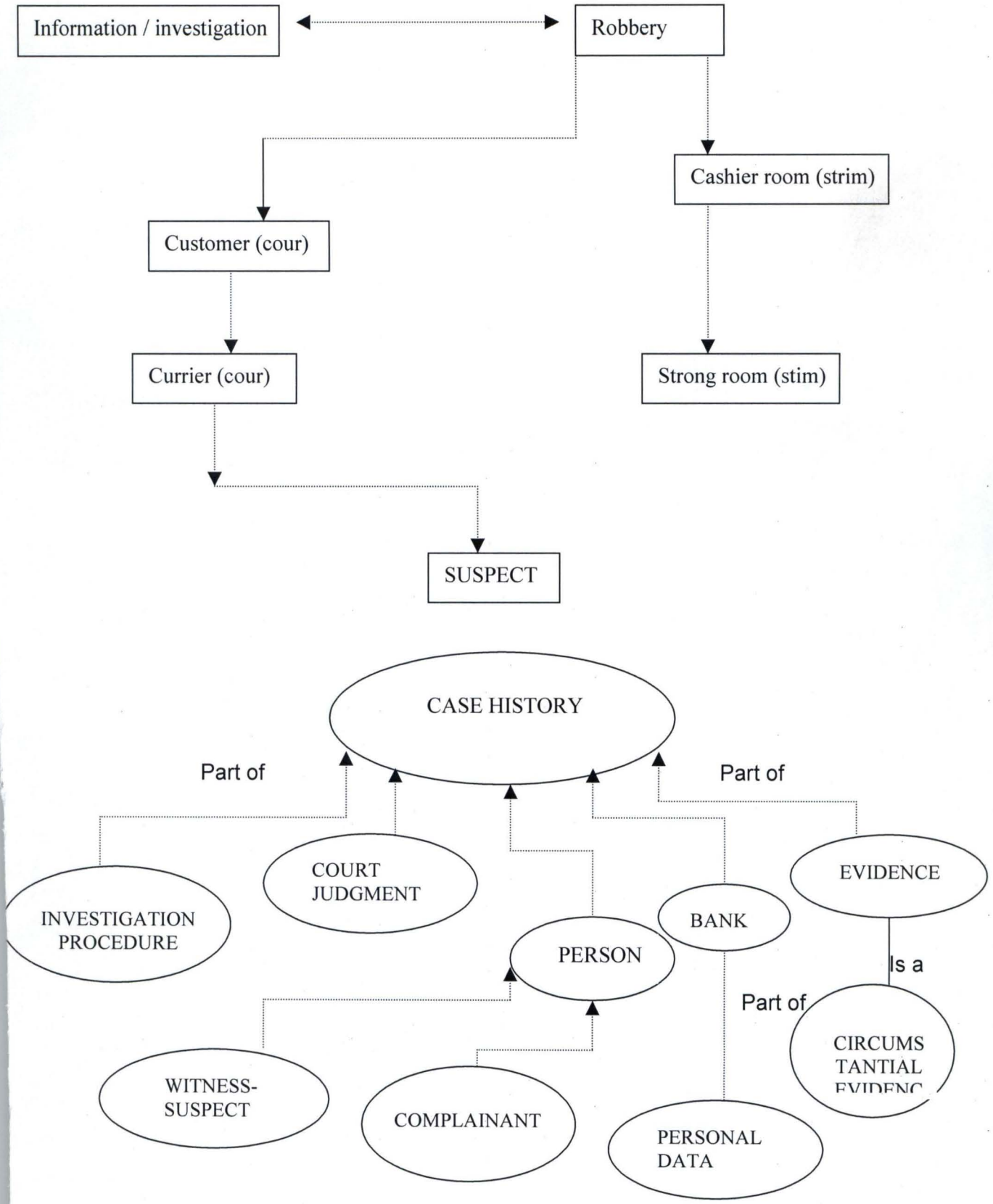

FIG. 3.2 CONCEPTUAL GRAPH

3.3 THE CONSTRAINT

The constraints that may be binding on the system may be classified into two categories, namely: static constraints and dynamic constraint. The static aspect of the system is the aspect which applies to it individual states and these constraint establish the dependence between parts of the system under consideration at a given point in time.

The dynamic aspect is the aspect which governs the evolution of the system. These are the systems laws of charge. Rules that governs the evolution of the systems have to be clearly spelt out in the process of system development.

