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AN INVESTIGATION INTO VARIOUS STRATEGIES THE USE OF ICT/SOCIAL MEDIA CAN EFFECTIVELY CHECKMATE THE SPREAD OF COVID-19 PANDEMIC IN ABIA STATE COLLEGE OF EDUCATION (TECHNICAL), AROCHUKWU.

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ABSTRACT
Introduction*: Coronavirus disease otherwise known as COVID-19 is known to infect humans and cause severe disease and fatalities. it is a global pandemic and has affected so many nations and their economies, societies and institutional sectors including educational sector. Protecting oneself and preventing rapid spread of the virus by being well informed about the transmission of the virus, adhering to the safety tips to stay safe and getting vaccinated is the best approach to fight against the virus. Aim: This research tries to explore some ICT/Social media tools in effectively curbing the spread of COVID-19 virus in Abia State College of Education (Technical), Arochukwu. Methodology: This research work adopted crowd sourcing approach for aggregating feedbacks on the effectiveness of curbing the spread of COVID-19 pandemic through the use of ICT/Social Media tools. Data mining technique such as FURIA classifier was applied to analyze and classify responses from crowd (staff and students) into effective or not effective using dataset of 200 instances in Weka toolkit version 3.9. The qualitative research approach was also adopted for collection of data from secondary sources, such as: online journals and articles. Rational Unified Process was used as system development methodology; Unified Modelling Language was used for the design of the proposed system. Tools: The system was developed using Android version 8.0 with other tools which include GPS/Network location tracker, Bluetooth technology for scanning and calculating users' distances, Java and XML as programming language and MySQL cloud database for data synchronization between devices.*
Result: This approach after being tested and evaluated showed that the system helped in monitoring social distance compliance, alert the violators and gives reports on the high rate of violations based on different locations, divulging information that could be used in creating awareness where there are high number of violations and giving useful information about various safety tips on how to stay safe. It also helped to mitigate the high rate of violations, that can even lead to high rate of exposure to COVID-19 virus, its spread and possible infection.

Keywords: COVID-19, Institution, ICT/Social Media, Data mining

I. INTRODUCTION
Coronavirus disease 2019 has posed a very serious global public health threat and has also been a major challenge to humans' existence (Regmi&Lwin, 2020). Corona viruses are known to infect humans and cause severe disease and fatalities. The most notable symptoms in COVID-19 patients include: dry cough, dyspnoea, fever, and bilateral lung infiltrates on imaging (Sohrabi et al., 2020). For confirmation of infection status, the respiratory specimen of a patient has to be subjected to laboratory test using real-time reverse-transcription-polymerase-chain-reaction (RT-PCR) assay (Tian et al., 2020). However, in most cases, persons infected with COVID-19 do not show any symptoms (Ahmed et al., 2020).

COVID-19 virus is more infectious compared to other infectious diseases. Statistics showed about 567,455,672 confirmed cases have been reported globally with 6.387,410 deaths. While in Nigeria 258,934 cases have been reported, about 249,000 cases recovered with 3,144 deaths (worldometer, 2022 July 17). Organizations such as the Centers for Disease Control and Prevention (CDC) have recommended many guidelines including maintaining social distancing, and others to reduce the chances of contracting or spreading the virus (Sathyamoorthy, Patel, Savle, Paul &Manocha, 2020). Several non-pharmaceutical interventions have been deployed across the world, such as: regular hand washing, face mask, self-isolation, work-from-home, physical distancing, and geographical lockdown. However, some of these measures, especially geographical lockdown, have significant negative impact on the basic macro-economic variables, such as: inflation, employment, exchange rate, and GDP growth (Farayibi&Asongu, 2020). Therefore, there is a need to consider more efficient approaches towards containing the spread of the COVID-19.

At the moment, one of the best ways to prevent contracting COVID-19 is to avoid being exposed to the coronavirus (Sathyamoorthy et al., 2020). This pandemic has caused significant social impacts by causing restriction measures such as quarantines, cancellation of mass gatherings and isolation, which may conflict with ethical and religious principles leading personal rights violation (Nguyen et al., 2020) as well as economic impacts by causing inflations, increased poverty rate, living in slums etc. in developing countries; marginalized populations in developed countries (Regmi&Lwin, 2020), travel restriction, border control, and public places closure. (Jancowicz, 2020; McFall-Johnsen, 2020).

The impact of COVID-19 is felt in educational sector as well as other sectors of the economy. Tertiary Education, which is a form of Education higher than secondary and primary schools has its main aim of training of higher manpower of the society. This involves teaching, learning and research as well as using the researched work to better the life of the surrounding environment in particular and the society at large. The process of deliberate transmission of accumulated knowledge, values, and skills from one generation to another in a particular society is education and be it informal or formal education, education is carried out in a well-organized environment such as communities or schools. A sound educational system is therefore prerequisite to achieving progress, from individual to the society and to economy. Protecting oneself and preventing rapid spread of the virus by being well informed about the transmission of the virus, adhering to the safety tips to stay safe and getting vaccinated is the best approach to fight against the virus.

Nowadays, due to the pervasive impact of the corona virus on local and global educational system, virtual lectures, modern e-learning courses, educational games, electronic tests, portals with educational resources as well as digital school registers and monitoring system of the learning process have become everyday realities. Information & Communication Technology (ICT) / Social media offer new opportunities to interact with other people.

Crowdsourcing is a distributed problem-solving and production model (Devece, Palacios & Ribeiro-Navarrete, 2019). Crowdsourcing is the process of aggregating crowd wisdom to solve a problem. It is used increasingly in health and medical research. Conventional, expert-driven solutions to medical problems often fail. Innovative approaches such as crowdsourcing may provide a useful community-based method to improve medical services (Wang et al., 2020). Prpic, Shukla, Kietzmann and McCarthy (2015) identified four types of crowdsourcing: (1) crowd voting, whereby a crowd chooses from several alternatives; (2) idea crowdsourcing, where a question is put to the crowd and the best answers are selected; (3) microtasking, where the organisation divides a task into microtasks, each of which can easily be accomplished by individuals; and (4) solution crowdsourcing, where a problem is stated and the crowd proposes solutions.

Crowdsourcing approaches are increasingly used in public health and medicine (Budge, Tsoti, Howgate, Sivakumar, &Jalali, 2015). Some crowdsourcing approaches focus on the process of mass community engagement, obtaining creative input from many individuals. Other work has focused on the collective input of

participants to generate a single, high-quality output such as clinical algorithms (Feng, Woo, Kim, Kim, Ki, & Shao, 2016; Ong, Bilardi& Tucker, 2017; Pan, et al., 2017).
Advancement in mobile phone technologies has enhanced mobile healthcare delivery. These technologies along with mobile Internet offer anywhere and anytime connectivity and play key roles in modern healthcare solutions (Sadiku, Shadare& Musa, 2017). As stipulated by (Kaufmann, 2016) the complexity for developing decision supporting system has increased due to the latest computing technologies and tools that Artificial Intelligence (AI) provides, which could be used extensively to classify, learn, adapt, and modify data sets.
Artificial Intelligent machine learning techniques have given a great deal of concern and attention in information industry because of its ability to produce intelligent decision that implements Knowledge Discovery in Database (KDD) approach. This is due to the wide accessibility of enormous amount of data and the important need to turning such data into useful information as intelligent knowledge (Han &Kamber, 2006). A very promising machine learning tool to attain valuable information is the use of data mining. Data mining techniques are used to discover hidden information, patterns and relationships of large amount of data, which is very much helpful in decision making. Data mining techniques are useful for data analysis and predictions (Pandey & Sharma, 2013). In data mining, tasks such as classification, clustering and association are used to discover implicit knowledge from huge amount of data. Classification technique is a supervised learning technique in machine learning, which the class level or the target is already known (Jantan, Hamdan, & Othman, 2010).

Due to advancement in technology, there are many supervised machine learning classifications that can be used for classification such as Decision Tree, Artificial Neural Network (ANN), Random Forest, Naïve Bayesian, RBF Network, Artificial Immune System (AIS), Support Vector Machine (SVM), Fuzzy Unordered Rule Induction Algorithm (FURIA), etc.
Therefore, this paper proposes to investigate the effective application of ICT/Social media to reduce or eradicate Corona virus pandemic in Abia State College of Education (Technical) Arochukwu. It attempts to explore GPS/Network tracker, Bluetooth technology for scanning and calculating users' distances and crowdsourcing as a technological tool to seek for collective input of ideas and wisdom from students and staff to aid in generating algorithm for analysing and classifying the feedback using FURIA classifier.

