

Design and Implementation of an Expert System for Electoral Security Using Faulty tree Analysis

¹Okeke Ogochukwu .C, ²Onyemelukwe Nnaemeka. C

¹Computer Science Department , Chukwuemeka Odumegwu Ojukwu University Uli, Anambra State. Nigeria,

²School of Health Information Management, Nnamdi Azikiwe University Teaching Hospital Nnewi, P.M.B 5025, Nnewi.

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ABSTRACT- Security is indispensable to the conduct of free, fair, and credible elections Borislava(2010). From the review, the basic security of the electorate at political party rallies and campaigns is to have a peaceful election without any fear of election malpractices, fraud, and violence before the election, the day of the election, and after the election. Agoha(2015) Given this, the Design and Implementation of an Expert System for Electoral Security Using Faulty tree Analysis which bridges the gap between the problems and the root cause of the problem in the electoral process system in Nigeria, was conducted. The system consists of a knowledge-based method to gather information from the electorate. The organization and conduct of this paper focused on the election security process, which is significant for ensuring effective security.

Keyword: Security, Electoral, Expert System, FTA, knowledge-based.

I. INTRODUCTION

An election is a complex process composed of many steps, some executed by computers and others by election officials, voters, and other people. Our earlier work evaluates perpetrators of electoral violence processes focused on identifying single points of failure. This paper is based on extends that work by modeling electoral malpractice, then integrating each event with a model of the electoral process, which determines the changes to the process model that will suffice to thwart that event Borislava (, 2010). specifically, we apply fault tree analysis (FTA) to identify a detailed election process model which automatically locates vulnerabilities that can be exploited. We then use minimum cut set MCU to formally evaluate the election process's malpractices against each violence. Democracy was regained by the country in 1999 after Olusegun Obasanjo was elected as the president of Nigeria. He was re-elected again in 2003, in the 2007 general election. Umaru Yar Adua came to power under the people's Democratic Party (PDP). He passed on in May 2010 and was replaced by Dr. Goodluck Jonathan, who won the 2011 general election but was defeated in the

March 2015 general election by Muhammadu Buhari. He was also re-elected in the 2019 election. Why is democracy in Nigeria encountering so many troubles, insurgencies, corruption, ethnic rivalry, political assassination, among others? How come rather than solving so many social ills, it seems to be aggravating them Temidayo(2016).

In Nigeria, due to the state of affairs conducting elections, results are always subject to petitions, delay, instability, electoral violence, and complaints. The electoral system established a course of action for such disputed results to be challenged at elections tribunals or courts established to look into such cases. The commission in charge of elections affairs in Nigeria is called Independent National Electoral Commission (INEC) Olawale (2017). The electoral security assessment can be shown using the FTA method.

A. Statement of the Problems

1. Vote trading and vote-buying Electoral Rigging (Before and After)

B. Aim and Objectives of the Study

The aim is to design and implement an expert system for electoral security using faulty tree analysis.

C. Objectives are:

1. To design a model that identifies and rates candidate base on the previous record as regard vote-buying
2. To identify the probability risk factor that could constitute threats to peaceful Election.

Pan et al. (2007)

II. RELATED WORKS

Onimisi (2019), In his paper, notes that the post-electoral violence obtains during the election is one of the most violent in the history of democratic dispersion in the country. Based on the records from various secondary sources and with the use of satisfying analysis, he concluded that the main causes of the level of violence could be attributed to ethnicity, sectional in politics, and depth



ignorance and recommending that re-strategies-strategize the security architecture for election in the country. Mou's (2018) Review focus on National security and electoral integrity in the forthcoming general election in Nigeria. He argues that without good governance, that will guarantee electoral integrity, moderate democracy, and security in Nigeria. This is the basic prerequisite of creating a conducive playing field for the citizens of any country to elect their flag bearer, leader, and chief that could provide good governance, development, and prosperity for their nation. He also highlighted that the failures to appreciate and handle these issues carefully, especially of national security and electoral integrity, have created several problems for many nations the world today and are still doing so. Some state in Nigeria has already become a consequence of the electoral violence Olakunle (2019), Mou (2018), which identify the probability risk factor that can lead to election rigging, violence, and buying of the vote, etc. The recommendation being made here is that these are all supplementary to good national security architecture, good governance, and increased electoral integrity; effective and inclusive policing becomes easier to accomplish. Wale (2010) Examines the obstacles to a free and fair election which say that the corruption in Nigeria policies is the greatest obstacle to a credible electoral process in Nigeria which undermines their output in terms of securing as an instrument of a free and fair election in Nigeria, which still not bridge the gap of acts of violence in an election conducted in Nigeria.

