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IMPLEMENTATION OF SURVEY MOBILE APPLICATION: A VOTING ALGORITHM FOR SOCIAL INFLUENCE MINIMIZATION USING GPS

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ABSTRACT

Old approaches methods for voting or survey systems are becoming outdated in today's world, and recent improvements are being introduced, the survey applications are getting revolutionized with technological development. The mobile survey applications allow users to cast their votes and provide feedback with an easy and trust-enabled method. Surveys are increasingly becoming essential to build a human friendly product/service. In this paper we proposed a Mobile voting application in Kuwait which allows voters to cast their vote and engage in different surveys without fear of complicated verification procedures. The surveys are the cornerstone of marketing, and for reliable and trustworthy outcomes, the project incorporates experience of voting system into a smart and simple survey mobile application, and will be compatible with all mobile platforms. It will be designed to be ease of use and customizable, so any one can use it for their own survey, also it will eliminate the duplication of votes to get more credibility. The key features of the application include the use of ID and GPS as main aspects to authenticate the user account, and provide the necessary security measures by broadening the device's scope. GPS will be the main contribute as it will be used in a new technique. The voting application is based on the three-step process used by each survey application, i.e. user authentication, voting, and results assessment.

Keywords: *Survey Mobile App, GPS, Mobile Voting System, Smart Voting, Social Influence*

1. INTRODUCTION

The coordination of technology with other fields has been increased on a greater level because it provide maximum user interaction. Online survey now is more popular, and easier than the traditional ways that requires effort and time for example, SurveyMonkey that enable users around the world to give their feedback about anything. Surveys and voting through online means ease the complete voting process and carry all the steps in a convenient way, from start to end with maximum secure and efficient result may be obtained. There are different researches that are being carried out to develop the maximum secure and efficient mechanism for the voting. [1].

Survey and Voting, the official voting system is a formalized system on matters of administration or other democratic activities, it is usually used for one purpose or one question as voting for choosing the president for specific country (one purpose). On the other hand, survey system application is the aggregation of information that got from asking people about something face-to-face or through internet or by calling them on phones, it is a general view or an examination, collecting and recording of the opinions of a group of people. [4]

User of surveys play a very important role in customer experience analysis and this input acts as output to improve productivity by producing customer-friendly goods. Voting systems is come under the main umbrella which is the feedback systems, it is defined as a return of information about something you give when you only are requested for, it is more rational and based on facts, And that is very beneficial to assist in improving or make modifications in services or products. [12]

The Mobile phone voting system (MPVS) will make the survey easier, it provides mobility features

which means you can vote from anywhere and anytime. This technology will provide user identify privacy and also verification. The application that been developed carry out the complete process in smooth fashion and will help to avoid manual errors. The voting systems all over the world continue to pass through improvements from time to time [9]

Some of existing voting application used for official uses and frustrate users because they need user authentication through fingerprinting or some other biometric verification. Therefore, applying such measures for the survey is not a well-suited approach as getting feedback from the users is not an easy job. Some people are reluctant to use any system when the find out that application needs personal identification through fingerprints or face recognition. The application development for survey is not a new thing but the currently systems has major drawbacks that opened the doors of research and innovation for this subject. [19]

The new developed approach is designed in such a way that it eradicates the drawbacks and issues of old voting systems. Online voting has been widely applied across all over the world, it is designed to calculate the percentage of choosing answers. some voting applications are designed on only two modules which are admin who have the total authority for organization and control the survey rules, and user who have only view the list and result.[20]

The main purpose of these applications is getting most secure system that can provide maximum output. India uses their security method in voting, which is QR code that got scanned first to get sure from the information printed on Aadhaar card that is stored on the database, then OTP generated by admin. [21]

The discussion here in this paper is not about online voting survey app evaluation due to a large amount of applications, but to develop a new app that work shifts towards making survey application more effective and secure as official voting systems with the all confidence and security that been used in voting system then injected it into the survey without bothering user by many authentications methods. GPS will be our main contribute in this paper with other security method as ID and phone number. New technique will be used in GPS to prevent the influence on opinions.

2. PROBLEM DEFINITION

There are many of applications developed for surveys but does not authenticate the user and only focuses on the votes and those apps which authenticate require fingerprinting and face recognition that makes people uncomfortable. Many voting apps is slow in processing and not compatible for all phone software only for a particular software, hence this gap makes a place for the application that provide security measures without making people uncomfortable. The proposed application is based on the simple methodology of user verification to increase the vote significance, but that does not mean that will be less in security and confidence because new method has been used to achieve the true result without bothering the user.

