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Enhanced Performance Management System for Nigerian Police Using Neuro-Genetic Algorithms

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Abstract:- **Our security agencies today have failed in their various quest towards the actualization of their sets goals due to lack of a good management information system that will ensure effective decision-making process. This serves as a bases for this research paper which is to develop an enhanced information management system that will monitor, evaluate/appraised staff personnel using neuro-genetic algorithms with the view of ensuring accurate, timely information management system that enhance good decision-making process which will serves as a platform for assessing the staff or personnel appraisal during promotion, incentives and rewards or benefits. The system will utilize biometric features like fingerprints for capturing then voice and password/pin as a means for identifying enrolled staff before access into the system, and system is managed by the admin officer. The database contains officer's table, attendance table, duties table, skill level indicated in two tables label A and B. Table A shows the level of competence exhibited by the worker while carrying out the work as being monitored. Table B shows the attitude and conduct exhibited by the worker while carrying out the duty. The new system designed to managed the Nigeria Police staff information can analyzed their performance with less bias. The methodology applied here is the object-oriented methodology and design. The system will be implemented using C-Sharp Programming language and used Microsoft access for the back-end.**

Keywords:- *Performance; Information Management; Evaluate; Productivity; Neuro-Genetic Algorithms.*

I. INTRODUCTION

It has been over twenty-five years now and the police system in Nigeria is still not changed the way they organize, work and coordinate system of appraisal/compensation procedure for staff through Controlling and monitoring. Execution controlling is a method of organization in which a firm seeks to build up her execution by creating a measure to gauge the execution echelons of all component of the firm. The execution produced by the workers within a given duration is generally calculated in units.

Execution is known as the accomplishment of the firm according to her objectives. They include results attainted or accomplished across the aid of person/worker. The executions comprise financial state and conducts. Execution controlling goals are to attain the aims of the institution outcome and competence as feasible. Even in our society of budget cuts today, execution managing/controlling is being used more to assist institution to meet their objectives according as planned. Government over years has steadily been faced with budget deficits. When it was obvious that there is not enough money placed aside to fund vital schemes, governments, therefore, was enforced to find a new procedures/way to make job available which is the government responsibility. Thus, the result/results of government self-re-examination has improved the growth of execution/execution and controlling/managing of schemes in many local governments and firms.

The Law enforcement agency institution/organization needed to pay sufficient attention and awareness to performance management design to improve competence and productivity. Records now show that very fewer units in the Nigeria Police or Law enforcement agencies are trying to improve performance management redesign for good appraisal/compensation procedure[1]. In Nigeria Police, performance of officers is tacks to limited budgeting supervision and yearly performance work. Experts, although, point out that there is no connection amid workers execution and the state of financial record[2].

The paper intends to create an enhanced execution controlling system for Nigerian Police using Neuro-Genetic Algorithm. We construct an integrated module and vital interfaces that contain collection of data, information maintenance, and dissemination to regulate wage structure, compensation packages, salaries raise etc. Develop Neuro-Genetic Algorithm to perform real genetic staff performance analysis.

This work is significance to the Nigeria Law enforcement agencies (Nigeria Police), as it will assist security-agencies to carry out performance management system in a robust and transparent way. This work will also give Nigeria Law enforcement agencies (Nigeria Police) hope that staff assessment is done with less bias.

II. RELATED WORKS

A. Principle of Performance Management

Shane in [3], opined that Execution-management is a combined steady advanced process for communication and subsequent commands, competences and importance of the firm will assist to produce a straight understanding. It's a procedure in which supervisors, managers and workers job to place staff execution with the organization's objectives. Execution controlling is method to advance execution across a procedure to produce await results, to positioning performance

or execution level, then collecting, investigating and reporting on the records to advance individual.

[4], pointed out in their research that impact of incentive on job is the key driver of execution of employee in Malaysia and advice others to borrow the idea to improve production in their organizations. The work showed good relationship between motivation and employee's execution or job execution.

[5], stated that the bliss of civil service redesign that begins in Anglo Saxon countries during the late 1970s has outspread across the world. It is now rotating all over the world as a model, each nation builds up the model based on their choice/pattern. Execution controlling is relatively everywhere for several decades in the public sector and now became an interested for public administrators, elected officials, people etc. Supervise performance is the key element for restructuring of the civil service[6].

