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Public Health Facilities Classification using A Web-based Portal Integrated with GIS

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Abstract:- The health system is defined as a logically organised group of assets, personnel, and organisations that provide medical treatment to a particular population in accordance with the financing, supervision, and provision of healthcare services. Due to the significance of good health, many health centres have been constructed in Kerala. The majority of people who visit hospitals do not know what medical services are provided there, and many of them are not aware of the services that are now provided by the medical industry or where they could obtain them. Patients may occasionally have problems moving to another health centre because of a lack of amenities at the current one. By designing and creating a web-based map named MED-E- ASSIST to categorise public health facilities in Kerala using GIS, by supporting users in finding information and health facilities, this project addressed the previously mentioned problem. Using the website MED-E-ASSIST, the user can locate the medical facility where they receive the proper care. The UTAUT (Unified Theory of Acceptance and Use of Technology) paradigm from business informatics, which gives access to specific usage patterns, is used to gauge how well an innovation is received by users. According to UTAUT, behavioural intention determines how technology is actually used. Every public health facility in a region is represented on a web map by the project, which groups facilities according to the services they provide. The website also provides details on the open slots for each service.

Keywords:- *CodeIgniter, Firebase, UTAUT.*

I. INTRODUCTION

Health, according to the World Health Organization (WHO), "is a state of complete physical, mental, and social quality of life, not only the absence of illness or infirmity." [1] It speaks to people as more than just their condition and places an emphasis on their strengths rather than their flaws. According to Ramzi and El-Bedawi [2], interconnections and accessibility from urban areas are essential for effective healthcare delivery. These factors also include resource allocation, economic devel- opment, geographic distribution of residents and communities within a nation, and economic growth. Low- and middle- income residents often have difficulty accessing healthcare services in developing countries since these facilities and systems are generally concentrated in urban rather than rural areas [3]. An innovative mapping and geomobile application or app was developed to modernise the healthcare services in Pulau Indah, Klang, Malaysia. The objective of this study was to present pertinent geographic data about healthcare facilities and the best path to adjacent healthcare services. The data collection process includes the names of healthcare institutions, the types of facilities, travel times, prices, and a base map from Google Earth.

Geographical information systems (GIS), healthcare, andhealth centres have all been the subject of extensive re- search. For example, dos Anjos and Cabral [4] employed the coordinates of healthcare facilities along with demographic, elevation, and auxiliary data in their study on Mozambique's geographic accessibility to basic healthcare facilities to sim- ulate accessibility to Health Centres (HC) using GIS. GIS was employed similarly to how Ravitch et al. [7] to address healthcare-related difficulties including geographical analysis and geographic accessibility,GIS was also utilised to address related difficulties by Ravitch et al. [7], Garcia et al. [6], and Edward and Biddle [5]). But none of these studies include the section on categorising the services offered by particular medical facilities. To preventing a patient from travelling toa healthcare facility that is unable to give the emergency and immediate care needed, the services offered by a facility are quite vital.Considering the previous, this project seeks to use GIS to map every public health centre in Kerala and classify each one according to the services it provides. The data was gathered and kept in a cloud that could be expanded as the amount of data increased.

This effort aims to provide precise and timely information to the end-user, who may be a patient, on the services provided by Kerala's health facilities. The health center's administrator can update details regarding the services provided by their establishment, including scanning, laboratory tests, hospitality,doctor availability, etc. With the website administrator's con- sent, the HC can be added to the list via the MED-E-ASSIST website, and the administrator of the HC will be issued with a user ID and password so they can login and update the information regarding the services they offer. A single HC administrator is unable to view or change the specifics of another HC service. The project additionally seeks to address the issue of inadequate knowledge regarding the locations of health centres and their services. The study examined the primary GIS concept, as well as several associated works and frameworks like CodeIgnitor 4. The majority of medical resource allocation evaluation techniques in the past relied on conventional databases to create information systems and quantitatively assess medical resource allocation capabilities using metrics like the supply and demand balance for medical resources, the expertise of the medical staff, and medical technicians with a population of 1,000 [19]. The traditional database, on the other hand, is

not capable of spatial expres- sion, which restricts its capacity to offer decision-makers data on the spatial distribution of medical resources and decision support [18].