II. RELATED WORKS

In response to the COVID-19 pandemic, authorities across the globe have taken measures to slow the spread of the virus and protect vulnerable groups from contagion and the Centers for Disease Control and Prevention (CDC) have recommended many guidelines including maintaining social distancing, wearing masks or other facial coverings, and frequent hand washing to reduce the chances of contracting or spreading the virus.This section discusses the review of related literatures.
Adekanmbi, Oyewusi, and Ogundepo, (2020), proposed a system that used real-time data collection (crowdsourcing) through ordinary local residents, who leveraged low-cost smartphones with an on-device app to run quick mystery shopping at drug outlets to check recommended malaria treatment drugs in four (4) states across the country. The instant survey data was collected via guided mystery shopping, which required the volunteer participants to answer three basic questions after a 5-10 minutes in-store observation. Each submission was verified with the drug store picture and auto-generated location co-ordinates. The antimalarial policy compliance level was immediately determined and can be anonymously aggregated into a national map for onward sharing with pharmaceutical trade groups, government agencies and non-profits for immediate intervention via requisite stakeholder education. The advantage of this system was that it provided an affordable option that could be scaled up to support healthcare surveillance and effective policy compliance tracking in developing nations, where there was a paucity of data as a result of high illiteracy and infrastructural inadequacy.

Punn, N. S., Sonbhadra, S. K and Agarwal, S. (2020), proposed a deep learning-based framework for automating the task of monitoring social distancing using surveillance video. It utilized the YOLO v3 object detection model to segregate humans from the background and Deepsort approach to track the identified people with the help of bounding boxes and assigned IDs. It was observed that the YOLO v3 with Deepsort tracking scheme displayed best results with balanced mAP and FPS score to monitor the social distancing in real-time.

Rusli, M. E., Ali, M., Yussof, S. and Hassan, A. A. A. (2020), presented an innovative solution called MySD which stand for "My Safe Distance" that helped users or public to observe social distance advice closely. It leveraged smart phone hardware features that typically has Bluetooth transceiver as well GPS to determine safe distance and required level compliance.

Monzon (2020) developed a contact tracing system, called Rapid Trace, which uses Bluetooth technology for pairing and GPS for proximity checking. It beeps whenever users breach the stipulated physical distance of 2 metres. It makes uses of Quick Response (QR) scanning to enable users to scan the QR code of public places like eateries, supermarkets, theatres, and malls to make it possible for the quick tracing of the places visited by an infected person or someone that had come into close contact with an infected person. However, this system does not address how the privacy of users can be safeguarded.

Adebusoye&Yakubu (2020) developed a digital contact tracing system, called Stay-SafeNG, which utilizes SMS notification to inform those that have been exposed to an infected person to self-isolate and get tested. However, this system does not address how the privacy of users can be safeguarded.

III. METHODOLOGY

The proposed system is a Mobile-based Monitoring system for social distance compliance via Bluetooth technology and GPS location by applying the proximity analysis. Data mining technique such as Fuzzy Unordered Rule Induction Algorithm (FURIA), would be applied to analyse and classify the feedback on effectiveness of ICT/Social Media in curbing or mitigating the spread of COVID-19 pandemic, from crowd (Students and Staff) into effective or not effective. More so, the system would use Bluetooth-based proximity analysis to monitor outdoor and indoor distances of users, if the users are within 1.5 meters and stay together for more than the safe time frame of 10mins, it would alert them for violating social distancing measure while sending the user's information (suspect case), while capturing the GPS coordinate of the location. It also displays COVID-19 safety tips to create awareness on how to stay safe. The mobile-based application would use eXtensible Markup Language (XML) for designing the application interface and Java programming language for processing the inputs and output data and it would run on the Android platform and use Bluetooth Low Energy (BLE), the location and GPS reading of the smartphone.

a. Advantages of the Proposed system

The advantages of the proposed system are:

i. The system collects responses from users on the effectiveness of using ICT/Social Media in curbing the spread of COVID-19 pandemic.
ii. The system helps monitoring social distance compliance.
iii. The system helps to notify the users when they violate social distance measure.
iv. The system assists in reporting users who have high rate of violation as suspected case(s).

b. Proposed System Model

In this work, online feedback would be taken from crowd in order to gather information about the effectiveness of ICT/Social Media in curbing or mitigating the spread of COVID-19 pandemic in Abia State College of Education (Technical), Arochukwu and data mining technique would be applied to analyze that feedback to classify responses in the feedback from crowd into effective or not effective. The responses would be stored into the database and the model will be formulated based on FURIA classification and rule set generated from the classification. The model will be implemented on a mobile-based application.The Rational Unified Process (RUP) is the system development methodology adopted in this research work. RUP is not a concrete development model, but rather is intended to be adaptive and tailored to the specific needs of the project, team, or organization. RUP is based on a few fundamental ideas, such as the phases of development and the building blocks, which define: who, what, when, and how development will take place. It is a general process model and was designed for object-oriented development using the Unified Modeling Language (UML).

The major system development phases utilized in this research work were:

a. Analyzing user requirements for some strategies for using ICT/Social Media in curbing or mitigating the spread of COVID-19 pandemic and checking social distance compliance via Bluetooth technology and GPS location.
b. Identifying the areas of shortcomings and solutions.
c. Designing a more robust system using Unified Modeling Language.
d. Coding and implementing the proposed system using mobile application development technologies, specifically: Java, extensible mark-up language (XML), Bluetooth Low Energy (BLE), GPS Location and MySQL relational database.

i. Crowdsourcing Approach and Data Collection

This research work uses crowd sourcing approach for feedback on the effectiveness of curbing the spread of COVID-19 pandemic through the use of ICT/Social Media. There are four pillars of crowdsourcing, which are the Crowd, the crowdsourcer, the crowdsourcing task and the crowdsourcing platform. The Four Pillars of crowd sourcing for the proposed system are,

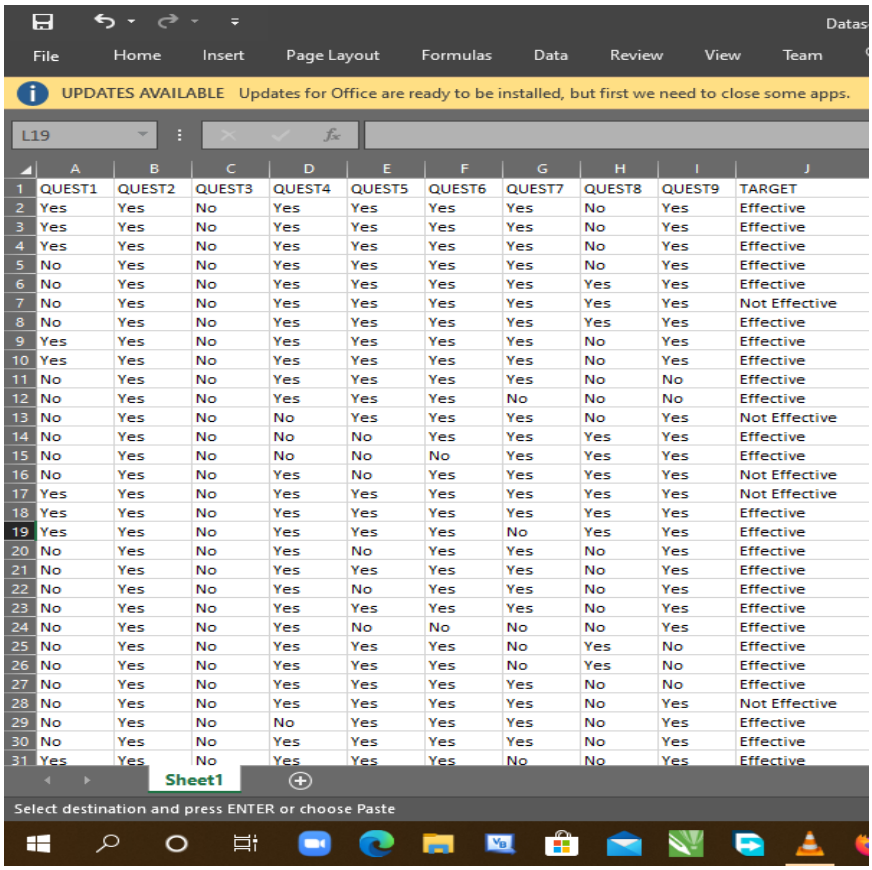
i. The Crowd: This consists of students, staff and administrator,
ii. The crowdsourcer: Researcher
iii. The crowdsourcing task: Feedback on ICT/Social Media effectiveness on mitigating the spread of COVID-19 pandemic.
iv. The crowdsourcing platform: Android app for crowd to use in registration and answering some questions.