3. LITERATURE REVIEW

The literature towards this field is significantly enriched with content which depicts the importance and advancement of this filed. Recent year's research conducted in this fields got a lot of contribution from top scholars and they described their technique in a variety of manners. The research work carried out in the section given below is mainly based on the voting applications that are being used for the purpose of election. But as the voting mechanism in survey needs some enhancement therefore contribution of e-voting application is also significant.

In the [5] aim to improve the engagement for students who afraid to say their opinion in front of their teacher and their friends and what they didn't understand from a lesson, so this designed application will help them to say what they want as anonymous to make the classroom more active. The proposed solution is a good solution for all student that have a fear of facing teacher or friends in a classroom, there is many students in universities also have the same feeling and not asking any questions in a lecture that has many students.

In the paper [6] defined the meaning of e-voting process and how the android platform will affect in the election positively and let all people to vote from mobiles, it done by simple registration only one time and he/her can vote directly for a particular election on the app. their new voting system will ensures voter confidential by using unique identification ADHAAR ID [U-ID] number. An online solution is very useful as the information

about the voters and the election but it doesn't require any fingerprint or face recognition or mobile number, it's not secured well.

In [7] urban areas voting or cast is complicated because they have only one identification and this will exceed the number of cheating so anyone can take the voting identification from his friend and vote again thought he is not allowed to vote, they solve this problem by saving faces for the authorized voters with their identification number in a databased on android mobile so voter can vote from their phones but first must take a picture by his phone. Author developed a very promising system but it is against the will of those who do not want the facial recognition, used one secured method is poor because twins will face a problem with this system.

The author [8] system based on the retina detection. The paper suggests that this is the most secure way of voting by providing retina security. This solution is very secure but people who have met some kind of accidents for them this solution would not be so effective.

In the paper [10] purposes a systematically engineered e voting system that analyze, design and implement a dynamic system. The purposed system is complete secure and without any vulnerability based on complete voting system. This include a hardware, network and software which will follow the process of voting from start to end to ensure the complete security. The purposed system is very useful and very effective but it will require a huge cost to completely establish it.

In paper [11] secure cloud-based solution for gathering data from remote locations. The author designed a cloud based system and secured the system using three different algorithms of cryptography Blowfish, AES and RSA. The purposed system is secure and can be used for the voting but it is highly expensive.

In [13] proposed an error free, restricted voting system that is based on oblivious and proxy signature scheme is proposed in this paper. The process enables the users of smartphone to cast their votes without any problem. A highly secure system that uses digital signature for the security is proposed with high cost.

In the paper [15] purposes a mobile based e-voting system which significantly uses security algorithms to make the system completely secure and to avoid any vulnerability into the system via SHA-1 algorithm. An online solution is very useful for the voting but there are security concern still exists because system verifies the vote and confidentiality of voting process but does not talk about the verification of the voters.

In the paper [16] e-voting system that verify the votes based on NIC and SIM. This is a great solution to resolve geographical restrictions for casting votes. Secure authentication methods are used for solving the identity problems. The system uses authentication of authorizing end-user, the application generates 4 digit pin from NIC and SIM. The system also encrypts the votes with AES algorithm. The system is secure and maintain quick response. It also encrypt the voting data which makes it highly significant system for e-voting and it could be improved to one step further by adding finger print security.

In the paper [17] mobile based e-voting system which include mobile phone application for the purpose of voting. A user of the application can add his/her vote while sitting at home. The data security is ensured through the hash function with the use of a mix of symmetric and asymmetric primitives. The purposed voting solution is quite efficient but it lacks the fingerprint identification or any proper identification method for the user verification.

In the paper [18] purposes a mobile based voting system and purposes a tracking mechanism for the votes till results. This application makes the comprehensive procedure of voting very easy to handle and run. This online voting solution is lacking the verification of voters and encryption of voting data.

In the paper [23] author purposes an application that allows user to cast vote via SMS. The proposed application secure the methodology via RSA encryption algorithm. The proposed technique is highly effective and allow user to collect data through SMS but it lacks user finger print or other verification.

In the paper [24] author Madhuri et. al. purposes a simple and secure voting system based

Aadhar card to ease the voting process. Verification of the voters will be done based on the card.