The performance management goal has a biggest-productivity measure that people and groups have the responsibility of better business course and their methods/experience that aid within structure and make productive leadership available. The objective of performance management is to build up the capacity of recruits or workers in order to improved staff productivity. The purpose of the result performance management is not limited to measuring outcome and productivities. It's a channel and guides to policy fulfillment command and ensuring we handle that which matter most. Execution improvement in firm has become a hard matter earlier because managing/controlling propositions of theory. [7], disagreed that the past has witness a stable gradual change in the managing of public jobs done across import market-type managerial operation in the civil service. Thus, changes now aim the enhancing eminence of performance in public jobs done, establishing fresh ways of link amid public and private service firm, and now modernized ways of accountability and regulation. Similarly, these public controlling changes have, in a difference way, been referred to the method of a state build up and economies/financial state transitional. However, there are good increases when using performance management system in the civil service.

B. Proedure of Performance Management

The procedure of performance management is as follows:

- Designing Managers performance and Progress.
- Supervise Managers performance and Progress.

They happen in defined order. At the beginning of the year, planning commences followed by supervision and supervision are carry out all through the year as plans are implemented. The two procedures shall need a holistic action from the head/manager and managee. The two components (manager and managee) make available suitable facts and keep the procedure in outlook. The entire procedure execution controlling may be in view of different look.

Execution levels obviously force firms' operation, aims, and policy and plan operation. Because execution controlling target to enhance quality management among people in the firm, duty-wise execution plan controlling goaled to enhance eminence of managing among people in the firm, the execution plans and presumptions must come from both Firm's assignment, aim, plan and execution system and individual managee's duty and his/her support to firm procedure is important to execution plans. The execution plans of all the workers in the firm must in the end sum-up with the firm objectives to be attain within the year. Staff's execution and progress plan of action are subjected to supervision. If not powerful plans of action, for mission accomplishment, it cannot be feasible to resolve on a basis to attainment for set objectives.

Here are some types of execution attributes which empower Execution Controlling for robust operations and qualitative in attainment of firm objectives. They are:

- Steady operation: Execution controlling should be a steady operation that must be handled periodically (yearly) i.e., planning staff execution and progress, supervise workers execution and monitoring managee's progress and summarized yearly production.
- Adjustable: The Execution controlling procedure should be adjustable and make sure that the supervisor and managee acting together. Although, each of the component group should have enough manpower to plan their own procedure among the over-all structure for execution controlling.
- Forecaster: Execution controlling should be forecast. The entire three components of execution controlling are mentored for the upcoming designing and enhancement. Evaluation method gives vital contribution to actions in feature.
- Participation: Execution Controlling is characterized by participatory. This offers frequent understanding between the head/manager and the staff to look into execution and progress require.
- Management: Execution Controlling goals calculate worker's total execution for calculated execution i.e., goals, levels etc.
- Conduct of Contentment: Execution Controlling that summarized progress natures and interest herself powerful with staff emotional conduct detail and individual quality that is important process to the execution procedure. PFM identify the staff quality and conduct of each employee's level and diligently evaluate the size of their assistance to employee standard of execution. It a process of clearing the ways to recognized employee's subsequent progress need.

C. Performance Management in Police

Police performance in its simplest way, means the system at which the police carried out and delivered their varieties of task or duties for which they have responsibilities. "Execution/performance" didn't mean "execution indicator" (that is, numbers and statistics), however, it is a simple presumption for instance when individual compare common crime calculation with police performance. Performance gauge is used to perform trial of what execution is about, and

may not include the entire process of the assignment areas considered for the law-enforcement-agency to take charge of responsible, except they have been particularly set in place. The law-enforcement-agency has the actual duty within community in tackling crimes and make sure communities has safety. This is some of the most fundamental and recognizable services make available in our localities and officers responsibilities cut-across a very broad-range of job. We can rely on the police for some of the following:

* Prevention of all types of crime, eg. Shop-lifting to fraud.
* Arresting of criminals and ensure that they face justice
* Disorganizing organization of criminal association and target across-board communities
* Providing with public-safety-reassurance (e.g. the present of police officers should be around the communities) to reduce panic.

D. Neuro-Genetic Algorithm

A genetic-algorithm (GA) is a meta-heuristic inspired by the procedure of natural enrollment that belongs larger class of evolutionary algorithm (EA). Genetic algorithms are commonly used to generate big-eminence solutions to optimization and search issues by relying on bio-inspired operators such as mutation, crossover and enrollment. Genetic algorithm works modeling the parameters of a problem as real strings.