However, by using an open call for participation of crowd (students and staff) in this assessment, the dataset would consist of the responses from at least 200 users. So the feedback would be collected form each participant by using android app interface. Table 1 shows the predictors for data mining and Figure 1 shows the snapshot of the dataset in Microsoft Excel Application.

Table 1. Predictors for data mining

Predictors	**Values**
Are you a staff?	{Y; N}
Are you aware of COVID-19 pandemic?	{Y; N}
Has COVID-19 virus killed any staff or students in the college?	{Y; N}

Is COVID-19 virus preventable?	{Y; N}
Are you aware of different symptoms of COVID-19?	{Y; N}
Have you heard about ICT/Social media?	{Y; N}
Can ICT/Social media be used to prevent COVID-19?	{Y; N}
Have you been complying to social distance measures?	{Y; N}
Are you aware of some safety tips for staying safe?	{Y; N}
How is the use of ICT/Social media in mitigating the spread of COVID-19?	{Effective; Not effective}



	A	B	C	D	E	F	G	H	I	J
1	QUEST1	QUEST2	QUEST3	QUEST4	QUEST5	QUEST6	QUEST7	QUEST8	QUEST9	TARGET
2	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Effective
3	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Effective
4	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Effective
5	No	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Effective
6	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Effective
7	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Not Effective
8	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Effective
9	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Effective
10	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Effective
11	No	Yes	No	Yes	Yes	Yes	Yes	No	No	Effective
12	No	Yes	No	Yes	Yes	Yes	No	No	No	Effective
13	No	Yes	No	No	Yes	Yes	Yes	No	Yes	Not Effective
14	No	Yes	No	No	No	Yes	Yes	Yes	Yes	Effective
15	No	Yes	No	No	No	No	Yes	Yes	Yes	Effective
16	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Not Effective
17	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Not Effective
18	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Effective
19	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Effective
20	No	Yes	No	Yes	No	Yes	Yes	No	Yes	Effective
21	No	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Effective
22	No	Yes	No	Yes	No	Yes	Yes	No	Yes	Effective
23	No	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Effective
24	No	Yes	No	Yes	No	No	No	No	Yes	Effective
25	No	Yes	No	Yes	Yes	Yes	No	Yes	No	Effective
26	No	Yes	No	Yes	Yes	Yes	No	Yes	No	Effective
27	No	Yes	No	Yes	Yes	Yes	Yes	No	No	Effective
28	No	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Not Effective
29	No	Yes	No	No	Yes	Yes	Yes	No	Yes	Effective
30	No	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Effective
31	Yes	Yes	No	Yes	Yes	Yes	No	No	Yes	Effective

Figure 1: Snapshot of the Dataset in Microsoft Excel Application

ii. The Functional Model of the Proposed System

The Unified Modelling Language (UML) Use Case diagram for proposed system is shown in Figure 2. The Use case diagram illustrates how the users interact with the system. It also describes the graphic diction of the interaction among the element of the system and the methodology used in system analysis to clarify and organize system requirement. It shows how functionalities relate between the internal/external actors.

The following are actors are the participants of the system:

Actors: System administrator, User (staff and students)

User (staff and students): The usersget registered, login, give feedback, check social distance (SD) and view safety tips

System administrator: The system administrator registers, logins into the system, View response, view violations and view suspects reports.

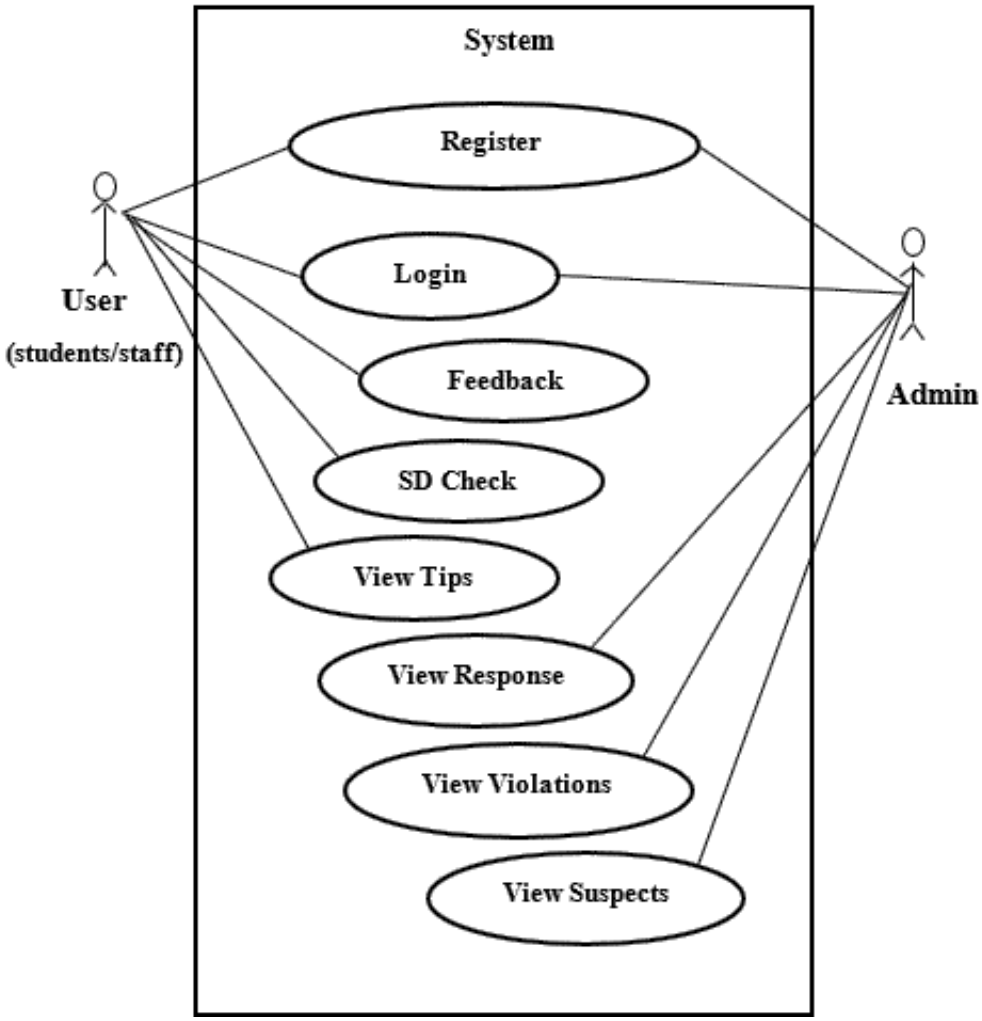


Figure 2: Use case diagram of the proposed system

iii. **Activity Diagram of the Proposed system**

The activity diagram illustrates the behavior of the proposed system with regards to various activities. These activities are modelling elements that depicts the execution of a set of operations. However, the execution of these activities can betriggered by the completion of other activities, by the availability of objects, or by internal/external events. Figure 3 shows different activities for the proposed system, with rounded rectangles representing activities; arrows between activities representing control flow and thick

bars representing the synchronization of control flow. Figure 3 and 4 shows activities for users and administrator.