The research purposes different strategies for the voters to cast their votes. There are number of strategies that handles the verification of the voters but mostly the strategies proposed for the e-voting system for election are complex and to use them in survey voting is little bit difficult. The users of the survey applications are requested users which do not like the involvement of personal data and attributes to support the survey. Hence to assure that users are authenticated but without complex process is necessary thing to do.

4. RELATED WORK

This Many survey applications play a pivotal role by implying different strategies for optimizing the survey. online approach is very helpful for voting, but there are also security risks, because there are systems that validate voting mechanism and confidentiality, but often does not think about voter authentication. The system which focuses on the verification of the voters implies tough procedures for it. So there are two different approaches that are being followed in the work that already exists in which one verifies the voter and the other verifies the voting process. It is important to have both these approaches including the ease of use of the system.

Maker Faire Kuwait App it is a mobile application for events like workshops, speech and projects. Inside this app there is a section of voting for projects, for security of the app and voting, it uses only email, password and GPS but with different technique from our proposed. The unsuitable use of GPS in this case, that it has been used to ensure that the voters are in the same place of the fair, so no one can vote from anywhere, it is only confined to who is in the fair to make sure that the voters saw the project that they will vote for.

SurveyMonkey Live Survey Application very popular application that provide user with a live survey and is developed as mobile applications platform, it also presents helping to the users to create and make their own special survey [4]. It allows user to reach their target responded and get feedback from customer, and has an option for letting voters to vote only one time or multiple times. It's security as many app depends on IP, which the app get access to the device IP or Mac address to ensure that any device can vote for one time. Also we providing a comparison between application for knowing the difference between them like it's advantage, disadvantage, features and security to decide which will be suitable for using in education. Hence there are lot of related work with some features here and there but the focus of user authentication does not come in the survey.

[3] In some techniques the voter's assurance could also be taken through his ID card number. As there has been numerous solutions proposed that effectively enable voters to vote through devices, for all authorized voters they will enter their ID with OTP against CNIC, thumb impression and face affirmation then they can vote only one time, all ballot [voting] stored in database and when it ended, the report printed with all numbers for every candidate. This is another approach of voting through providing only fewer details but in survey OTP is not a suitable solution because this can irritate the user and he may not be willing to go through this process again and again.

The applications developed for the voting are mostly compatible for all mobile android and iOS. But application developed for surveys are not mostly mobile application as there are many applications that works for the user feedback but normally these applications are web based which makes the accessibility of the application difficult.

In [2] voting application using android device, the paper proposed AOVSAD system which required ID for the voter to login and cast his/her vote, the security method in this app is ID, OTP and face recognition. The following figure (1) show the block diagram of that system.

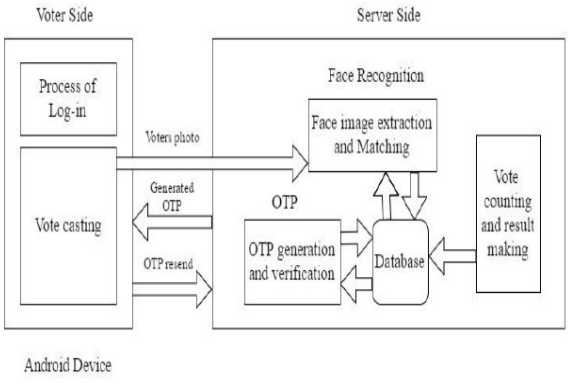

Figure 1 : AOVSAD

In figure (1), the android device is a voter side and the processing is done in a server side. The all data of voters stored on database on the server side, the face recognition has two parts detection to detect the real face of human to prevent this step been skipped by using a normal photo, and face recognition to match the voter face with the faces stored in the database, then after that, OTP is sent to mobile to get sure that is a authenticated person. The face recognition is one of personal authentication that will be not using in that survey application.

5. APPLICATION COMPARISON

In an increasingly digital online world the use of internet surveys for medical, marketing and educational research has been increased. Tools like LimeSurvey, HostedSurvey, QuickTapSurvey and Survey Monkey offer educationists, occupational health practitioners and marketers an exciting opportunity to carry out their own surveys and research. These applications provide online and offline survey opportunities and user can self-host these surveys without involvement of another party.