Figure1 shows the methodology that is derived from performance prediction indicators that is deploying a simple staff performance assessment and monitoring system focusing on performance monitoring of staff's continuous assessment in order to predict their final achievement status upon performance. This is done based on various data mining techniques (DMT) and the application of machine learning processes, rules are derived that enable the classification of staff in their predicted unit or department [8]**.** The deployment of the prototyped solution, integrates measuring, 'recycling' and reporting procedures in the new system to optimize prediction accuracy. A fuzzy qualitative classification system for staff performance evaluation using the link analysis methodology [9], unlike the conventional approach where fuzzy rules are used to encode information provided by training data, the proposed model considers involving variables, units and their relations as elements of a social network that can be modeled as a weighted graph. Genetic algorithm along with decision tree is used in distant learning for analyzing the staff performance. These concepts form the basis of the GATREE System [10], which has been built on top of the GALIB library [11]. The genetic operators on the tree representations are relatively straightforward. A mutation may modify the test attribute at a node or the class label at a leaf. A cross-over may substitute whole parts of a decision tree by parts of another decision tree. It is used to assist in the task of continuously monitoring a staff's performance. [12], uses a hybrid of genetic algorithms and neural to optimizes his prediction. This is shown in figure2.

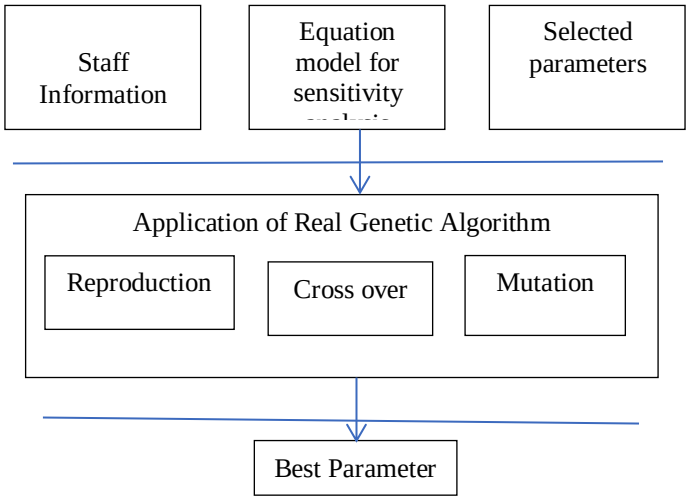

Fig 1: Hierarchical Design of real genetic staff performance analysis tool[13]

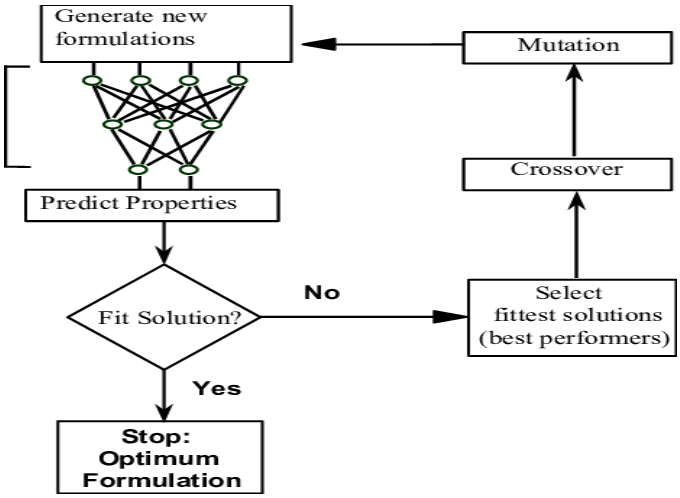

Fig 2: Genetic algorithms and neural structure [12]

III. METHODOLOGY

Object Oriented Design (OOD) is the methodology adopted in this research work. Proposed system, evaluate procedure and implementation. This method allows the fulfillment of software results positioned on the principle of objects. Figure 3.1, Object-Oriented-Methodology (OOM) is a method of progress analysis that motivates and ease re-uses of software element.

A. System Architecture

The features of the system architecture are: i) Voice and password/pin identifications as method of the identities needed for accessing the system. ii) The System/Admin or staff login with his/her identification (Voice and password/pin), after the authentication of the voice, then the scheme asks the user for password/pin before accessing into the method. iii) Then the user's particulars such as his/her name, addresses, assign duties and progress position etc. are analyze. iv) Personnel job are been observe for atrial to edit or update and modification of existing staff information, forcefully login, and un-moral action. v) The System/Admin also carryout valid job such as updating the workers data-base and investigate performance of

staff. vi) Feedback of personnel progress reports for decision-making. vii) Analyzing the performance outcome that is measurable such as attendance, internal evaluation marks. The overall system architecture is shown in figure3a and Figure3b.