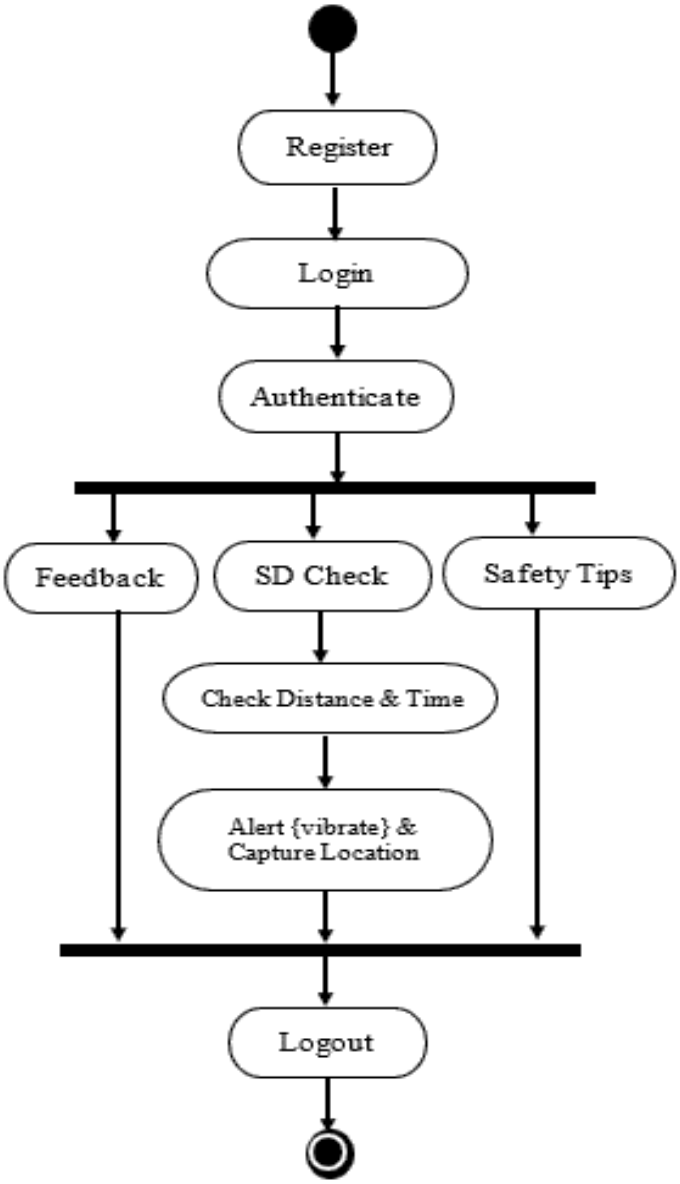


Figure 3: Users Activity Diagram of the proposed system

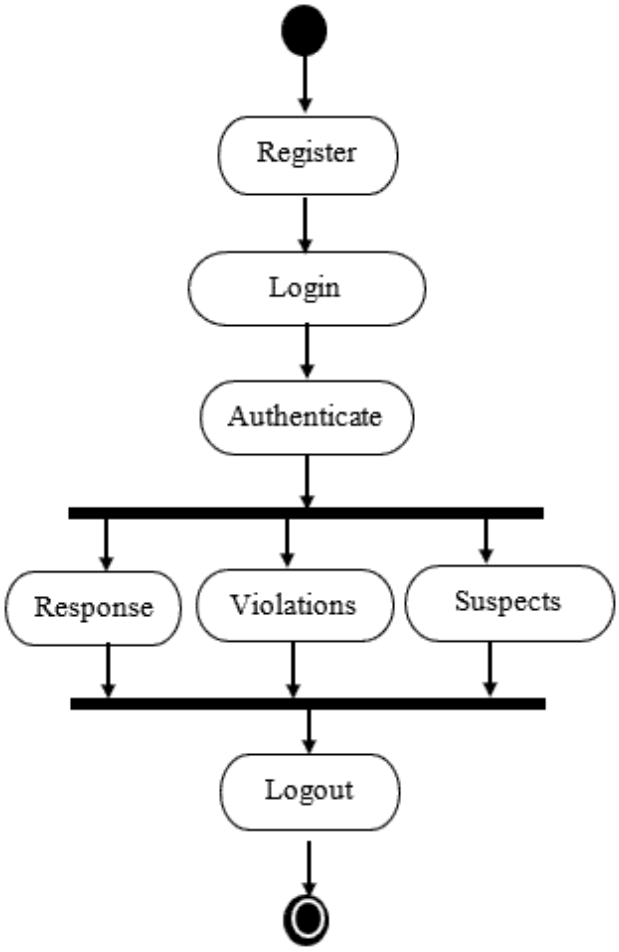


Figure 4: Administrator Activity Diagram of the proposed system

iv. Architecture of the Proposed system

Theillustrative representation of the proposed system architecture is shown in figure 5. System architecture depicts the various key components of the proposed system. Crowdsourced responses component handles the feedback on ICT/Social Media effectiveness on curbing the spread of COVID-19 pandemic from the users (staff and students), the storage of the responses into the MySQL database. Thereafter, FURIAclassifer is applied to the extracted responses from the database to analysis, evaluate and classify it into effective and not effective. User Interface handles users' registration, login, alert the user if social distance measure is violated and allow the users to view safety tips, responses, violations list and suspect list. Data Process Interface handles the initialization of the Bluetooth and GPS/Network location, calculates the distance between 2 or more devices and captures the location of the users. The information is stored into MySQL database.

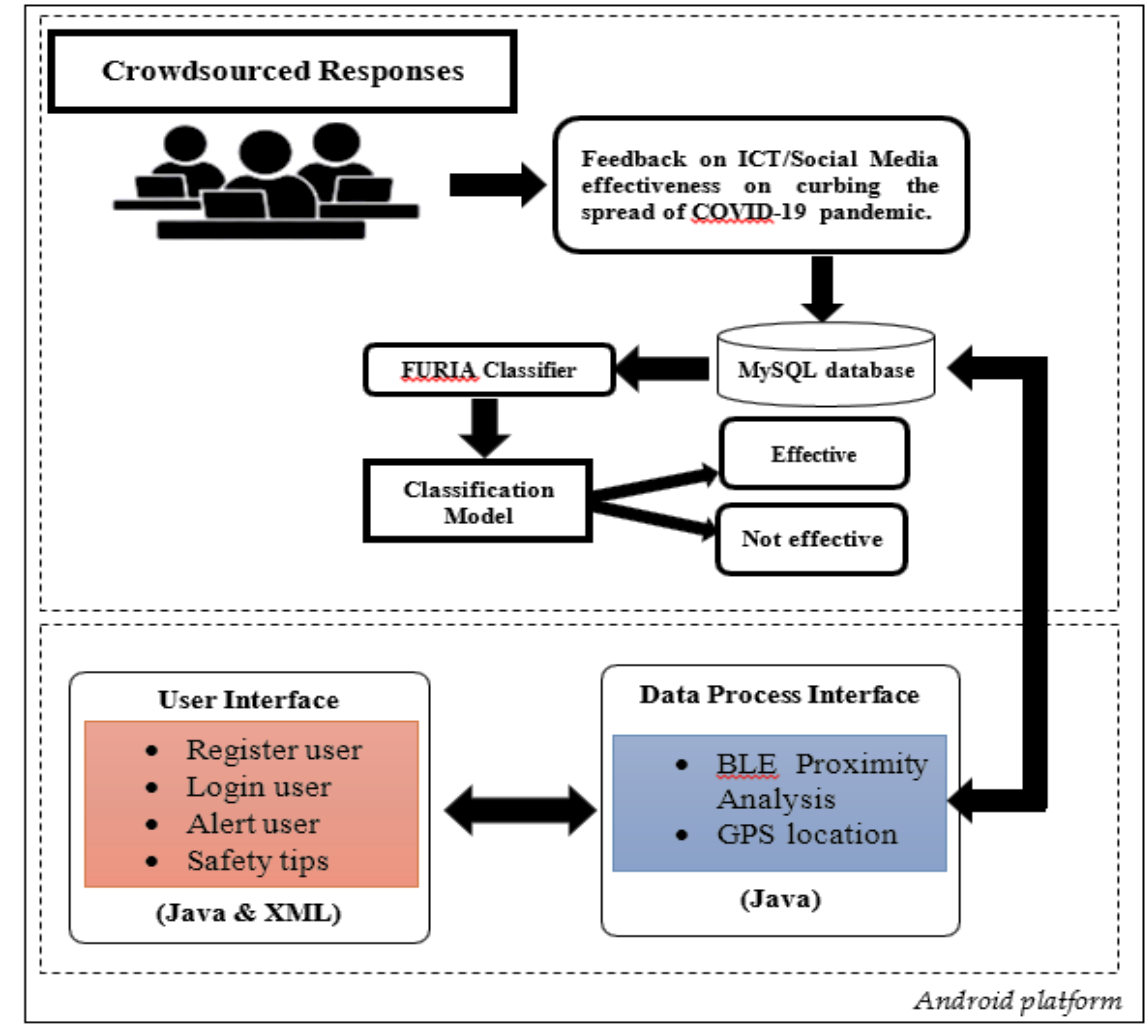


Figure 5: System Architecture of the proposed system

v. Database Structure of the Proposed system

The database was designed using MySQL relational database. The main table of users was linked with other tables on a one-one or one-to-many relationship. Figure 6 shows different tables such as admin, user, violation, suspect and their relationships.