Table 1: App comparison table

Name	Attributes				
	Availability	***Customization***	***User friendliness***	***User authentication***	***Survey***
LimeSurvey	Free [Premium features paid]	Highly customizable	Complex to use	None	Online
Survey Monkey	Paid [basic plan is free]	Customizable	Easy to use	None	Online
HostedSurvey	Paid [no free version]	Customizable	Slightly complex	None	Online
QuickTapSurvey	Paid	Customizable	Easy to use	None	Offline
Mobile survey application	Free	Customizable	Easy to use	Yes	Online

These all application involves a pricing structure for the user to get benefits from their services. On their basic plans which is free for some applications like survey monkey there is very limited functionality and paid services charges higher cost. These applications are very flexible for the users and allow to setup questionnaire to get response in variety of manners. In survey monkey there is a progress bar which provide easy readability of total number of completed questionnaires. From all the application available for the survey the survey monkey has been widely used because of the flexibility in its features.

Different survey applications include template questionnaire as well where user who want to conduct the survey can use those build in survey questionnaires to conduct the survey. Through this way user can easily make the questionnaires and it will save a lot of time as well. The questionnaires availability makes the process convenient in one more, as some users may not have any idea about their questionnaires development and by reading those questionnaires, they can get the idea.

The comparison for different survey applications is given in Table (1), which evaluates the survey applications based on different attributes and spot the gaps where the new research contribution is required. These applications are chosen based on its uses by users and common between them. The table compares survey applications based on different attributes which are considered most desirable for the survey applications.

The proposed comparison is between some of the renowned survey applications and it also include the proposed application as well. The survey shows the feature difference between already [4] available and proposed application. Already available applications are mostly high cost bearing and does not involve user authentication feature. Therefore, the user providing the vote may or may not be a valid user. Hence the new application is required to provide a feature of user authentication with free availability and customizable environment.

6. PROPOSED TECNIQUE

To overcame the challenges and shortcomings of the already existing systems. The convention purposed clean and simple manner of balloting which is exceedingly secured. This system will be a mobile based application which allow users to vote or participate in surveys without hesitating. The application does not involve fingerprint security or face recognition even though it provides a significant security to ensure the

transparency of the vote. It up to user to registration for first time only or enter the following data to enable voting every time but GPS will be required always while voting. The application takes different information's from the participant in the survey or voting:

1. ID number of the user
2. GPS location
3. Mobile number of the user

After taking these required details from the user he will see voting details page. Then the system will let the user to vote and record his response. In the last step system will calculate the user's response and evaluate it to show result. The steps of proposed application are described in the section below:

6.1 User authentication

The application will authenticate the user based on user ID information, mobile number. The application also maintains the area restriction and ask the user to enable GPS. The details of the input data that needed from the user is depicted in Figure (2).

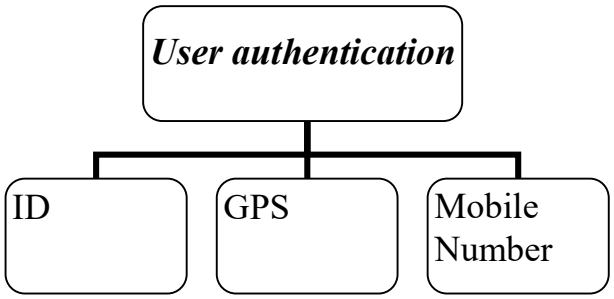

Figure 1: user authentication

- ID

Entering ID for any vote participation is must because it will authenticate the participant so that he can contribute into the survey with proper details. The system will record the IDs of the voters.

- Mobile Number

Another important feature that will authenticate the user is its mobile number. This is also a significant feature for the user of the application and it will be third point of user authentication.

- GPS *(must be enabled)*

The application will record GPS location of the user as it runs in the background of the mobile in every voting, that will also be used as an authenticator, as the app will get the location information then user will be able to vote. The technique in getting the location of the user is to know if any other users vote from the same place with the same answer or not, that will help ensuring about a person's opinion does not effect on other people, and therefore, the voting result will not reliable or ideal, so only 25% of the total count of voters in the same location with same survey votes will be calculated. And 75% will be cancelled. Some apps use the GPS to let user vote only if he reside inside the mentioned area, then letting them to vote. The following flowchart represent for GPS section of the proposed app.