B. Neuro-StructureGenetic Algorithm

Most Important Parameter Used RGA: This analysis is concerned with finding most important attribute that affects the performance of staff. As the fore mentioned properties of RGA are highly advantageous, RGA (Real Genetic Algorithm) for RGSPAT (Real Genetic Staff Performance Analysis Tool) is designed using Crossover and Mutation process. For this experiment we have selected the quantitative factors among the staff in the organization. The real-valued genetic algorithm (RGA) uses a real value as a parameter of the offspring in populations without performing coding and encoding process before calculates the fitness values of individuals. The performance analysis for RGSPAT model is given by the following equation.

Performance value (PV) = 100(ATT) + 100(OD) + 100(JSL) + 100(JA) + 100(BV)/5 (1)

The working of real genetic algorithm in performance analysis is as follows.

a. [Start] Generate random population of attributes as chromosomes

b. [Fitness] Evaluate the fitness f(x) of each chromosome x in the population

c. [New population] Create a new population of attributes by repeating following steps until the new population is complete

i. [Selection] Select two parent chromosomes from a population according to their fitness (which satisfies the fitness function)

ii. [Crossover] with a crossover probability Pc crossover the parents to form a new offspring (children). For real values, linear crossover is performed. ax+(1-a)y, where a is priority value in the equation and x, y are real values

iii. [Mutation] with a mutation probability Pm mutate new offspring at each locus (position in chromosome), For real value mutation, add any random value as x + N(0,0.1)

iv [Accepting] Place new offspring in a new population

a. [Replace] Use new generated population for a further run of algorithm.

b. [Test] if the end conditions are satisfied, stop, and returns the best parameter in current population

c. [loop] go to step b. Initially a population of chromosomes, each of which represents a potential solution to the problem at hand, is generated randomly and each of them is evaluated by finding its fitness. The next generation of same size is created by selecting more fit individuals from this population and by applying genetic operators like crossover and mutation to them. Mutation is an operator which creates a new individual by making a random change in the old one, whereas crossover creates new individuals by combining parts from multiple individuals. Classic mutation randomly alters a single gene, while crossover exchanges genetic material between two or more parents. This completes one generation and after repeating this procedure for a number of generations, due to selective pressure the algorithm converges and it yields a better solution.

C. Usefulness of the System

The system has the following advantages: i) The method can discover from the database of illegal trials tracks and create responsive security feedback for fraud mitigation or alleviation. ii) The method offers competence ways of implementation of voice or fingerprint identification in entry prove. iii) The method constructs it unfeasible for imitation of workers accounts. iv) It will activate technological innovation into the progress of transferable and mobile devices combine with voice and password/pin identification for officers' examination and execution appraisal.

IV. RESULTS AND DISCUSSION

The enhanced execution controlling method is software designed for officer, particularly those in security agencies. It is designed to automatically accumulate facts of each officer over a period of time, which then analyzed based on some mathematical formulas and the execution percentage of each officer is displayed using charts and tables. Figure4 is screenshot showing password/Pin authentication. Figure5 shows screenshot of performance of officer/workers. Figure6 shows the screenshot of officer personnel dashboard. Figure7 shows screenshot of officer's Job Skilled Level and Figure8 dhows screenshot of officer's attitude and behaviour.

V. CONCLUSION

Performance management is the real tool meant to enhanced the performance and productivity in the Nigeria-Police and others security agencies as well as civil service department as the case may be. In Nigeria-Police, execution controlling is yet to be fully institutionalized as it is in the western nations such as America, China, Europe etc., although some good trial has now been recorded but more are yet undone which will help arrived at success. Outcome execution controlling in the Nigeria Law enforcement agencies require specific tools which will measures the execution of workers with less bias. The proposed method is capable to handle the challenges such of assigning duties, monitoring, storing, appraisal with less bias and updating information and giving feedback of any criminal acts for immediate prosecution and analyzed performance idea in the scheme. Some security features are still lacking in this study such facial, card etc. as means of identification.