Medical and health care, as one of the public service resources, are crucial to guaranteeing the regular and orderly functioning of urban operations and are a tremendous guar- antee for people's health and safety. Foreign academics are now concentrating their research on the spatial distribution and formation of medical resources rather than just the selection and layout of locations. Studying the accessibility of medical service facilities and examining and evaluating how residents are distributed can not only increase the ease and fairness of resident's access to medical service resources, but can also help layout medical service facilities more efficiently and boostmedical services.

II. RELATED WORKS

The literature review for a web-based map that uses GIS to categorise public health institutions in Kerala is concentrated on key sections like (i) GIS concept and description, (ii) GIS in healthcare, concentrating on public health facilities, (iii) GIS in Kerala's healthcare, (vi) Researcher perspectives, related work, and our adopted theoretical framework for GIS.

A conceptual framework known as GIS is used to collect and analyse geographical and geographic data. A user of GIS can compare and contrast a range of different types of data. The system may incorporate information about physical struc- ture's locations. It may contain details about a landscape, such as the locations of streams, structures, different plant and soil kinds, and so forth. GIS and related spatial analytic approachesprovide a set of tools for documenting and analysing the geographic structure of healthcare, examining how it relates to health access, and thinking about how healthcare could be provided more effectively [8]. It has been investigated into how GIS can be utilized to analyze medical needs, plan, rate, and access health services locations, as well as enhance planning and decision in the health sector. To useGIS for healthcare, analysts and decision-makers will need access to integrated spatial data on the use of health services and their outcomes linked to human service systems [9]. A wide variety of services are included in healthcare, including personal health services, health information, and education for preventing illness, spotting it early, finding a cure, and getting well [10]. The significance of GIS is appropriate given the goal of current social health, which is "the attainment of the best achievable level of health by all people," as reported by the World Health Organization (WHO) [11].

The distance between a health system and a medical facility is important. The performance of the healthcare system is impacted by proximity measurement, which also helps with policy reform. Tanou and Kamiya [12] underlined that the majority of Ghanaians do not seem to have geographic access to healthcare. Insufficient Maternal and Child Health services are believed to be difficult to access, especially in countriesin Sub-Saharan Africa, due to the separation between a per- son's residence and the nearest hospital. In Burkina Faso, a landlocked nation in West Africa's Sahel region, women still don't use enough healthcare services throughout pregnancy and delivery. Therefore, the impact of geographic closeness to healthcare institutions on the utilisation of maternity healthcare in Burkina Faso was examined in [13].

The Community Based Medical Development and Service zones were established, some of which had an actual structure for the provision of services and employed skilled primarycare nurses, while others did not [14]. In order to enhance the functioning of health systems, spatial data that reflects the actual distribution of illness burden is needed. Geographic mapping makes it easier to prioritise the use of resourcesby pointing out the locations where particular problems are most prevalent and it is possible for managers to keep aneye on, assess, and focus on areas where resources are best deployed [15]. Shihua Cao [20] use the integration capabilities of the health cloud platform, the two parties jointly run par- ticular value-added services including appointment scheduling, maternity and child healthcare, and medical communication. Centenaro M [21] introduces the Internet of Things-based, next-generation mobile technology. To study the geographical distribution of healthcare resources in the urban region of Hohhot, Xiao Yu [22] employs the average closest neighbour, method for estimating kernel density, accessibility metric and standard deviation ellipse technique.

The most typical application of a GIS is to create map-based data visualisations. The concept is that each visualisation conveys information that might not be clear from the raw data alone. Finding patterns and trends based on location is made easier with the help of this form of representation. Multiple layers are frequently used to create GIS maps. Each map inthe stack is referred to as a "layer," and it may be created by stacking the map types we previously examined on top of one another. Most GIS systems allow you to shift a layer up or down in the stack or turn it on and off in the map legend. UsingGIS mapping, for instance, Edward and Biddle [5] were able topinpoint areas with a significant demand for access to primary healthcare. When developing interventions to improve access to primary healthcare, the providers' geographic location and proximity to patients are seen as the main treatment barriers. As a result, they thoughtfully incorporated spatial elements into their work and used techniques to evaluate the established geographic limit. Geospatial analysis was used by Garcia etal. [6] to assess the barriers to healthcare access among a particular immigrant community. They came to the conclusion that geographic factors limiting access to healthcare, such as the placement of healthcare facilities and transportationchallenges.