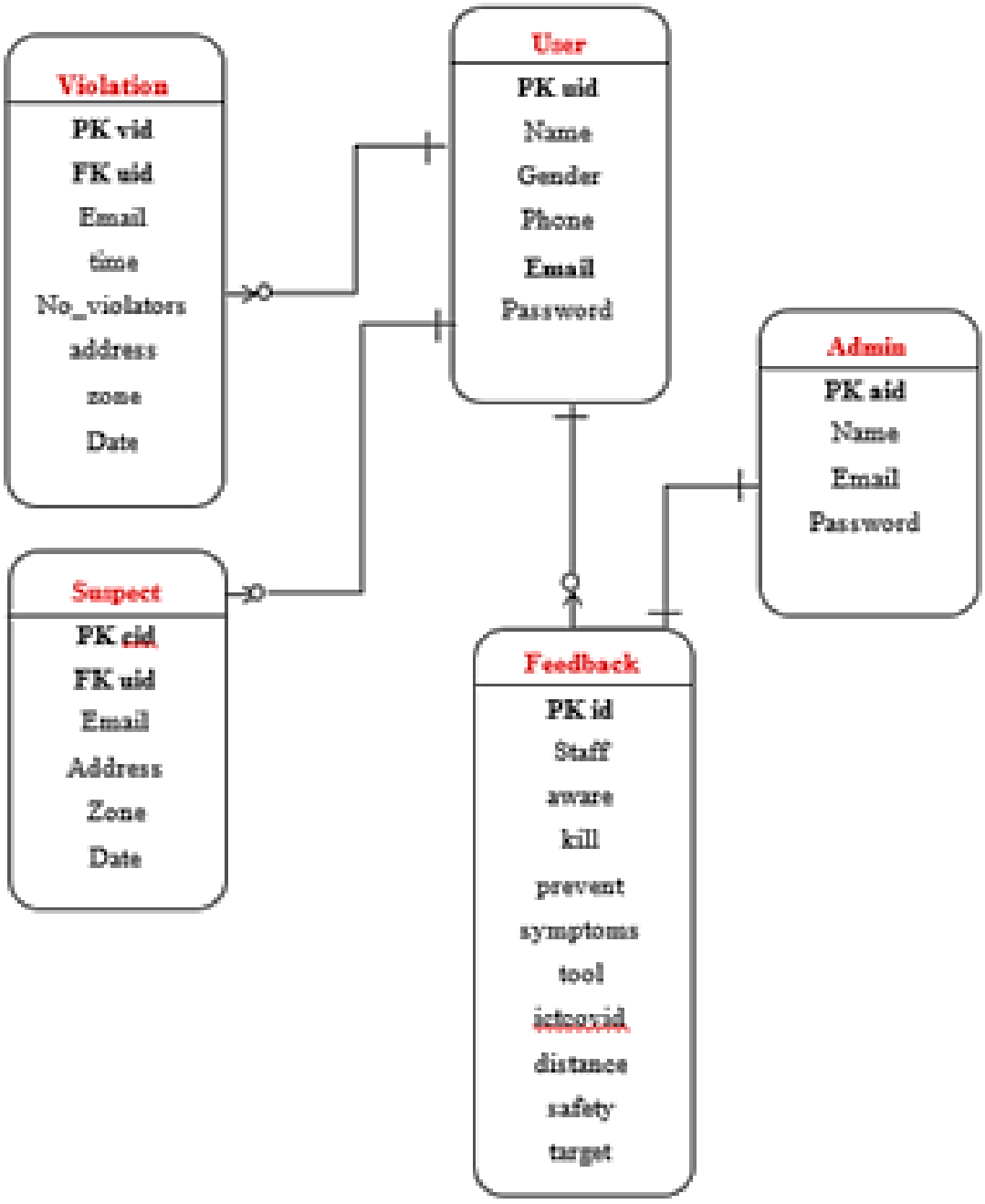


Figure 6: Database Structure

IV. DATA ANALYSIS

This research work used crowd sourcing approach for aggregating feedbacks on the effectiveness of curbing the spread of COVID-19 pandemic through the use of ICT/Social Media tools. However, by using an open call for participation of crowd (students and staff) in this assessment, the dataset used consisted of the responses from 200 users. So the feedback was collected from each participant by using android app interface. Some features or attributes based on the questions were selected and extracted from MySQL database. The dataset was preprocessed with Microsoft Excel application so as to remove impurities. In Weka toolkit, the excel file had the dataset of 200 instances, 10 attributes including the target variable for training and testing the model. The dataset in csv (coma separated values) format was uploaded and FURIA algorithm with Test mode of 10-fold cross-validation was applied to obtain the model.

Below are the tables showing frequencies and percentages of features in the training set, which were extracted based on the questions that were given to the users or participants (students and staff) to give their responses.

Question 1: Are you a staff?

Table 2. Frequency and percentage of responses for Question 1

Response	**Yes**	**No**	**Total**
Frequency	68	132	200
Percentage	34%	66%	100%

Source: field survey 2022

Table 2 revealed that 68 out of 200 (34%) responses came from the staff (academic and non-academic) of the college, while 132 of 200 (66%) responses came from the students of the college.

Question 2: Are you aware of COVID-19 pandemic?

Table 3 Frequency and percentage of responses for Question 2

Response	**Yes**	**No**	**Total**
Frequency	198	2	200
Percentage	99%	1%	100%

Source: field survey 2022

Table 3 revealed that 198 out of 200 (99%) respondents from the college were aware of the COVID-19 pandemic, while 2 of 200 (1%) respondents answered they were not aware of COVID-19 pandemic.

Question 3: Has COVID-19 virus killed any staff or students in the college?

Table 4. Frequency and percentage of responses for Question 3

Response	**Yes**	**No**	**Total**
Frequency	0	200	200
Percentage	0%	100%	100%

Source: field survey 2022

Table 4 revealed that 200 out of 200 (100%) respondents from the college have not heard of any staff or students killed by the COVID-19 virus in the college.

Question 4: Is COVID-19 virus preventable?

Table 5. Frequency and percentage of responses for Question 4

Response	**Yes**	**No**	**Total**
Frequency	179	21	200
Percentage	89.5%	10.5%	100%

Source: field survey 2022

Table 5 revealed that 179 out of 200 (89.5%) respondents from the college affirmed that the COVID-19 virus is preventable, while 21 of 200 (10.5%) respondents affirmed that COVID-19 virus is not preventable.

Question 5: Are you aware of different symptoms of COVID-19?

Table 6. Frequency and percentage of responses for Question 5

Response	**Yes**	**No**	**Total**
Frequency	146	54	200
Percentage	73%	27%	100%

Source: field survey 2022

Table 6 revealed that 146 out of 200 (73%) respondents from the college are aware of different symptoms of COVID-19 virus, while 54 of 200 (27%) respondents are not aware of the symptoms.

Question 6: Have you heard about ICT/Social media?

Table 7. Frequency and percentage of responses for Question 6

Response	**Yes**	**No**	**Total**
Frequency	167	33	200
Percentage	83.5%	16.5%	100%

Source: field survey 2022

Table 7 revealed that 167 out of 200 (83.5%) respondents from the college affirmed that they have heard about ICT/Social media, whereas 33 of 200 (16.5%) respondents answered that they have not heard about ICT/Social media.

Question 7: Can ICT/Social media be used to prevent COVID-19?

Table 8. Frequency and percentage of responses for Question 7

Response	**Yes**	**No**	**Total**
Frequency	**161**	**39**	**200**
Percentage	**80.5%**	**19.5%**	**100%**

Source: field survey 2022

Table 8 revealed that 161 out of 200 (80.5%) respondents from the college affirmed that ICT/Social media tools can be employed to prevent the spread of COVID-19 virus, whereas 39 of 200 (19.5%) respondents answered that ICT/Social media cannot be used to prevent the spread of COVID-19 virus.

Question 8: Have you been complying to social distance measures?

Table 9. Frequency and percentage of responses for Question 8

Response	**Yes**	**No**	**Total**
Frequency	**56**	**144**	**200**
Percentage	**28%**	**72%**	**100%**

Source: field survey 2022

Table 9 revealed that 56 out of 200 (28%) respondents from the college have been complying to social distance measures, whereas 144 of 200 (72%) respondents have not been complying to social distance measures.

Question 9: Are you aware of some safety tips for staying safe?

Table 10 Frequency and percentage of responses for Question 9

Response	**Yes**	**No**	**Total**
Frequency	**115**	**85**	**200**
Percentage	**57.5%**	**42.5%**	**100%**

Source: field survey 2022

Table 10 revealed that 115 out of 200 (57.5%) respondents from the college are aware of some safety tips for staying safe, while 85 of 200 (42.5%) respondents are not aware of the safety tips for staying safe.

Question 10: How is the use of ICT/Social media in mitigating the spread of COVID-19?

Table 11. Frequency and percentage of responses for Question 10

Response	**Yes**	**No**	**Total**
Frequency	**161**	**39**	**200**
Percentage	**80.5%**	**19.5%**	**100%**

Source: field survey 2022

Table 11 revealed that 161 out of 200 (80.5%) respondents from the college affirmed that the use of ICT/Social media tools has been effective in mitigating or curbing the spread of COVID-19 virus, while 39 of 200 (19.5%) respondents answered that the use of ICT/Social media tools has not been effective in curbing the spread of COVID-19 virus.