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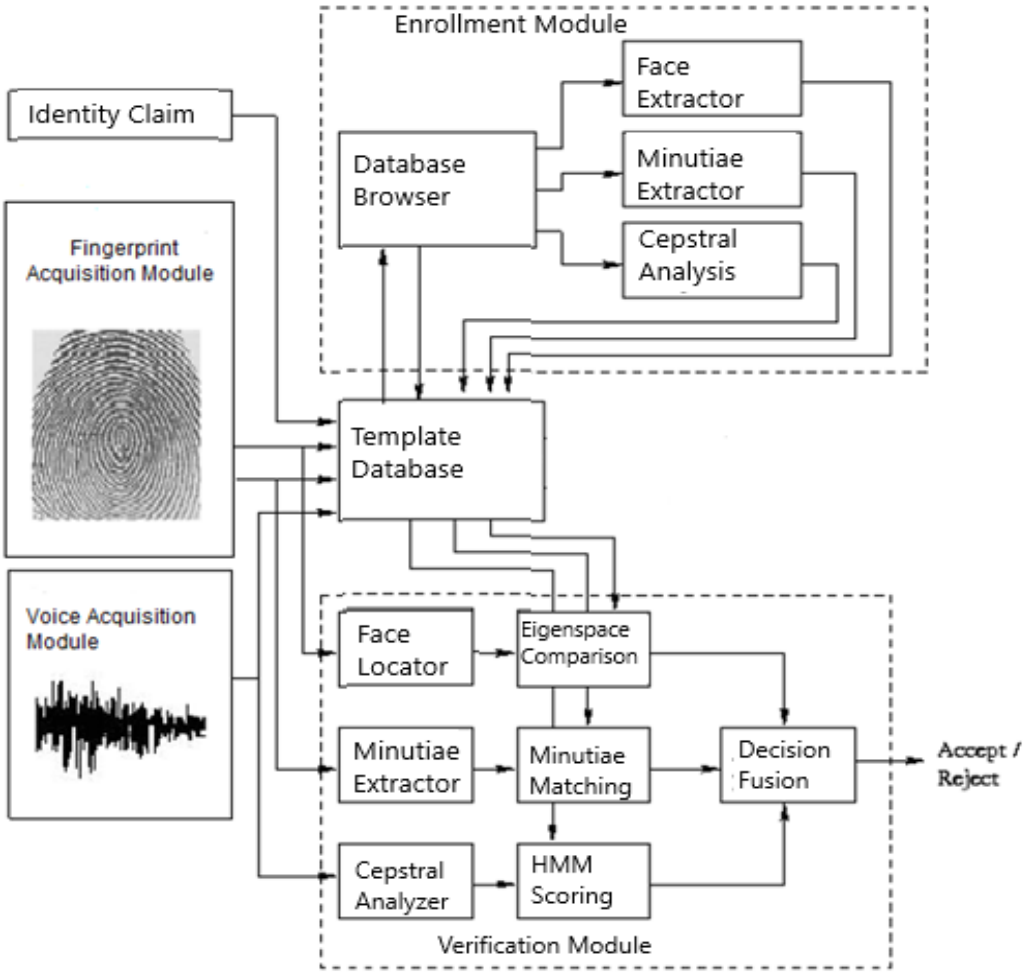

Fig 3a: Sysyem Architeture

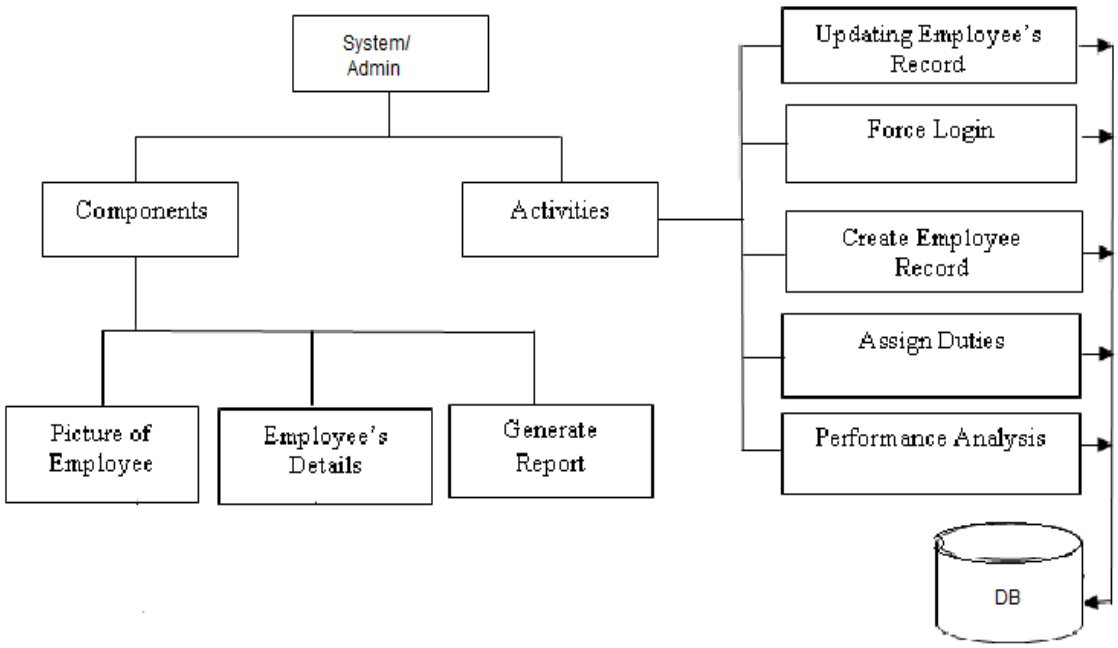

Fig 3b: System Architecture(The System/Admin is linked to the template database)