Pediatric asthma doctors' geographic reach was studied by Ravitch et al. [7]. They found that the health outcomes ofthese patients location were different and were related to the accessibility to care as well as other demographic factors including the patient's income and educational attainment. Dos Anjos and Cabral [4]

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demonstrated in a related study that the availability of various information technology services andapplications has considerably enhanced the usage of GIS in public health, andthat it is currently believed to be useful in understanding and treating health issues in different geograph- ical areas. The related studies above demonstrate GIS's use in the healthcare industry in terms of geographic processes, geospatial analysis, geographic accessibility, and establishing geographic borders, hence utilising the public health centresin Kerala as the target data.

Any research endeavour that seeks to increase understanding of actual occurrences or give a framework for evaluation of them. According to Venkatesh et al. [16], tTheoretical frameworks helps in defining project's objectives and con- tribution to the body of knowledge. To explain a variety of processes and procedures connected to technology acceptabil- ity, it is crucial to apply the appropriate model or theoretical framework. The Unified Theory of Acceptance and Use of Technology (UTAUT) paradigm was created by Venkatesh et al.As per UTAUT, behavioural intention to use a technologyis determined by behavioural intention and facilitating factors, whereas behavioural intention to use a technology was influ- enced by performance expectations, effort expectations, and social influence. Eight preexisting hypotheses that potentially forecast behavioural intents to use information technology were examined and validated to develop the model.

III. METHODOLOGY

To make it possible to analyse the geographical pattern of medical resources in Kerala's main urban area, it is necessary to identify the relationship between the medical resources and whether their spatial distribution is random, agglomerated, or divergent. As a result, the average closest neighbour analysis was performed on the three main types of medical resources, such as clinics, specialty hospitals, and general hospitals, usingthe GIS spatial analysis method and QGIS software. The two main groups into which the measurement methods for classifying the accessibility of medical service facilities can be divided from a macro perspective are the potential model and the two-step mobile search technique. By incorporating pertinent evaluation elements like the hospital level and med- ical population with a range of calculation approaches, the two models may efficiently assess how conveniently accessible service facilities are. The research's primary methods for measuring and evaluating the accessibility of medical service facilities in Kerala's major urban area include a GIS-based network analysis approach and an improved potential model. In this project, the back-end server is contacted in real-time through HTTP from selected Android and iOS mobile devices.The first evaluation, physical sign recording, patient browsing, and other activities are carried out by the back-end service programme in accordance with the answer type depending on the user type and request type, and they are then stored in the pertinent database. GIS applications have played a significant role in both health-related study and experimentation. Figure 1 shows the research's approach.

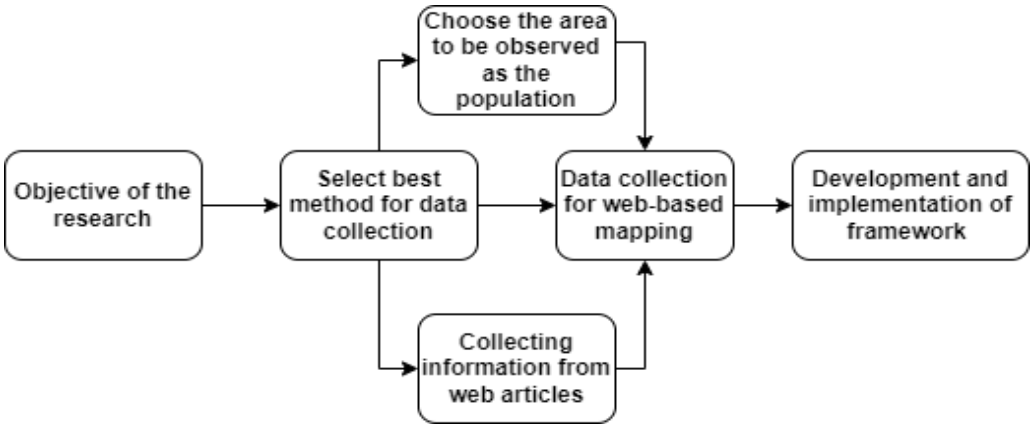

Fig. 1: Methodology and Data Collection Process

A. Research Techniques and Data Gathering Tools

Collecting high-quality data with the intention of addressingall open-ended inquiries is the main objective of data collec- tion. To improve the accuracy of the information, data must be gathered in order to develop conclusions and determine what is factual. Primary data collection is, by definition, the collection of raw data at the source. It is the process of compiling the precise information that a researcher has obtained for a given research goal. It could be further divided into two groups: methods for gathering quantitative data and methods for gathering qualitative data. The gathering of information that has already been used but was not initially acquired by the original user is known as secondary data collection. It involvesobtaining knowledge that is already public, whether it is from books, journals, or online resources. In terms of simplicity, it is both far more inexpensive and easier to gather.