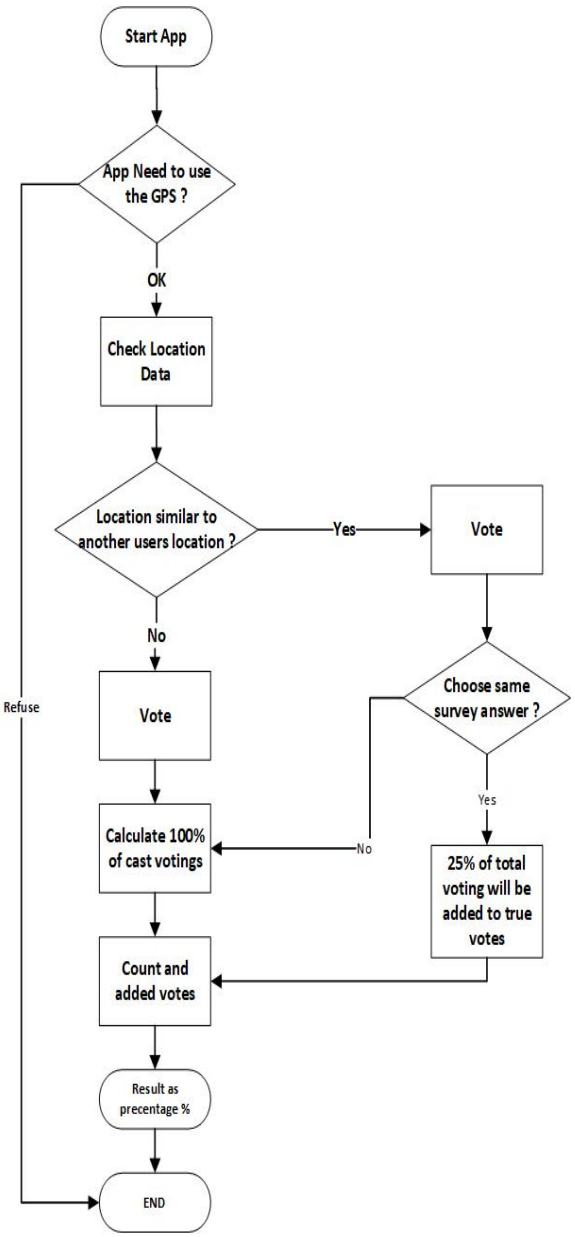

Figure 2: GPS flowchart

This figure (3) describe the GPS section of the system only, as shown the user start the app, application asking to enable the GPS of the mobile, when user refused to enable the GPS, so user can't start the voting process, because in this case the application didn't get any feedback if many voters in the same location or no.

If the user enables the GPS, voting process will be started, for the second condition part of the app which if there is many voters in the same place. If no so the app will calculate and count 100% of total votes, but if there is many voters in the same location and they choose the same answer of the survey, the app will take only 25% of their total votes and added it to the result. As example If 100 users vote for a something and 20 of them were at the same location and choose the same answer, the application will count the 80 votes add with 25% of 20 users who was in same locations and choose the same answer, so the counted true votes will equal 80 + 5 (which is the 25% of 20) = 85 and that result is the 100% of true votes.

6.2 Voting

The application will allow the online voting and it will have database which will save all the casting votes encrypted. The proposed application will have user friendly interface which will directly guide the user to cast their vote clearly [13]. The application will be used for the survey of different types and even with the average computer skills people can vote. The developed application will be robust which will make system do not corrupt it in the event of voting. The developed application will be able to handle multiple users at the same time and with the same efficiency, this will cater for the large and ever growing population of voters.

6.3 Vote Evalution

After the vote process the application will process all the votes and evaluate the results based on the processing. System will count all the votes and then accumulate the results from the votes to display the final verdict. All the steps followed by the application are demonstrated through the flowchart given in the figure 4.

The application allow user to enter the authentication details upon entering the user is verifies. After user's verification then he can vote for his selected option or provide feedback based on the system requirements. Then the system evaluates votes based on the user's feedback and present those data through graphical representation.