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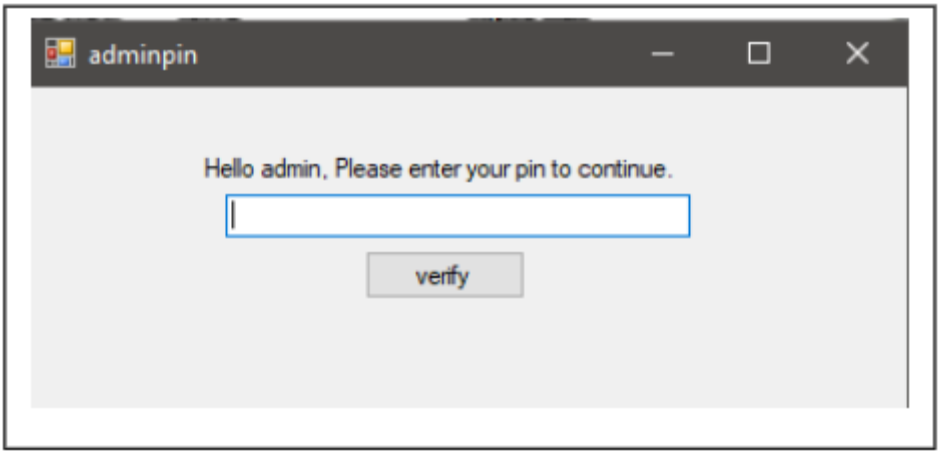