A qualitative research was conducted to fulfil the disserta- tion's goals. The major characteristic of qualitative research is that its results are not measurable and quantifiable, therefore thus is frequently ideal for small samples. Accurate data collection is crucial in order to prevent the researcher from making ill-informed conclusions, which increases the chance of decision-making

mistakes. Case studies, checklists, inter- views, sporadic observation, surveys, and questionnaires are some of the instruments used to collect data. The goal of data collecting is to gather reliable information that will enable analysis to result in the creation of answers to the questions that have been addressed that are believable and convincing.

The proposed web-based map for the classification of Kerala's public health facilities was built, and the value of technological adoption was confirmed using the quantitative method. In order to gather information from health centres, Google Forms were distributed. FireBase was used to store the information that was gathered. Another option for data collection is the collection and use of information found in website articles. Web article data gathering is a more expedient and affordable data collection method. Surveys are created to collect data from a population. In order to avoid confusion, it must be made clear that a questionnaire is not a survey but rather one of its components. Three different types of questions are asked on questionnaires. Each question is suited to the type and scope of the study. The respondent's longitude and latitude, as well as their responses, are pinpointed with the highest degree of accuracy using Google Maps.

B. Population and Sample Analysis

The total group of participants in the study is referred to as the study population. A portion of this group that reflects the population is known as a sample. Sampling helps to avoid pollsters from conducting too many surveys, which raises response rates and lessens survey fatigue. Sampling is a potent method for gathering viewpoints from a broad range of individuals selected from a certain group in order to have a more comprehensive understanding of the group as a whole. It is essential to choose a study population that accurately reflects the total population for any research study to be effective. The target population needs to be chosen and agreed upon before your study can begin. The entire population of your target market would require data collection, which would be expensive and time-consuming.

Across this study, health centres in Kerala state with 14 dis-trict were used as the population, and one among the Thrissur district's health facilities were used as the sample. For the time being the sample was used to develop the website MED- E-ASSIST. Details of health centres from Thrissur district was evaluated and displayed on website for the end users to view the facilities offered by each health centre. The health centres were classified based on their sector, location and services they provided. Each and every sector was identified using a unique id and also it was used to mention the sector of each health centre. Also health centres were identified using another unique key called HC id. The health centres in same location was grouped together for easy access and users will be able to locate the health facilities. Here, a widely used mathematical formula from Kothari's [17] is utilised to ensure the accuracy and dependability of the sample size of the responders, as shown in equation 1.

$$n = \frac{Z^2pqN}{e^2(N-1) + Z^2pq!} \quad (1)$$

where n is the sample size, Z is the confidence level, p is the probability of success, q = 1 - p, N is the population, and e is the precision level.

C. Profile and Demographics of the Respondents

The study of human populations, including their size, com- position, and spatial distribution as well as the mechanisms by which populations change, is known as demography. The main factors affecting demography are births, deaths, and migration, which together produce population change or stability. Aside from demographic issues, research on the human population also offers age-specific information for planning, scientific, technical, and economic objectives. A nation progresses via a five-stage demographic cycle.

- First stage (High stationary): The population is stagnant during this stage due to a high birth rate and high mortality rate cancelling one another out. This stage persisted in India till 1920.
- Second stage (Early expanding): The birth rate stays the same while the death rate starts to go down. The population begins to grow quickly as long as birth rates are high.
- Third stage (Late expanding): Birth rates tend to reduce and death rates continue to decline, but population trends to increase as birth rates continue to outpace death rates, however population growth rates slow down.
- Fourth stage (Low stationary): At this point, the popula-tion stabilises since there are fewer births than deaths. Most developed countries have experienced a demo-graphic switch from having a high birth and death rate to having a low one.
- Fifth stage (Declining): Population starts to drop as a result of a lower birth rate than a higher death rate.

South-western India contains the state of Kerala. The ma- jority of Kerala's 34.8 million residents are Malayalis (Malay- alam speakers). The majority of the Keralites are descended from Dravidian communities that immigrated to Kerala. As a result of centuries-long trading connections across the Arabian Sea, people of Arab, Jewish, Syrian, and other ethnic back- grounds moved in Kerala, giving rise to additional ancestries. The figure 2 shows the population density of Kerala.