The above review points out how important electoral security needs to be addressed in the aspect of preventions, measures, ideology, control, strategies of conducting free and fair election such as less violence, no vote-buying, no rigging, etc. American ideology is based on liberal trends such as warfare programs for the poor, expanded civil liberties, action to promote equal opportunity, job-retraining programs for unemployed works, and graduated income taxes which is far from Nigeria's political ideology that is based on vote-buying, godfatherism, and corruptions. The knowledge gap of the paper is to find out the problem facing Nigeria party not to adhere to their constitution or party ideology before electing a candidate and proffer solution using faulty tree analysis that will identify the potential cause of system failures before the failures occur which bridge the gap between the problems and the root cause of the problem.

III. METHODOLOGY

A. Analysis of the Existing System

The electoral security at the polling unit will be as at the polling unit. Presentng.Com(2020) An official will check if you are at the correct polling unit and confirm that the PVC presented belongs to you, then the INEC official will validate your card reader, you will be asked to place your finger on the card reader whit your PVC to confirm that you're valid before any election security is carried out.

B. The weakness of the Existing System

- I. The operational control over security forces deployed during elections cannot prevent electoral fraud
- II. Lack of expert analytical solution to identify the root cause of the violence.
- III. Manual technology is used.

C. Analysis of the Proposed System

Registered party member will login into the platform with his or her PVC and membership card, which automatically accreditation and verify that the registered voter is a valid party member; the registered voter will get equal opportunity to rate the intending flag bearer or delegates who, in turn, elect the party's candidates on their behalf in terms of security threat which might arise during the election using the software. The system (expert) will automatically record each registered voters assessment (rating) against the name of the flag bearer stated in the platform, and the software then draws the inference that is used to analyze, tabulate and account for all the statistics, using faulty tree minimum cut set method to identify the probable root cause and display the quantitative analysis of the unprofessionalism that has the highest number of rating.