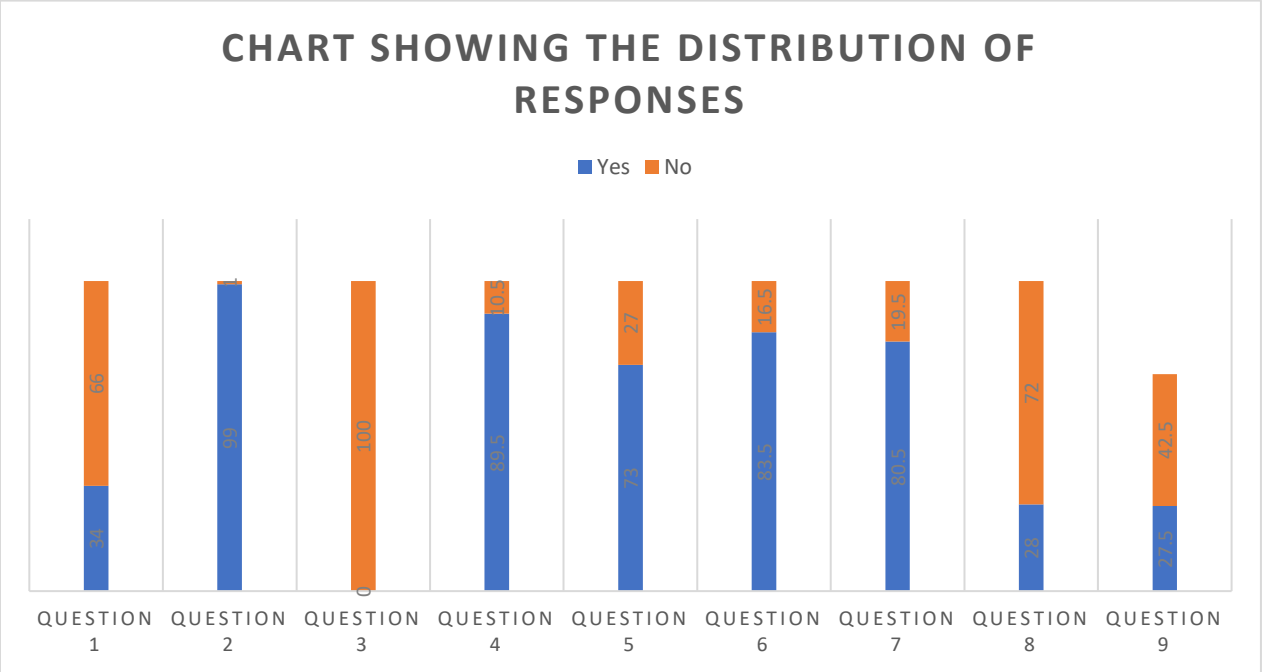


Figure 7. Chart showing the distribution of responses

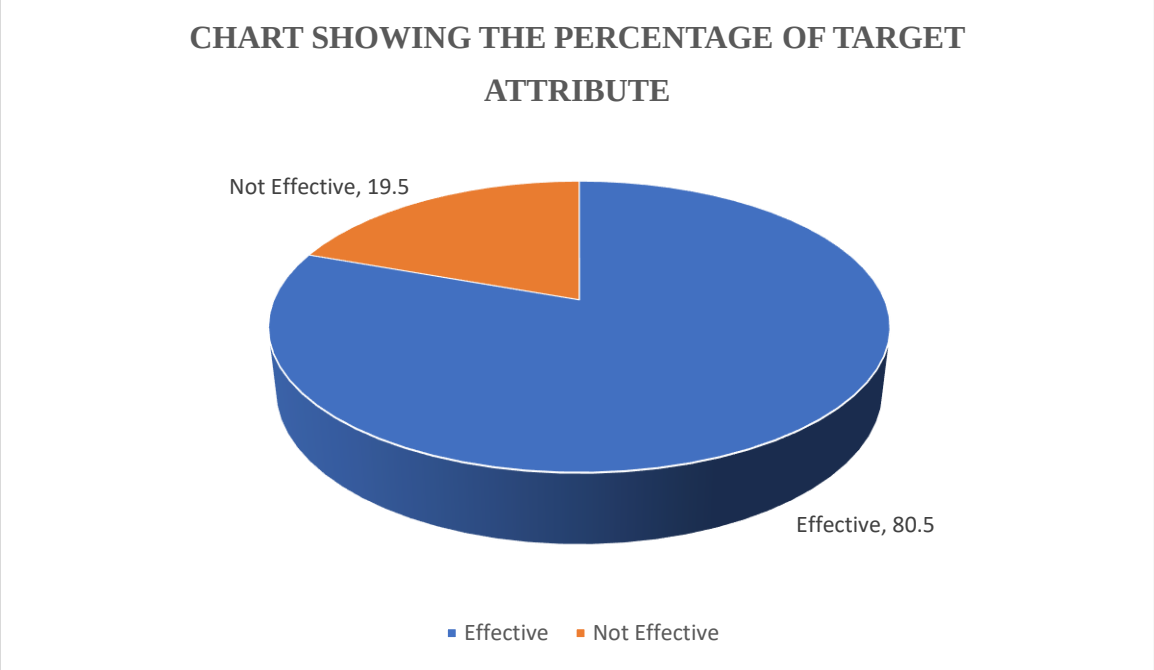


Figure 8. Chart showing the percentage of target attribute

a. Model Performance Summary

For the data classification format, determinant for the Training Set was used to develop the model.

Table 12: Model performance summary

Performance Measures	FURIA
Correctly classified (160)	80%
Incorrectly classified (40)	20%
Relative Absolute Error	99.4851%
Root Relative Squared Error	100.5271%
Total number of Instances	200

Table 13: Evaluation of model's accuracy by class

Class	Precision	Recall	F-Measure	ROC Area
Effective	0.804	0.994	0.889	0.480
Not Effective	0.000	0.000	0.000	0.480

Table 14: Confusion Matrix

a	**b**	← Classified as
160	1	a = Effective
39	0	b =Not Effective

V. RESULTS AND DISCUSSIONS

This work employed crowd sourcing approach for capturing feedbacks on the effectiveness of curbing the spread of COVID-19 pandemic through the use of ICT/Social Media tools. This open call for participation of crowd (students and staff) using Android platform as one of the ICT tools to aggregate their responses, aided in the assessment of the level of awareness of the COVID-19 virus in the college. In order to assess the level of awareness of the COVID-19 virus in the college amongst staff and students, an Android app was developed. Figure 9 and figure 10 show how participants' feedback was captured, aggregated and stored into the database. Based on the result, table 3 showed that about 99% of the participants from the college were aware of the COVID-19 virus, table 6 also showed that about 73% of the participants were also aware of different symptoms of COVID-19 virus. This depicts that there is high level of awareness of the COVID-19 virus amongst staff and students in the college.