Some of the rules attempt to enforce data integrity while others are concerned with the semantic of the operation data of the bank robbery investigation. Emphasis is on the semantic aspect. The set constraints are listed below:

1. No two bank should have identical bank-no
2. Complainant should have unique person-no
3. No two witnesses should have is identical witness-no
4. Suspect must have unique suspect-no
5. No two evidence should have identical evidence-no
6. No two evidence should have identical exhibit-no
7. Case history should have unique case-no.

3.4 INFERENCE MODULES

Knowledge serves and the basic for reasoning by knowledge information processing system, but it is not sufficient in itself to discover and use lines of reasoning. The inference Engine is concerned with piecing together an appropriate line of reasoning which leads to the solution of problem or the formulation of a body consultative advice.

In the project work, the inference Engine coded in modules using IF THEN clause of basic programming language is used. The textual description of same of the modules in the context of bank robbery investigation are given in the following:

1. if target of bank robbery is courier and the robbers went away with the money nobody is killed in the robbery.
   THEN the crew of the courier and Police Escort are suspects.
2. If target of Bank robbery is strong room and the robbery takes place at 8.00p.m and the Gate-man is wounded and the robbers went away with the money
   THEN Bank Manager, Bank-Accountant, Ledger Clerk, Cashier and Gate man are suspects.
3. If target of bank robbery is cashier and the cashier is wounded and the robbers went away with the money.
   THEN cashier, Bank-Manager, Bank-Accountant, Ledger-Clerk, Gate man and other person that may be involved are suspects.
4. If target of Bank robbery is courier and the robbery takes place in the bank premises and the robbers did away with a car in the bank premises.
   THEN the culprits involved in that case are suspects.
5. If target of Bank robbery is customer and the robbery takes place in the bank premises and nobody in killed in the robbery seen and the robbers went away with the money
   THEN Bank-Manager, Bank-Accountant, Ledger Clerk, Gate-man, Cashier and other customer are suspects.
6. If targets of bank robbery is customer and the robber takes place in the bank premises and the robbers went away with the money and a car in the bank premises and nobody is killed in the robbery and exist a case such that the robbers went away with a car in the bank premises
   THEN the culprits involved in that case are suspect.

7. If target of bank robbery id strong Room and nobody is wounded in the robbery and the robbers went away with the money and there exist a case such the robbers did away with the money.
THEN the culprits involved in that case are suspects.

A deduction in the context will be true only when the history of the existing cases has been processed and the findings favour the deduction.

Consider for example the modules given above in case number 4. the deduction that a group of robbers which are involved in a case of bank robbery in the past whereby a car is stolen are suspects in a case under investigation may be valid. The information deduced from the existing records may show that every member of the group has been executed by firing squad five years ago. Therefore, the truth values of the earlier assertion is false. Then other course of action has to be taken and this may lead to some chains of investigation procedures.

Thus, there are may alternative paths which can be navigated in the semantic network thereby leading to many alternative decisions. A navigational path which is fovoured by a decision extract with the highest estimate is considered valid and true

CHAPTER FOUR
THE IMPLEMENTATION OF THE SYSTEM

4.0 INTRODUCTION

This chapter describes the Hardware and software requirement of the system. The system architecture of the system's implementation is discussed as well. The results obtained from the experiment study of the system are reported.

4.1 THE HARDWARE AND SOFTWARE REQUIREMENT

Discussed below are the hardware and software requirement for the implementation of the system

4.2 THE HARDWARE REQUIREMENTS

Provisions of facilities to allow full operation of system requirement determine there would be computer system to the desired application. Although it is necessary during the development phase of the computer system to have an idea about the hardware and software facilities required for its implementation. A number of factors have to be considered. For example, the main memory and disk should be expanded. The system must have sufficient modularity and capacity as well as system flexibility. Maintenance services in the event of system breakdown should be available from the suppliers or local installation. Terminal equipment or peripheral equipment must have:

1. Adequate screen size
2. Adequate speed operation
3. Alphanumeric keyboard
4. Communication, On-line or OFF-line
5. Storage facilities as required by the system.

The output devices must meet the system requirements, particularly the printers. On the basis of the above requirements and availability of resources, the Apple 11E microcomputer was used to implement the system.