D. Acceptance of Respondents in Current Situation and Tech-nology

A person's attitude, perception of a technology's utility, and perceived simplicity of use all have an impact on whether or not they adopt it, based on the Unified Theory of Acceptance and Use of Technology (UTAUT) and Technology Accep- tance Model (TAM). Since then, numerous research have supported the hypothesis either theoretically or experimentally. Others theoretically contribute to UTAUT by expanding the theory, introducing moderating variables, or even expanding and combining the theory with other models. It is seen as a multidimensional construct in these theories and models. In addition to anxiety and self-efficacy, the modified UTAUT views attitude toward technology use as a direct determinant of behavioural intention and system use

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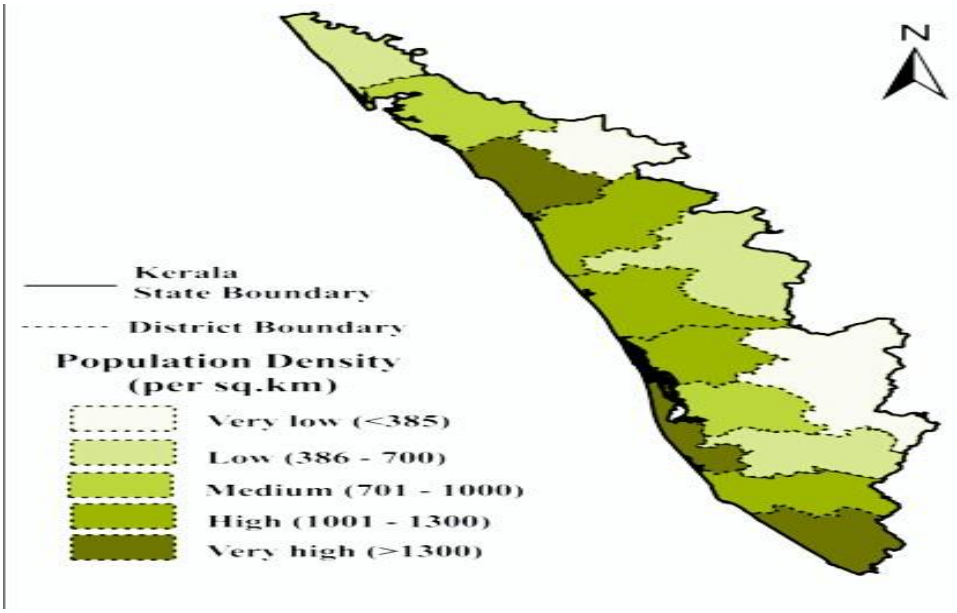

Fig. 2: Population density of Kerala

Table 1: Respondent's Acceptance of Technology

Question	TN	M	SE	SD	V
Did you have any trouble finding the medical facility you wanted togo to?	260	1.77	0.03	0.42	0.18
Did they provide the services you were looking for?	260	1.73	0.03	0.44	0.20
Did they have the tools necessary to handle your situation?	260	1.39	0.03	0.49	0.24
Have you ever been turned away from a health centre because they didn't provide the services you needed?	260	1.18	0.02	0.39	0.15
Have you ever had a medical facil- ity admit you for a condition?	260	1.10	0.01	0.31	0.09
Would you be willing to accept MED-E-ASSIST as a means ofgetting details on health facilities?	260	1.03	0.03	0.16	0.03

to the information in Table 1, the participant's response that it was difficult to find the health centre they wanted to visit indicates the highest M value in terms of technology adoption. The participants went on to say that they did not receive the treatments they needed at the medical facilities they visited.The information in Table 1 also demonstrates that patients were admitted to a hospital for treatment during the next level of a high M. The participants then stated that they would accept MED-E-ASSIST as a system for information access and the locations of health centres, together with the use of smartphones to help their access or utilisation of MED-E- ASSIST. Table 1's depiction of the respondents' technological perspectives on health centre accessibility and acceptance of MED-E-ASSIST confirms that, should a system like MED-E-ASSIST be put into place, the respondents would value the use of technology to make it easier for them to access information and find public health centres.

The biggest M value in terms of Technology Performance Expectancy is related to participants' affirmations that they will find MED-E-ASSIST useful and effective when visiting the healthcare facilities listed in table 2. The participants said that using MED-E-ASSIST will make it easier and faster for them to access healthcare services. In accordance with participant replies, efficiency and time management are twoof the most crucial benefits of using MED-E-ASSIST since it will enable users to research the services offered by the healthcare institutions closest to them before attending. The biggest M value in Table 3's replies from participants, which measures the respondents' social influence, supports the idea that someone who has the power to affect a participant's behaviour would advise them to use MED-E-ASSIST. And finally, people they care about think they should use MED-E- ASSIST because it helps them.