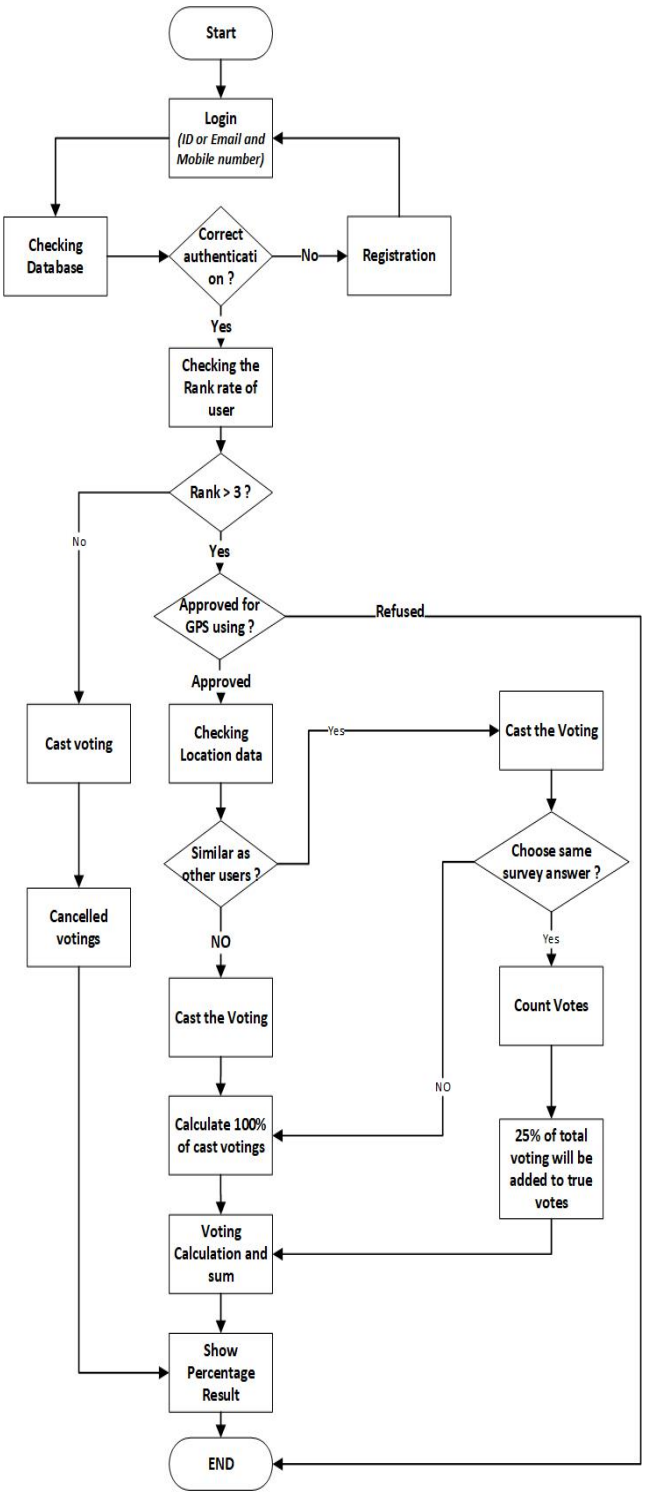

Figure 3: flowchart of the application

The application flow is simple and convenient for the users of the application which allows a user access through the mobile application.

After accessing the application, it requires from user to enter the details for his verification. Upon getting verification details from the user the application then allow user to participate into the survey. See Figure (5).

When user complete the survey then he has to submit the details which system evaluate. After the evaluation complete results of the application will be displayed.