Fig 4: Screenshot showing password/Pin authentication

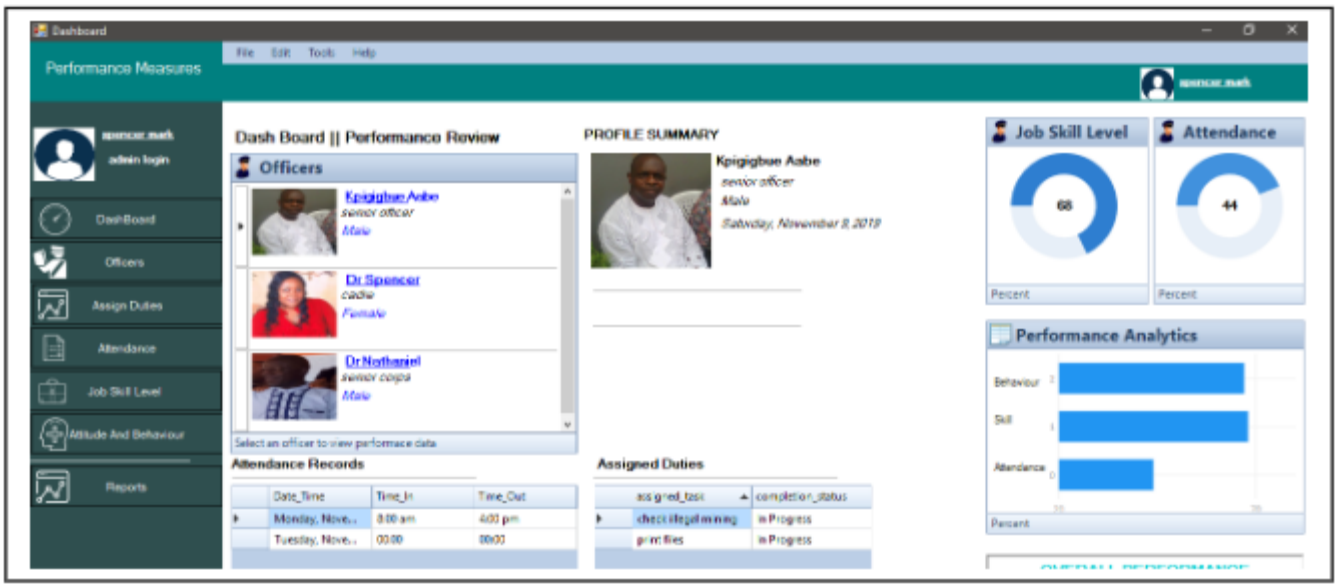

Fig 5: Screenshot showing Performance of Officer/Workers

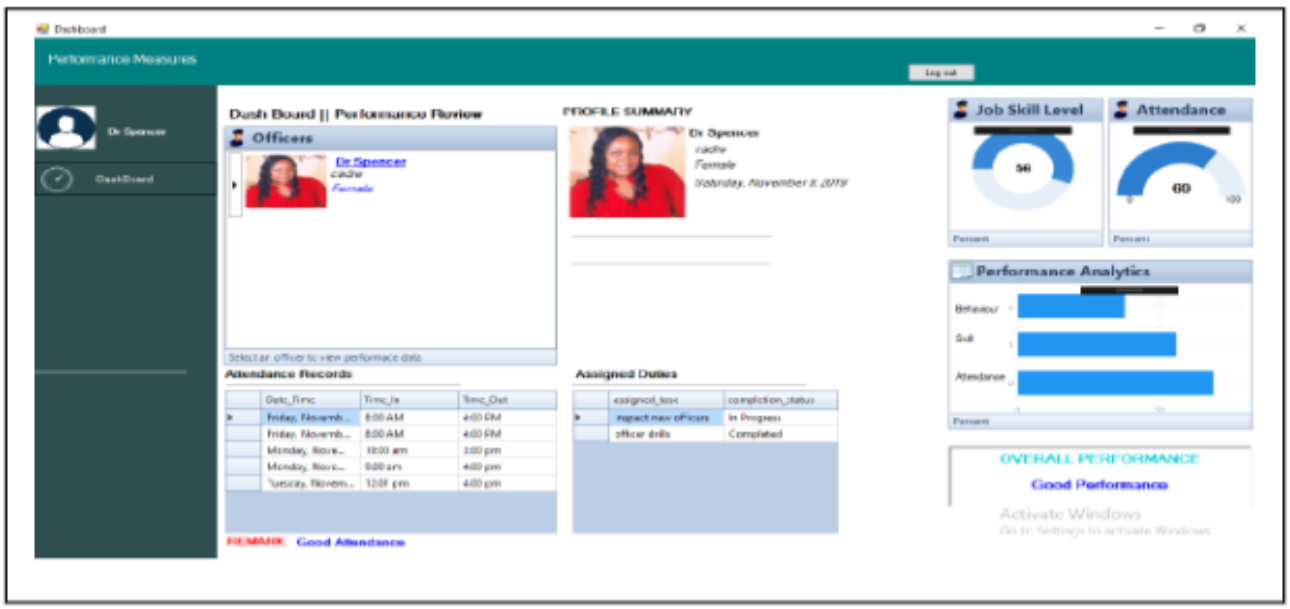

Fig 6: Screenshot showing Officer Personnel Dashboard

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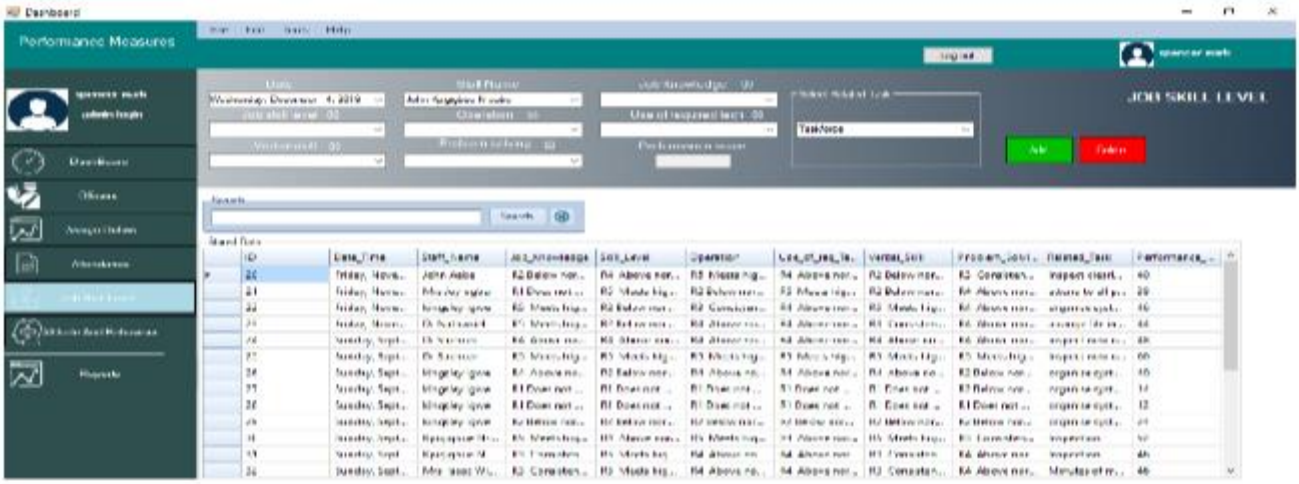