Table 2: Technology Performance Expectancy Of Respondents

Question	TN	M	SE	SD	V
Will MED-E-ASSIST be effective and valuable for your access tomedical facilities?	260	1.10	0.02	0.31	0.09
Would using MED-E-ASSIST make it easier and faster for youto get medical services?	260	1.10	0.02	0.30	0.09
Through checking nearby medi- cal facilities and their services before leaving, using MED-E- ASSIST help you in managing your time effectively?	260	1.09	0.02	0.29	0.08

Table 3: Social Influence of Respondents

Question	TN	M	SE	SD	V
Do those who have control over my behaviour believe I should use it?	260	1.14	0.02	0.35	0.12
Do people who matter to me believe that utilising MED-E-ASSIST is beneficial to me?	260	1.12	0.02	0.32	0.10

IV. PROJECT DESIGN

When your health is at stake, you require a product that is effective, dependable, and simple to use. The importance of health centre mapping as a tool for making healthcare decisions has increased. Access to medical care and close proximity to it are nevertheless significant factors in deter- mining health outcomes. Developing nations lack this crucial information, whereas wealthy nations have produced and kept good data on the locations of healthcare institutions. For researchers, it is either unavailable, insufficient, or, if it is, expensive. Being in constant communication with the patients they are caring for is more crucial than ever. Particularly if you work for a healthcare network that places hospitals and urgent care facilities, monitors primary care clinics and immunisation facilities, or oversees public health officials.

Data mapping is the practise of pinning data points on a map utilising location data in a geographic information system (GIS) programme to gain quick insights and layers of practical demographics, statistics, and pertinent information at your fingertips. Locating the ideal area where hospitals, pharmacies, and all other healthcare facilities were accessible, reducing lengthy travel distances, and facilitating access to medical and emergency services. In this project, GIS and public health data from Kerala were combined so that public health facilities can use MED-E-ASSIST as a web-based map.The use case diagram for MED-E-ASSIST is displayed in Figure 3. Web-based mobile and desktop solutions will be utilised to deliver the MED-E-ASSIST services. On the MED-E-ASSIST website, users can conduct a search for healthcare facilities they wish to visit. In order to do it, the user mustfirst choose a place, after which they can search for health facilities there. The user will then enquire as to the best way to get to the medical facility. The user can provide comments on the assistance provided by the health centre as well as the suggestions offered by MED-E-ASSIST, which is helpful for receiving more support.

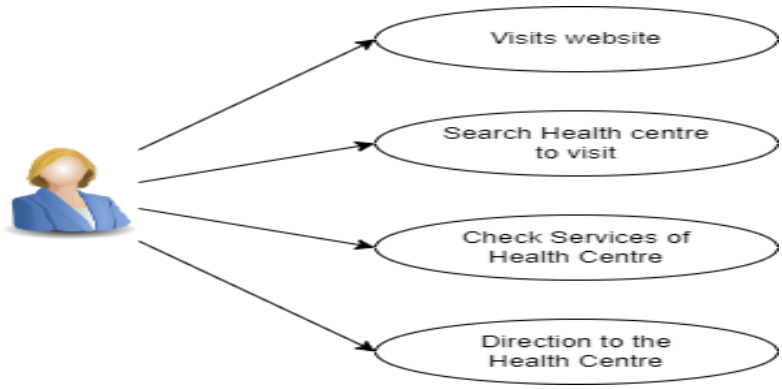

Fig. 3: Use case diagram

Any project's success depends on having the proper specifi- cations in place. It's crucial to distinguish between functional and non-functional needs when recording product require- ments as shown in figure 4. The following is one way to put them into words:

- Functional requirement: "The system must do"
- Non-functional requirement: "The system shall be"

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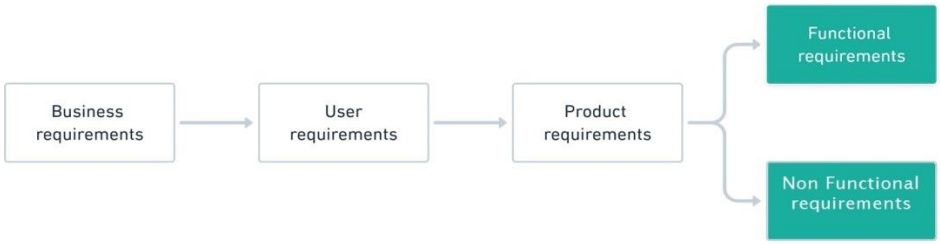

Fig. 4: Functional and Nonfunctional requirements

As the name suggests, functional requirements concern certain product functionality. Most of the time, defining, measuring, and testing them is an easy effort. Non-functional criteria, on the other hand, are more ethereal and are also referred to as ”quality requirements” or ”quality attributes.”