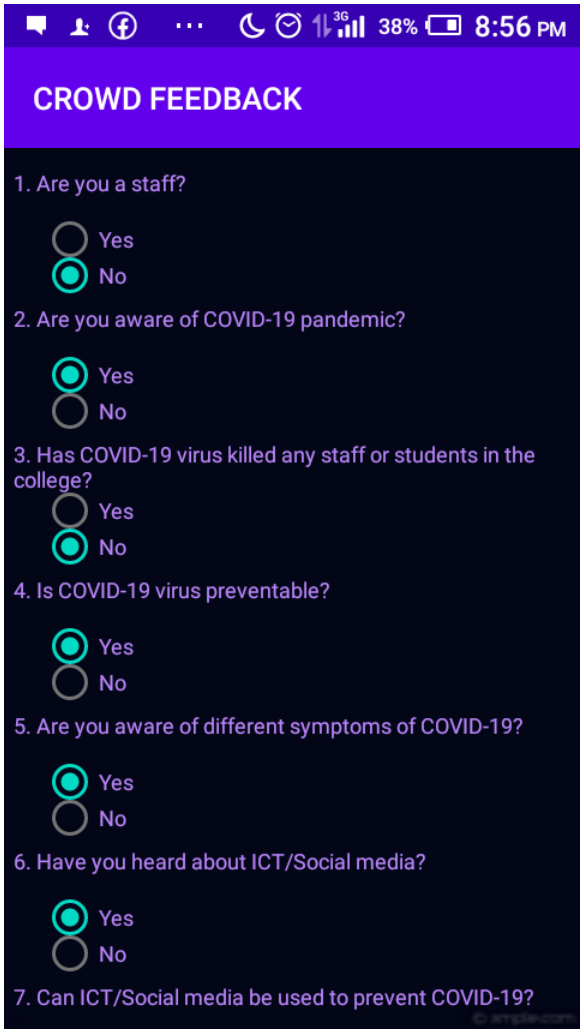


Figure 9. User Feedback Screenshot

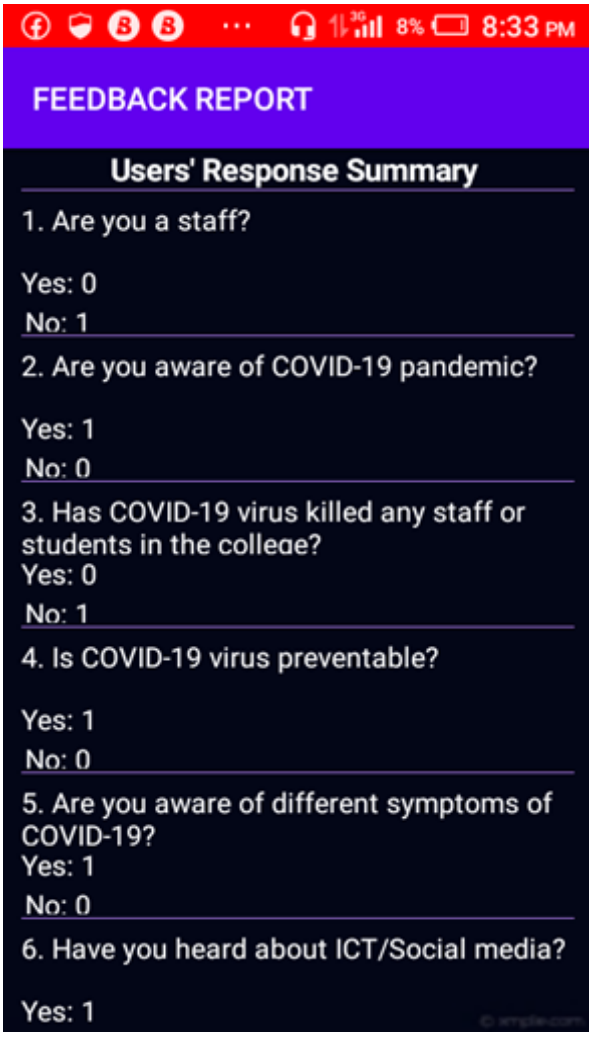


Figure 10. Feedback Report Screenshot

Based on the feedback from the staff and students of the Institution, Table 4 revealed that 100% of the participants from the college have not heard of any staff or students killed by the COVID-19 virus. Table 10 also revealed that 57.5% of the participants were aware of some safety tips for staying safe and table 9 showed that about 72% of the participants have not been complying to social distance measures. This means that even though there is no death or casualties caused by COVID-19 virus in the institution, there is low level of awareness on some safety tips for staying safe during COVID-19 pandemic and low level of compliance to social distance measures, which actually pose a major concern and it is worrisome. In order to prevent any occurrence of casualties from COVID-19 virus, Figure 11 shows how social distance violation summary report can be utilized to create more awareness on locations that have higher number of violations and suspects

cases and figure 12 shows how the users can benefit from information on safety tips to protect themselves and prevent the spread of COVID-19 virus.

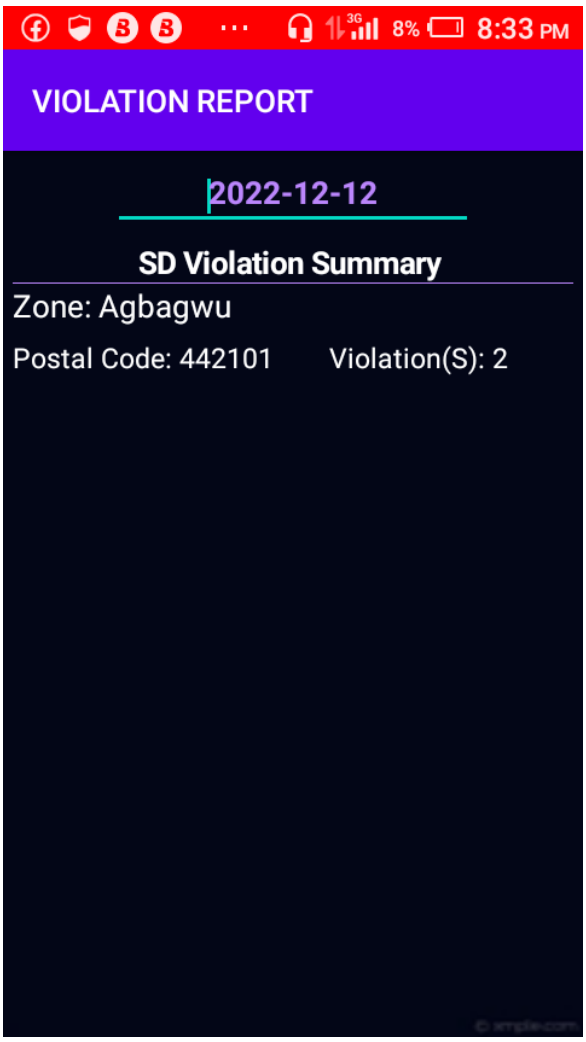


Figure 11. SD Violation Summary Screenshot

Figure 12. Safety tip Screenshot

Based on the feedback from the staff and students of the Institution, table 7 revealed that about 83.5% of the participants have heard about ICT/Social media tools. This means that a greater number of staff and students are fully aware of ICT/Social media tools as well as their positive impacts in lecture delivery and overall academic enhancement. Moreso, it also means they have used ICT/Social media tools in their daily activities within and outside the college.

Based on the feedback from the staff and students of the Institution, table 8 revealed that about 80.5% affirmed that ICT/Social media tools can be employed to prevent the spread of COVID-19 virus. This means that a greater number of staff and students in the college believe that COVID-19 virus can be prevented by the use of ICT/Social media tools. It also shows the level of exposure of staff and students to various ICT/Social media tools in the college. Figure 13 demonstrates the application of ICT/Social media tool to monitor social distance compliance and detect violations. The app uses Bluetooth technology to monitor the distance of registered users, detect users that are within 2 meters and alert the users by vibrating their device as well as capturing their location information (postal code, city) with the number of violations.

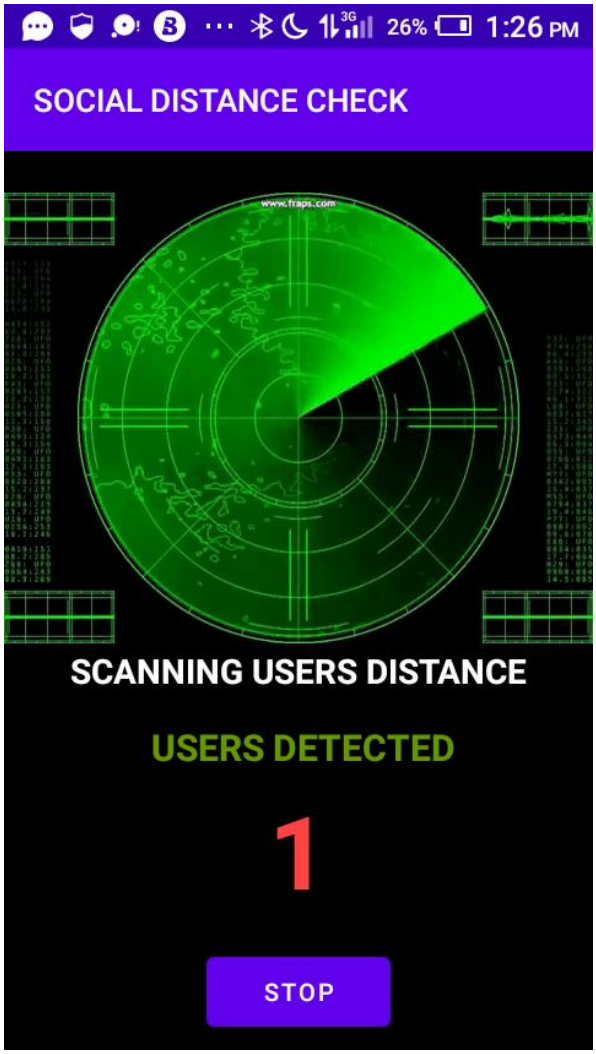


Figure 13. Social Distance (SD) Check Screenshot

Based on the feedback from the staff and students of the Institution, table 5 revealed that about 89.5% of the participants affirmed that COVID-19 virus is preventable and table 11 also revealed that about 80.5% of the participants also affirmed that the use of ICT/Social media tools has been effective in mitigating or curbing the spread of COVID-19 virus. Moreso, regarding the result obtained from the analysis and classification using data mining algorithm known as FURIA (Fuzzy Unordered Rule Induction Algorithm), it showed that the model had acceptable accuracy of 80%, which shows that the role of ICT/Social media tools in curbing the spread of COVID-19 virus is enormous and effective. This also means that COVID-19 virus can effectively and efficiently be prevented through the use of ICT/Social media tools. The proposed system, which is one of the ICT/Social media tools, helps in monitoring social distance compliance, notify or alert the user when they violate social distance policy and gives reports on the high rate of violation and suspect cases based on different locations, when the users are exposed to many people around them. It helps in divulging information that could be used in creating awareness where there are high number of violations and giving useful information about various safety tips on how to stay safe. This approach helps to mitigate the high rate of violations, that can lead to high rate of exposure to COVID-19 virus, its spread and possible infection.