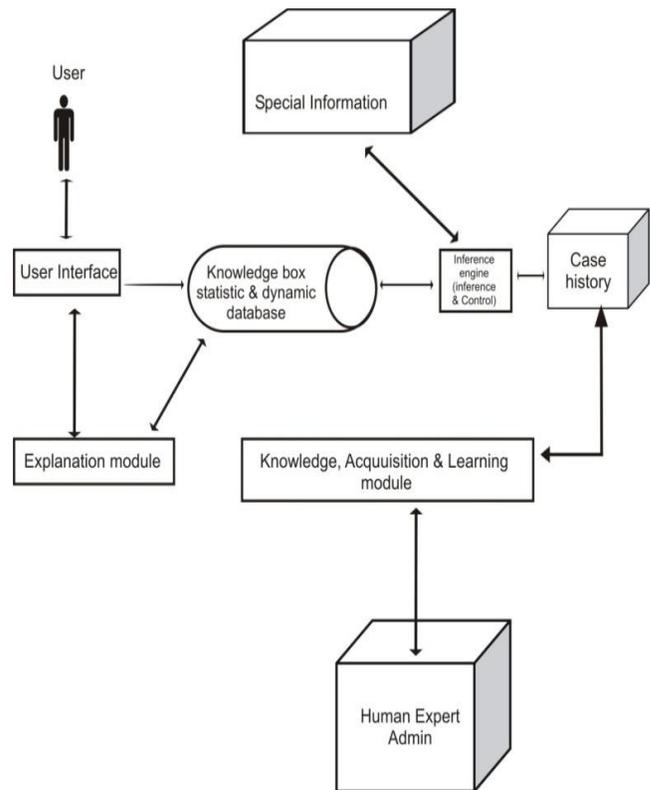


Fig1: Propose Expert system architecture

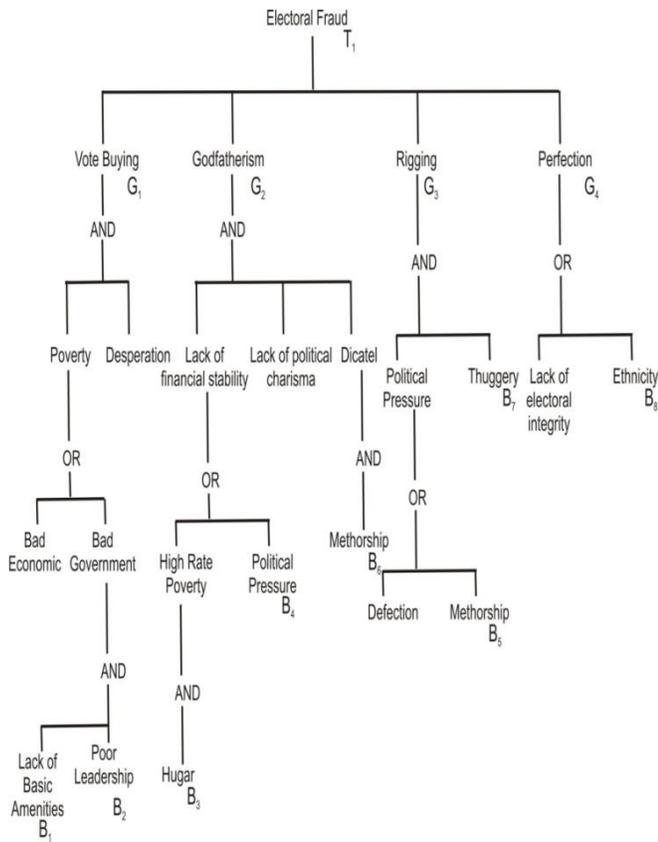


Fig2: Electoral fraud data flow diagram of the proposed system

IV. IMPLEMENTATION

In this section of implementation, a complete methodology for the authentication of knowledge-based expert systems is presented. Ogallo(2018) The first one creates a minimal set of test inputs that adequately cover the domain represented in the knowledge base (KB). Second, applying Turing Test to evaluate the system’s responses to test inputs and compares them to the responses of human experts.

A. Test Data

The test data were made up of 5 electorates from each Council Areas of two political parties that have 326 wards. Data tested was three thousand two hundred and sixty. (3,260) to determine the effect of election security in Anambra state Nigeria.

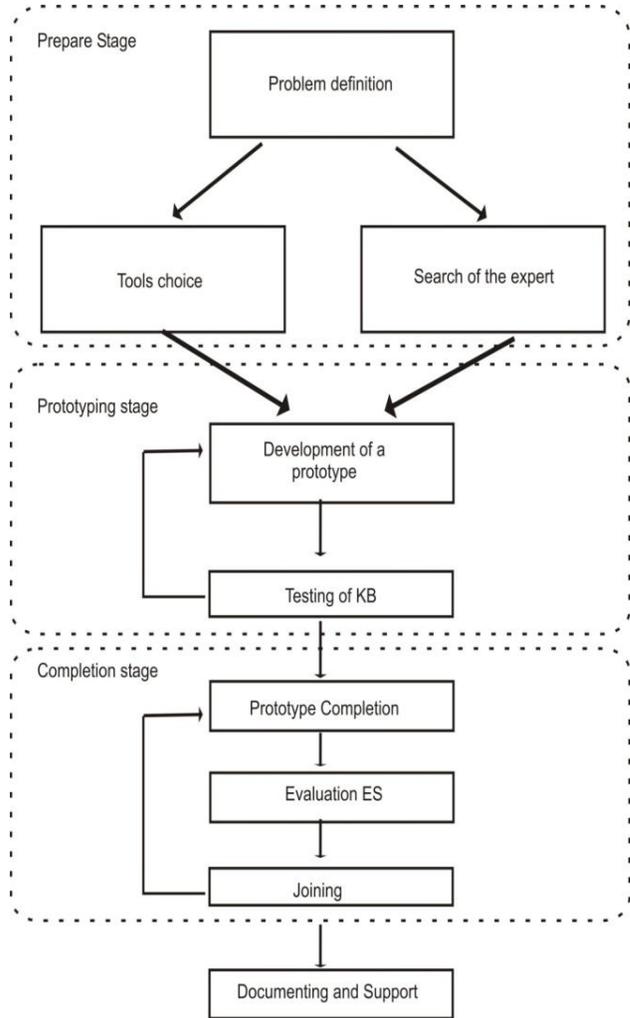


Fig.3: Stages of Program Development. TutsMaster.org(2020)

V. CONCLUSION

The use of computers has opened a wide range of operations in the application of operations research. Hitherto, complex problems with hundreds of variables are difficult to tackle. Still, most of the operations research problems are not generally obtained in (formula-like) closed structure, but by algorithms, which provides fixed computational rules that are applied repetitively to the problem with each repetition (called iteration) moving the solutions closer to the best possible; and the computations associated with each recurrence are typically tedious which must be executed on a computer. Hence, in this work, the efficiency of a computer is used to complement the dynamic programming model in achieving an electoral security process. The electoral security assessment is conducted using the Qualitative data collection method.

VI. RECOMMENDATION

Process improvement through the model of Electoral Security Evaluation Machine (ESEM) seems to be an effective approach for improving Electoral fraud on election days in Nigeria. The model enables the application of ESEM and also gives room for other methods. One major advantage of using Faulty tree analysis to analyze a carefully defined process model is the automatic generation of fault trees and corresponding MCSs.

Future research on modeling and analyze the different strategies of election security processes to further evaluate and improve the approach presented in this paper

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