The Microsoft premium Euro soft card 11E circuit card is three in one.

i. Z80 coprocessor board
ii. Expansion memory board
iii. 80 column video display board

By combining the function of three circuit boards in one, the softcard circuit board saves the remaining accessory slots in the Appl 11E microcomputer for other purposes. The coprocessor section of the Z80 microprocessor with the interface necessary for communication with the Apple 11E IN/OUT bus

A coprocessor is on additional shearing control of the computer thus creating two computers in one.

The memory section contains G4kbytes of RAM (Random Access Memory) permitting the large application programs of the computer aided investigation of bank robbery systems to run under Cp/M control program microprocessor).

An 80column screen display is permitted by the 80 column display section. In CP/M mode one can run the Microsoft basic interpreter.

4.3 THE SOFTWARE REQUIREMENT

The operating system must have the following capabilities.

1. Ability to support and End-User query language.
2. Ability to check data written on disk
3. Provision of adequate system security and control as operator intervention for hardware and software errors.

Characteristics taken into consideration for the choice of programming language for the implementation of the computer-aided system for the investigation of bank robbery includes:

1. A range of data types to enhance the modeling of the different real life relationships.
2. Interactive nature of the language.
3. Control abstraction to take care of sequence, recursion and enumeration.

The BASIC programming language meets these requirements hence it was chosen in the implementation of the system.

The soft card package includes CP/M-80 operation system, the Microsoft basic interpreter and special transient programs to perform utility function such as modifying CP/M to the particular system environment. The Microsoft BASIC interpreter is the most widely used in implementing system in the BASIC programming language today.

Additional features of the BASIC programming language include: Machines independence and wide scope. It is also a Psuedo-natural programming language making use English- like expression.

4.4 THE SYSTEM ARCHITECTURTE

The conceptual diagram of the system architecture is shown in figure 4.1 below. The system supports a knowledge base, inference modules have been discussed in chapter 3. in the following the transformation of the conceptual model into a form that is programmable using a computer as a tool is discussed.

4.5 THE KNOWLEDGE BASE

This is the part of the system, which is concerned with the knowledge about the bank robbery investigation data or inputs. It consist of all records that may be required by the user to operate the system. Information that are entered by the user are also stored in the knowledge base of the system. The semantic network of the experiment knowledge of the system was implemented using the matrix

principles (Mathematically). While the conceptual model of the case history was formulated using the concept of generalizing aggregation and association.