A. Functional Requirements

Successful project teams define functional requirements in great detail. The functionality of a system or one of its subsystems is specified in a functional requirement document. Functional user needs may be high-level declarations of what the system should be able to achieve. For example, adding a health centre, giving it an ID, deactivating inactive health centres, enabling active health centres, updating services given, mentioning the time window available for facilities offered, etc. are some of the functional needs for health centre map- ping. Functional requirements may be listed in a separate functional requirements document or as a section of a product requirements document. As many issues can be caused by unclear or confusing requirements as by those that are not documented.

When compared to other states, Kerala’s healthcare system excels in a number of areas. In reality, the ”Kerala Model for Development” is frequently cited as a model that other nations should adopt. With its primary emphasis on education, healthcare, the environment, and cleanliness, the State has attracted attention and praise from all over the world for its model of development. It is possible to determine the func- tional needs for MED-E-ASSIST based on this infrastructure. The following are the recognised functional requirements:

- The system will assist the user in finding correct information about the healthcare facility they plan to visit.
- The most updated information on the services offered by the various health centres will be available to system users.
- The system would be able to determine how many users had access to it and how many of them had used the tools effectively.
- The staff in the administration area can add a healthcentre to the list of facilities.
- The MED-E-ASSIST gives the health centre administrator the ability to add new services that are provided within the facility.

It helps healthcare facilities by improving the quality of care and patient experience, optimising workflows, lowering the risk of error, automating tedious tasks, managing hospital health and administration data repositories, and avoiding need- less travel. Additionally, it eliminates the need for numerous technological solutions to support different functions.

B. Non Functional Requirements

Non-Functional Requirements specifies the quality attribute of a software system. They assess the software system ac- cording to non-functional criteria. Systems that don’t meet non-functional requirements may not be able to meet user needs. In software engineering, non-functional requirements let you apply limits or limitations on the system design across different agile backlogs.

The following nonfunctional criteria have been noted:

- Security: The system’s information should be safe and secure.
- Administrator privileges: The administrator has access to all data stored in the hospital management system and can examine and modify it.
- Maintenance: When necessary, the system allows for upgrades and modernization.
- Usability: Both the administrator and the user can access the system without any problems.
- Performance: Users receive prompt responses from this system without any hiccups or problems.
- Continuity of Service: The MED-E-ASSIST website is always accessible.
- User Friendly: The system as a whole was developed in a systematic format, making it user-friendly in terms of interface and ease of usage comprehension.
- Localization: Applications that have been localised have characteristics that correspond to the locations of their users.

Create a product with special qualities using non-functional requirements. It can be easier to create a system that meets end users’ expectations if you are aware of examples of nonfunc- tional requirements and how they function in an application. Nonfunctional requirements cover how a system completes a task, whereas functional requirements address what a system accomplishes. The following methods can be used to assess the system’s nonfunctional needs’ quality:

- Consider the user expectations. Consider what standard of quality the intended audience is looking for.
- Recognize the needs of the market. To ascertain the demand for particular nonfunctional requirements and to contrast them with what the rivals are already providing, think about performing market research.
- Perform a performance analysis. For a quality evaluation, try checking how the nonfunctional requirements function.

C. User Interface Design and Technologies

CodeIgniter4 is the framework employed for designing user interfaces. Despite being a PHP-driven framework, CodeIgniter is not a PHP replacement. The adoption of CodeIgniter does not imply that PHP will be abandoned. PHP is a scripting language used on servers to create websites with dynamic applications. CodeIgniter includes libraries, a user- friendly interface, a logical access structure, plug-ins, helpers, and other resources that make it easier to solve the complicated PHP functions while still retaining excellent speed. Firebase is the database in use here. A collection of hosting services called Firebase are available for any kind of application. It provides NoSQL and real-time database hosting, content hosting, social authentication (using Google, Facebook, Twitter, and Github), and notifications, as well as other services including a real- time communication server. QGIS makes extensive use of the Qt library. Qt is cross-platform software used to create graphical user interfaces and cross-platform programmes that can run on a variety of hardware platforms and operatingsystems.