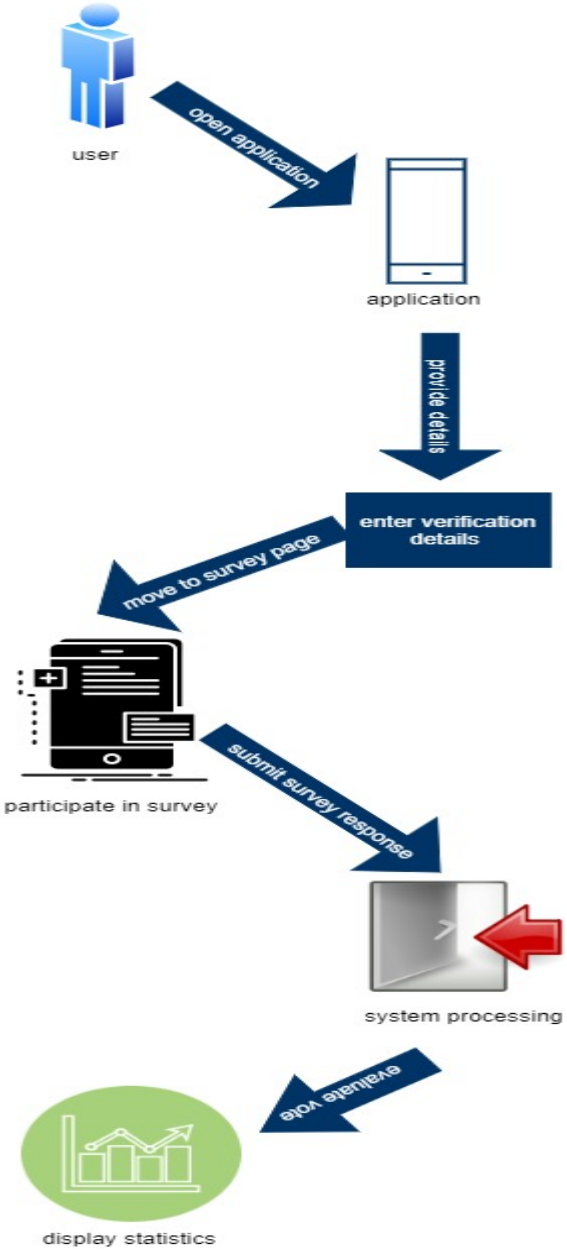

Figure 4 : Process carried through application

6.4 Ranking

This is a new step seeking to reach the convenience of the trusted users, the ranking processor is depending on several variable like Number of voting the user participate in, using of GPS every time and the correct ID authentications. When voter take place in more surveys, the ranking level will going up and the same with the verification uses, and when the user have rank number more than 50 the system treat this user as a trusted voter.

Each step has points, for fill up all the verification, using ID get 1 point and using Mobile number 1 point, that will be and for GPS enable the user will get 2 point, and for every 5-survey participation, the user will get 1 point. This equation shows how to calculate the points according to number of participations, P = NP\5, P (points), NP (number of participation). So when user ranking is more than 3 user can vote but if less than 3 the user can vote but this voting will be cancelled without knowing it. These points will be remained in user account and increasing every time user vote for a survey. The ranking also indicates on good or bad user which indicated by the system according to user rank. Any bad vote will be neglected.

6.5 Creating a survey

For another side implementing about who want to launch or create a survey for a service or feedback about product, App provide many templates for that with a good UI & UX to keep it easy for a user to create his own survey, or starting from a scratch which has types of surveys to be:

- **Multiple choices:** provide answers to user to choose from.
- **Text:** give the user the freedom to write his/her own experience about the service or product.
- **Matrix or rating:** letting voters to rate their satisfaction. See Figure (6).

Figure 6: Rating method

7. METHODOLOGY

The proposed technique will be carried out through the android application development. In the process of application development Android platform will be used and agile development methodology will be applied to carry out the development process. The application will use Firebase as database which will make the application consistent, easy to operate and very low in size. Firebase storage can store all the user record and questionnaires as well and through this way by using cloud server the application will be able to provide facility for the survey to its user.

The database of the application will be able to save user details and verify it when user enters those details into the application. Those users who enter incorrect details system won't allow them to proceed with survey.

8. RESULT AND DISCUSSION

The result of this paper and what we reach, provide the surveys and voting in an easy and trusted way. The application features are tabulated in Table (2).

Table 2: Features

Features	Proposed Design
Price	The Application will be free for all users
Operating system	Will be suitable for IOS & Android platforms.
Language	Support Arabic & English language at first launched, then in future will support many languages.
Ranking	Provide facility for trusted users.
Creating surveys	Provide option to choose from many customizable templates or start from scratch with UI & UX.

Encryption	User don't have to be worry about his information which the database system uses an encryption technique.
Personal verification	No need for personal verification like fingerprint or face recognition.

9. CONCLUSION

The developed application will allow user entry to the system for taking part in the surveys and providing feedbacks with security and confidently. The application include flexible features and allow users contribution with maximum security benefits. The developed application is cost effective, it produces much efficient results and reduces the risk of human and mechanical error. The application can be used for multiple purposes as for the surveys as well the voting with the maximum accuracy of trusted results. The application is designed on as a mobile based application which can provide researchers an easy access to use it for research purposes. The application takes users record which guarantee the data originality without any ambiguity. Ease of suability makes the application best fit for its purpose and in future the scope of application could be broadened to get the maximum results from it.

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