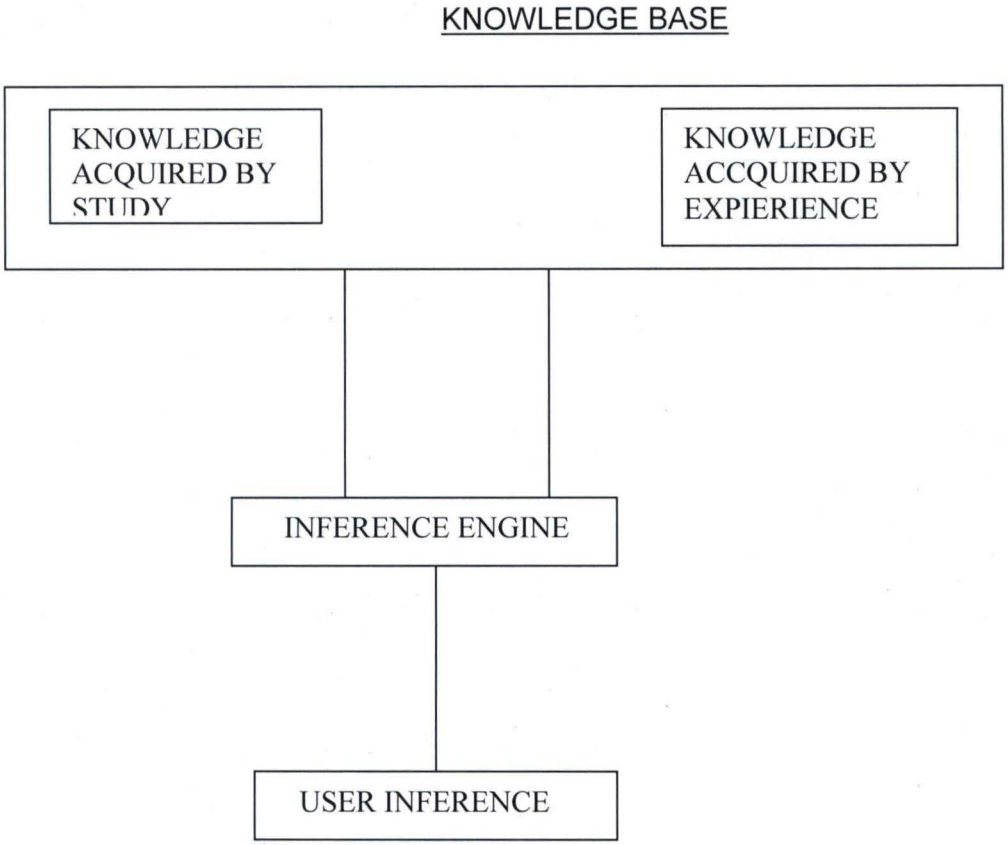

FIG. 4.1 **SYSTEM ARCHITECTURE**

4.6 THE INFERENCE MODULES

Linking the user and the knowledge base is the inference modules. The inference procedures are abstraction of the simple methods used in common sense reasoning or elementary logic. The two possible control strategies for using inference procedures for problems solving are: forwarding chaining and backward. In the forward chaining, one start from the available information and reasons forward trying to refer to infer the appropriate solution for the problem. In the backward chaining, one start from the conclusion and reason backward through the available data trying to establishing the necessary evidence to support that conclusion.

The interference modules are coded using the clause IF THEN of basic programming language. The modules are hierarchically structured and the details of the information content increased downward. Thus, a module in the hierarchy can call another modules at lower level thereby supporting the forwarding chaining strategy of inference procedures. The upward chaining of modules in the hierarchy is allowed and this support the backward chaining strategy.

4.7 THE USER INTERFACE

The interface acts primarily as the communication medium between the user and the expert system. It provides the resources for the user to ask questions and offer information, in practice at any time and without binding the user to respond narrowly to the systems initiatives.

A typewriter keyboard visual display units form the physical interface between a user and at and the designed system. The user is guided by well designed, easy to understand screen display and prompt. The menu prompt chain each corresponding option on any of the menus supported by the system.

A user view of the system is hierarchically structured. He gains access to the system by supporting valid user name and password. Following this, the system present to the user scenario of the modules which compose the inference procedures. The user then calls the modules one at a time. The system guides the user but always leaving the decision to the user.

4.8 THE CASE STUDY

A few sample transactions are described to depict the user friendly and interactive nature of the computer aided system for bank robbery investigation. The interactive nature of the transaction is depicted as follows.

The main program INVESTI.BAS is loaded and run using the command line-GBASIC INVESTIG.BAS/F.11/S: 360 with 1 files.

The following display is noted on the screen

```
************************************************************
*      USER:                              NUMBER            *
*                                                           *
*                        NAME                               *
*                                                           *
*                        PASSWORD                           *
************************************************************
```

The correct password results in the following screen display.

```
************************************************************
*                          HELLO                            *
*                     YOU ARE WELCOME                       *
*                          TO                               *
*                 COMPUTER-AIDED INVESTIGATION              *
*                          OF                               *
*                      BANK ROBBERY                         *
*                          IN                               *
*                       NIGERIA                             *
*                 STRIKE ANY KEY TO CONTINUE ==             *
************************************************************
```

Any key takes the user to the main menu of the system.

```
************************************************************
*      BANK ROBBERY                                         *
*      MAIN-MANU                                    *
*      1.    FAMILIARIZATION                                *
*      2.    UPDATING OF BASIC FILES                        *
*      3.    LISTING OF BASIC FILES                         *
*      4.    INVESTIGATION                                  *
*      5.    INQUIRIES                                      *
*      6.    EXIT MENU                                      *
*      SELECT OPTION (1-6)== ==                             *
************************************************************
```

Selections of option number 2 results in the update menu display on the screen.

```
**************************************************************
*       UPDATE OF BASIC FILES MENU                           *
*       1.      BANK                                         *
*       2.      SUSPECT                                      *
*       3.      WITNESS                                      *
*       4.      COMPLAINT                                    *
*       5.      EVIDENCE                                     *
*       6.      CIRCUMSTANTIAL EVIDENCE                      *
*       7.      EXHIBIT                                      *
*       8.      CASE-HISTORY                                 *
*       9.      INVESTIGATION PROCEDURE                      *
*       10.     PERSON                                       *
*       11.     COURT JUDGEMENT                              *
*       12.     EXIT MENU                                    *
*       SELECT OPTION (1-12) ==                              *
**************************************************************
```