QGIS is used to integrate the GIS with the website. The advanced technological architecture of the QGIS panels en- ables users to engage with certain limitations. It also describeshow the system was created, from the study of geographic data to its integration with QGIS online and eventual im- plementation. The attributes and geographic coordinates were obtained, analysed, and uploaded to the platform. QGIS allowsfor the display of several layers with a variety of sources or representations of sources.

V. RESULTS AND DISCUSSION

A robust, user-friendly, and reasonably priced object storage service designed for Google scale is Cloud Storage for Fire- base was used. Regardless of network condition, the Firebase SDKs for Cloud Storage give Google security to file uploads and downloads for the Firebase apps. Developers can upload files to and download them directly from users using the Firebase SDKs for Cloud Storage. The client can resume an operation where it left off if the network connection is weak, saving your users' time and bandwidth. The files are kept in a Google Cloud Storage bucket by Cloud Storage for Firebase, making them available from both Firebase and Google Cloud. The Firebase SDKs for Cloud Storage now give users the choice to upload and download files from mobile clients. Additionally, programmers can utilise the Google Cloud Storage APIs to carry out server-side operations like video encoding and picture filtering. The automated scaling of cloud storage eliminates the need to change providers. In order to identify users, the Firebase SDKs for Cloud Storage smoothly interact with Firebase Authentication. It also offer a declarative security language that enables developers to specify access limits on specific files or groups of files, allowing to make files as public or private as wish.

The GIS setup's first data collection is used by the sys-tem. Then use a computerised web-based map similar to Google Maps to explain the comparison. Parameters include the precise health services provided and the location-based health centres. The MED-E-ASSIST home page outlines the procedures a user must take to easily access the medical facilities. The user can get in touch with MED-E-ASSIST through the contact section with any questions. To view the health centres the user can click the button given in navbar or the button in home page. Then a list of health centres were displayed on the screen. Each health centre card specify the sector which they belong to, region where there are locatedand a button to view the list of services provided by them. That button will redirect to the next page which will list outthe facilities offered by that health centre.

The users can register with MED-E-ASSIST through the page 'Create your Account'. After registering with MED-E- ASSIST they were provided with a user id and password.

Those user id and password were used for their login creden- tial. Only after login they can update their institutions services. This modification permission were possible only to the active users. Only the admin can activate a user by verifying the centre and activating them. The non-active users were not ableto modify or view the list of services provided by them. By using this strategy genuinity was maintained. As an expansion of the original model Unified Theory of Acceptance and Use ofTechnology, UTAUT2 was used to incorporate other elementspertinent to the consumer market that affect behavior-related intentions to employ new technology, was developed to assess how well a new technology is being used by consumers. It hasthe highest explanatory power of all conventional acceptance models due to the variety of aspects, supporting the technologydevelopment process.

VI. CONCLUSION AND FUTURE SCOPE

With the aid of GIS technology, the project created the computerised web-based map MED-E-ASSIST to classify public health clinics in Kerala. A cloud service called Firebasewas used to store the data that was gathered. Every time data changes, the Firebase Realtime Database uses data synchroni- sation rather than standard HTTP queries. According to the study and findings, MED-E-ASSIST was successfully used and implemented for Kerala's public health facilities, which was really acceptable and suitable. The full development of MED-E-ASSIST will ensure a number of advantages, includ- ing time and effort savings by guiding users safely and easily to the healthcare facility that offers the precise services needed. The ideal method for demonstration and analysis is to map out the geographic distribution of the collected data. QGIS was used to illustrate the health centres. The eight models were then examined using the original information, and UTAUT was found to perform better. A questionnaire was constructed using validated questions from earlier studies that had been technologically adjusted.

As of now MED-E-ASSIST can assist the Keralites for the their medical online assistance. In future MED-E-ASSIST can give assistance to all Indians. The nation must be covered in data collection, which is a challenging task.

MED-E-ASSIST can also include addon services like taking appointments, booking time slot for testing or scanning etc. This will avoid people to wait for a long time at the health centre. A live chat feature might be added to assist MED-E-ASSIST website visitors. AI can be used to automatically add new health centres to the MED-E-ASSIST list and search for new health centres.

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