VI. CONCLUSION

Precisely, the corona virus disease 2019 in its acquired briefest terms and status COVID-19 is a global pandemic, which currently has redefined some superstructures, human society and history. Its influence pervasively cuts across all critical sectors of the social developments. Mirroring the problem that initiated this research, ICT/ social media is the most potent technological tools widely used in facilitating learning program for effective checkmating of the spread of COVID 19. It is exploited by tertiary institution to increase the efficiency of providing quality academics experience for under-graduate students and academics. The implemented system will aid in collecting responses from staff and students on the effectiveness of using ICT/Social Media in curbing the spread of COVID-19 pandemic, help in monitoring social distance compliance, help to notify the users when they violate social distance measure and assist in reporting users who have high rate of violation as suspected cases.

REFERENCES

Adebusoye, O., & Yakubu, O. (2020). *Nigerian Develops Contact Tracing App to Help Reduce the Spread of Covid-19*. Retrieved from: https://technext.ng/2020/07/13/nigerian-develops-contact-tracing-app-to-help-reduce-the-spread-of-covid-19/

Adekanmbi, O., Oyewusi, W. F., &Ogundepo, E. A. (2020). *Real-Time Crowdsourcing of Health Data in a Low-Income Country: A Case Study of Human Data Supply on Malaria First-Line Treatment Policy Tracking in Nigeria*. NeurIPS 2020 Crowd Science Workshop: Remoteness, Fairness, and Mechanisms as Challenges of Data Supply by Humans for Automation. Retrieved from http://CEUR-WS.org/vol-2736/paper3.pdf

Ahmed, N., Michelin, R., Xue, W., Ruj, S., Malaney, R., Kanhere, S., ... (2020). A Survey of COVID-19 Contact Tracing Apps. *Institute of Electrical and Electronics Engineer, 4* (1), 1-25.

Budge, E. J., Tsoti, S.M., Howgate, D.J., Sivakumar, S., &Jalali, M. (2015). Collective intelligence for translational medicine: crowdsourcing insights and innovation from an interdisciplinary biomedical research community. *Ann Med.* 47:570–5.

Devece, C., Palacios, D. & Ribeiro-Navarrete, B. (2019). The effectiveness of crowdsourcing in knowledge-based industries: the moderating role of transformational leadership and organisational learning, *Economic Research-EkonomskaIstraživanja,* 32:1, 335-351, DOI:10.1080/1331677X.2018.1547204

Farayibi, A. O., & Asongu, S. A. (2020). The Economic Consequences of the Covid-19 Pandemic in Nigeria. *European Xtramile Centre of African Studies, SSRN Electronic Journal,, 1* (1), 20-42.

Feng, S., Woo, M.J, Kim, H., Kim, E,, Ki. S., & Shao, L., (2016). A game-based crowdsourcing platform for rapidly training middle and high school students to perform biomedical image analysis. *In: Optics and Biophotonics in Low-Resource Settings II. SPIE.* https://doi.org/10.1117/12.2212310.

Han, J. &Kamber, M., (2006). *Data Mining: Concepts and Techniques*. San Francisco: Morgan Kaufmann Publisher.

Jancowicz, M. (2020). At Least 6 Countries Reimposed Lockdown Measures as New Coronavirus Cases Flared Up Again. Here's What they Looked Like. *Business Insider*. Available: https://www.businessinsider.com/countriesimposed-lockdown-again-after-coronavirus-case-spike-2020-5.

Jantan, H., Hamdan, A. R., & Othman, Z. A. (2010). Human talent prediction in HRM using C4. 5 classification algorithm, *International Journal on Computer Science and Engineering*, 2(08-2010), 2526-2534

Kaufmann, M., (2016). In Emerging Topics in Computer Science and Applied Computing. *Applied Computing in Medicine and Health*, 37-48.

McFall-Johnsen, M. (2020). Countries in Asia are Facing New Waves of Coronavirus Infections After Lockdowns Lift. The Same Could Happen in the Rest of the World. *Business Insider*. Available: https://www.businessinsider.com/countries-lift-lockdowns-face-new-waves-covid-19-2020-3

Monzon, L. (2020). *New COVID-19 Contact Tracing App Designed "For Nigeria by Nigerians"*. iInewsafrica. Retrieved from: https://www.google.com/amp/s/www.itnewsafrica.com/2020/06/nigerian-firm-develops-rapid-trace-an-app-to-take-on-covid-19/%3famp

Nguyen, C. T., Saputra, Y. M., Huynh, N. V., Nguyen, N., Khoa, T. V., Tuan, B. … (2020). *Enabling and Emerging Technologies for Social Distancing: A Comprehensive Survey and Open Problems*. 1-43, DOI:10.1109/ACCESS.2020.3018140.

Ong, J.J., Bilardi, J.E., & Tucker, J.D. (2017). Wisdom of the crowds: crowd-based development of a logo for a conference using a crowdsourcing contest. *Sex Transm Dis.* 44:630–6.

Pan, S.W., Stein, G., Bayus, B., Tang, W., Mathews, A., Wang, C., … (2017). Systematic review of innovation design contests for health: spurring innovation and mass engagement. *BMJ Innovations*, 3:227–37.

Pandey, M. & Sharma, V. K. (2013). A Decision Tree Algorithm Pertaining to the Student Performance Analysis and Prediction. *International Journal of Computer Applications*. (0975 – 8887) 61(13).

Prpic, J., Shukla, P., Kietzmann, J. H., & McCarthy, I. P. (2015). How to work a crowd: Developing crowd capital through crowdsourcing? *Business Horizons,* 58(1), 77–85. doi:10.1016/j.bushor.2014.09.005.

Punn, N. S., Sonbhadra, S. K & Agarwal, S. (2020). Monitoring COVID-19 social distancing with person detection and tracking via fine-tuned YOLO v3 and Deepsort techniques. Indian Institute of Information Technology Allahabad, Jhalwa, Prayagraj, Uttar Pradesh, India.

Regmi, K. &Lwin, C. M. (2020). *Factors impacting social distancing measures for preventing coronavirus disease 2019 [COVID-19]: A systematic review*. 23. [Online] Retrieved from: https://doi.org/10.21203/rs.3.rs-37498/v1

Rusli, M. E., Ali, M., Yussof, S. & Hassan, A. A. A. (2020). MySD: A Smart Social Distancing Monitoring System. 2020 8th International Conference on Information Technology and Multimedia (ICIMU)

Sadiku, M. N. O., Shadare, A. E., & Musa, S. M. (2017). Mobile Health. *International Journal of Engineering Research, ,* 6(11), 450-452, ISSN:2319-6890, DOI : 10.5958/2319-6890.2017.00061.7 Page 450.

Sathyamoorthy, A. J., Patel, U., Savle, Y. A., Paul, M. &Manocha, D. (2020). *COVID-Robot: Monitoring Social Distancing Constraints in Crowded Scenarios*. [Online]. arXiv:2008.06585v2 [cs.RO], 1-11.

Sohrabi, C., Alsafi, Z., O'Neil, N., Khan, M., Kerwan, A., Al-Jabir, A., … (2020). World Health Organization declares global emergency: A review of the 2019 novel coronavirus(COVID-19). *International Journal of Surgery, 76* (1), 71-76.

Tian, S., Hu, N., Lou, J., Chen, K., Kang, X., Xiang, Z., … (2020). Characteristics of COVID-19 infection in Beijing. *Journal of Infection, 80* (1), 401–406.

Wang, C., Han, L., Stein, G., Day, S., Bien-Gund, C., Mathews, A., … (2020). Crowdsourcing in health and medical research: a systematic review. *Infectious Diseases of Poverty. 9:8,* https://doi.org/10.1186/s40249-020-0622-9.