Selection of option number 1 results in the following display on the screen.

```
**************************************************************
*       BANK FILES UPDATE MENU                               *
*       1.      ADDITION                                     *
*       2.      MODIFICATION                                 *
*       3.      DELETION                                     *
*       4.      EXSIT MENU                                   *
*       SELECTION OPTION (1-4) ==                            *
**************************************************************
```

Selection of option number 1 to add to the bank files goes via an ON-GOTO statement to chain the BANK1.BAS Program which creates and records to the files.

The following is displayed on the screen.

```
**************************************************************
*       BANK-No.                                             *
*       BANK-NAME:                                           *
*       BANK ADDRESS:                                        *
*       BANK TELEPNONE-No                                    *
**************************************************************
```

The attributes are filled in sequentially. After the following display appears on the screen.

```
**************************************************************
*       DO YOU WANT TO PUPDATE AGAIN                         *
*       TYPE-IN YOUR NAME==                                  *
**************************************************************
```

AY typed in creates a new record while a N results in s chained main program which displays the main menu.

Selection of option number 3 on main displays the following on the screen.

```
**************************************************************
*               LIST OF BASIC FILES OF THE SYSTEM            *
*       MENU                                                 *
*       1.      BANK                                         *
*       2.      COMPLAINT                                    *
*       3.      WITNESS                                      *
*       4.      SUSPECT                                      *
*       5.      EVIDENCE                                     *
*       6.      CIRCUMSTANTIAL EVEIDENCE                     *
*       7.      CASE-HISTORY                                 *
*       8.      INVESTIGATION PROCEDURE                      *
*       9.      COURT JUDGEMENT                              *
*       10.     EXHIBIT                                      *
*       11      PERSON                                       *
*       12.     EXIT MENU                                    *
**************************************************************
```

Selection of option number 3 loads the chain program Wumi.BAS which display the list of the witness that are already in existence in the system.

Selection of option number 4 on main menu transfers flows of control via ON-GOTO statement to the investigation section of the main program INVESTIG.BAS. Display on the screen is shown below.

```
**************************************************************
*       INVESTIGATION OF BANK ROBBERY MENU                   *
*       1.      BANK-NO                                      *
*       2.      BANK-NAME:                                   *
*       3.      BANK ADDRESS:                                *
*       4.      BANK TELEPHONE-No:                           *
*       5.      DATE-OF-ROBBERY:                             *
**************************************************************
```

The attributes are filled in sequentially. Following this, the system searches through the list of existing banks to see if the bank just reported has been robbed before or not. If it does not exit in the system, then the following is displayed on the screen.

```
**************************************************************
*       THE ABOVE REPORTED BANK HAS NOT                      *
*       BEEN ROBBED BEFORE, SO YOU ARE MAKING                *
*       A FRESH COMPLAINS                                    *
*        STRIKE ANY KEY TO CONTINUE====                      *
**************************************************************
```

Any key typed in result in the following screen display

```
*****************************************************************
*       COMPLIANANTS STATEMENT                                  *
*       1.      PERSON-No:                                      *
*       2.      DATE OF RBBERY:                                 *
*       3.      TIME OF ROBBERY:                                *
*       4.      TARGET OF ROBBERY:                              *
*       5.      INTERNAL SUSPECT:                               *
*       6.      EXTERNAL SUSPECTS:                              *
*       7.      REFRENCES OF EXISTING:                          *
*       8.      CASE HISTORY:                                   *
*****************************************************************
```

The attributes are filled in sequentially. After which the witness statement appears on the screen.

```
*****************************************************************
*       WITNESS STATEMENT                                       *
*       1.      PERSON-No:                                      *
*       2.      WITNESS No:                                     *
*       3.      CASE No:                                        *
*       4.      WITNESS ACCOUNT:                                *
*****************************************************************
```

The attributes are filled in sequentially. Then the systems prompt for the target of the bank robbery.

```
*****************************************************************
*       BANK ROBBERY TAGETS MANU                                *
*       1.      COMPUTER                                        *
*       2.      STRNG-ROOM                                      *
*       3.      CASHIER                                         *
*       4.      CUSTOMER                                        *
*       5.      SELECT TARGET (1-4) ===                         *
*****************************************************************Selection of Target 3
```