Fig 7: Screenshot showing Officer Personnel Dashboard

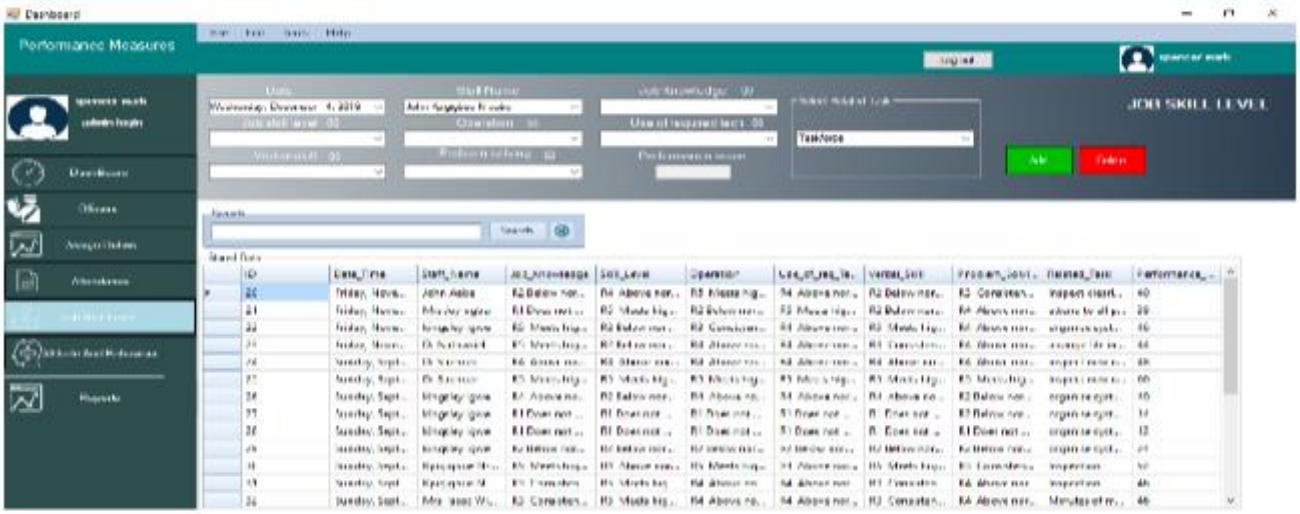

Fig 8: Screenshot showing Job Skilled Level

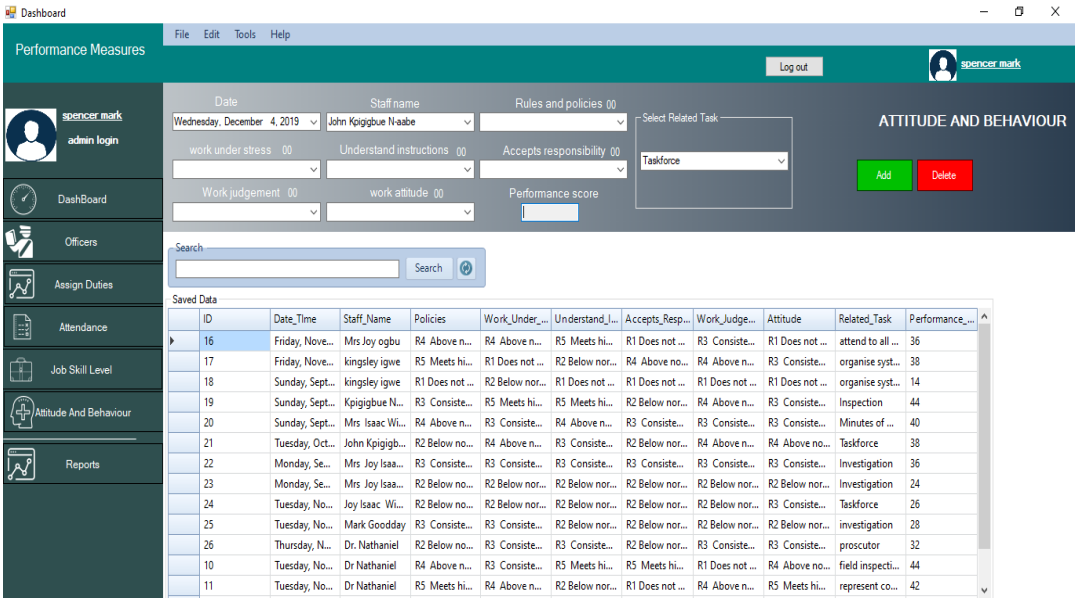

Fig 9: Screenshot showing Attitude and Behaviour

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