Transfers flow control to CASHIER SUBROUTINE which displays the following on the screen.

```
**************************************************************
*       BASED ON THE STATEMENT MADE BY COMPLAINANTES         *
*       WITNESS AND FROM PAST RECORDS, THE BELOW             *
*       MENTIONED PERSON ARE SUSPECTS AND ARE                *
*       SUSJECTS TO INTERROGATION                            *
**************************************************************

**************************************************************
INTERNAL SUSPECT                                    *
*       CASHIER                                       *
*       BANK-MANAGER                                  *
*       BANK ACCOUNTANT                               *
*       LEDGER CLERK                                  *
*       OTHER PERSON THAT MAY BE INVOLVED             *
*       EXTERNAL SUSPECTS                             *
*       POLICE                                        *
*       GATE MAN                                      *
*       ROBBER(S) CAUGHT IN THE SCREEN                      *
_____________________________________________________________

*       TYPE-IN Y TO GO BACK TO INVESTIGATION         *
*       MENU. ANU OTHER KEY TAKES TO MAIN             *
*       MENU                                           *
**************************************************************
```

CHAPTER FIVE

SUMMARY AND CONCLUSION

5.0 INTRODUCTION

This chapter finally reviews the contributions of the project in the enhancement of the bank robbery investigation and the recommendations on further research are highlighted. Also, a look is taken into the future to see the possible directions in which the system could be enhanced taking into consideration the evolutionary trends of technological revolution.

5.1 THE CONCLUSION

This project has addressed the design of an intelligent commuter-based system for the Investigations of bank robbery. The architecture of the system has been presented and its functionality described. It has been shown that there are many alternative paths that can be taken in the investigation of bank robbery. These paths have been modeled using the concept of semantic network.

5.2 THE CONTRIBUTION OF THE PROJECT

This section will briefly consider the contribution of the project so designed.
Firstly, a user interface, which facilitates intelligent interactive processing of the bank robbery data bank has been attempted. This aids quick investigation of bank robbery and bring the suspects to court within a few days. Secondly, the system provides the information needed by the Criminal Investigation Department, thereby reducing the long period of bank robbery investigation using the Conventional approach. Given the events, activities and objects associated with the reported bank robbery, the Intended system would provide the mechanism for the intelligent interactive processing of the corresponding semantic network of the bank robbery and the history of existing cases. The interactive processing considers a number of key factors which can be related, weighed and alternative deduction reasoning

evaluated with the intention of identifying the set of suspects involved in a given case.

5.3 MAINTENACE

Maintenance is a fact of life in the development of information systems. However, the Making of changes and adjustments do not necessarily signal correction of errors or the Occurrence of problems. Among the most frequent changes requested by end users is the addition of information to a report format. Information requirements may be revised as the result of system usage or chaining operational needs. Perhaps it oversights that occurred during the development process need to be corrected. Often the need will be arise to capture additional data for storage in transaction file, or perhaps it will be necessary to add error-detection features to prevent system user from Inadvertently taking an unwanted action. There are realities of application maintenance. When they occur, however, they are an indication that the system is being used and that it Is serving a used and that it is serving a useful function rather than being "shelved" by the end users. The corresponding semantic network of the bank robbery and the history of existing cases. The interactive processing considers a number of factors which can be related, Weighed and alternative deductive reasoning evaluated with the intention of identifying the Set of suspects involved in a given case.

5.4 THE RECOMMENDATIONS

Having gone through the various stages involved in the development of computer aided system for bank robbery investigation, and due to the constraints that militate against the realization of all the goals set out at the beginning of the project, the following presents a direction towards future research in the area of bank robbery investigation. Consideration could be given to other alternative paths that stated in the semantic network. This could be achieved by applying the principle of probability distribution of the decision extract. In the course of implementing this system, forward chaining and backward chaining strategies are adopted. Further research into this could use intensified and encouraged. Finally, for future use, there must be proper planning for both the hardware and software support and maintenance for the system. In addition to this, the users of the systems should be given an initial orientation on how to interact with the system, in order to remove the inherent fears of most users that believe that computers can only be operated by people in the field of computing.

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