Research Paper

Cloud Based E-Consulting Service in Health Care Domain

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ABSTRACT

With the development of cloud computing services, the number of users using its services has been increased drastically. In this paper, a novel approach is proposed for diagnosis and monitoring of patient's health condition through the usage of cloud based services. In developing countries, providing proper healthcare to all the people of rural areas is a challenging task. In this system, the patient communicates with doctors through the use of internet. The patient uploads all his/her past medical reports to the cloud and sends request to specialized doctors for treatment. The doctor can accept or reject the request from the patients for treatment. If request is accepted, doctor can provide the diagnosis by analyzing the past medical reports which are uploaded to the cloud. This system acts a medium of communication between the doctor and the patient.

Keywords: Cloud, e-consulting, health care, Android

INTRODUCTION

One of the most burning issues in today's world is health problems and unavailability of healthcare centers and healthcare professionals. Using e-Healthcare system we can increase the quality of treatment and accessibility. This system acts as a medium of communication between the doctors and patients. We are using cloud service because of its scalability and on demand self-service.

The main objective of this paper work is to automate the complete operations of the e-Consulting Services by usage of cloud and its services. To make the patient/caregiver easier to consult the specialist, the system provides the feature where one can directly upload his reports to the cloud regarding health issues and can proceed to specialist in the nearby location/professionals from reputed hospitals around the globe. The doctor can accept or reject the patient proposal by analyzing the report which is stored in the cloud and the notification would be sent to the patient/caregiver regarding the request. The patient can even fix the appointment with the doctor, apart from consulting services. This system extends healthcare systems to the remote and isolated areas which has limited access to medical technologies, remote health services are provided through telecommunications. The system provides best diagnosis to the patient and also assists doctors/researchers to get more insight of domain.

EXISTING STATE OF ART

Hospitals currently use a manual system for the management and maintenance of critical information. The current system requires numerous paper forms with data stores spread throughout the hospital management infrastructure. Often information (on Forms) is incomplete, or does not follow management standards and

here we cannot effectively share and access the reports. The existing system consists of booking a doctor's appointment through the website. The website is called practo.com. The appointment confirmation is given by a notification. The main drawback of this system is that it provides only appointment facility but it does not provide the doctors to evaluate the patient's reports and write a prescription on patient's health condition. Due to this the patient cannot communicate with doctors without meeting them.

PROPOSED SYSTEM

The proposed system has following functions: Maintaining patient and doctor details in secured cloud. Medical reports can be accessed at anytime, anywhere by authorized persons only. Patient can upload their reports to the cloud and can manage permissions. Patients select the doctor who is connected with cloud and send the request for treatment around the globe. Patient will be notified about status of their request. Chat portal is opened for communication of both parties. Doctor prescription is stored in the cloud, which can be accessed by the patient. The overall system design is as shown below:-

Modules concerning Data Flow diagrams: -
• Register with the system.
• Select the city and specialization.
• Send request for doctor to diagnose.
• Upload and view the reports.
• Provide access to doctor to your database.
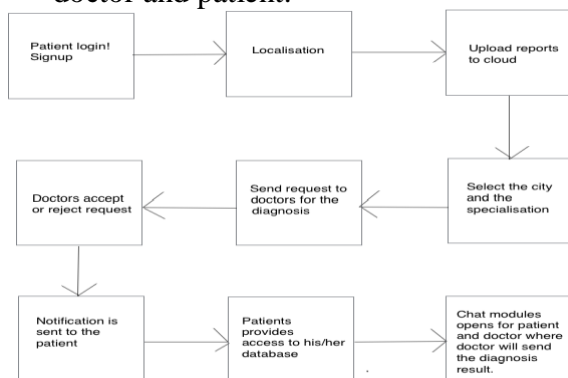• Communication portal between the doctor and patient.

Figure 1: Top Level Design.

1. **Register with the system**

The user who wants to access the services of the system must first register with the application. The system accepts user's email address and password for registering and stores these details in the firebase authentication. So that each time when the user tries to login into the system, it validates with the database. Knowing a user's identity allows a system to securely save user data in the cloud and provide the same personalized experience across all of the user's devices.

2. **Select the city and specialization**

After successfully registering with system, the user selects the city and specialization to get the particular domain expert doctors' list with in the particular city. We are the storing the doctors' information about their name, specialization and city in the firebase realtime database. Based on the user inputs the database is queried and the list of doctors with the specified city and specialization is generated and is displayed to the user. Now the user selects the doctors from the list and writes the problem description about his health issue and then sends the request to these selected doctors for diagnosis.

3. **Send request for doctor to diagnose**

When the user sends the request to doctor for diagnosis, a notification is sent to the doctor about the request for treatment. The doctor can accept or the request by reading the problem description of the user. Again a notification is sent to user about the request accepted or rejected by the doctor.

4. **Upload and view the reports**

It is very important to preserve all the health related reports of a user, so that the doctor can provide better diagnosis and advices to the user. Cloud database functionality, allows user to store and retrieve the data at any time and at any place. The system provides the user to store all their health related reports in their database, by which the user can keep track of all their medical information without losing them. The user takes the picture of the medical report and uploads it to the

database. Whenever it is required the user can retrieve their reports which are uploaded to the database.

5. Provide access to doctor to your database

The user can send the request for treatment for more than one doctor. If multiple doctors accept the user request for treatment, then the user can select one doctor from the list. Then the patient can provide access to doctor to their database if required. Once the access is provided to doctor, the doctor can view all the past medical records of the user which are stored at one place in firebase database. By this the doctor can give better diagnosis by analyzing the reports.

6. Communication portal between the doctor and patient

When the doctor accepts the user request for treatment, the user's id is added to the list which contains all the connected users for the particular doctor. Now the chat portal opens up between the doctor and patient. Through this portal the patient can communicate with doctor anywhere around the globe by being at his home.

RESULT

The performance and efficiency of the system can be analyzed in many of its functionalities through elaborate experiments.

1. Compression Ratio.

The compression functionality provided by this system reduces the size of a report file and stores it in the cloud with minimal loss in quality. This helps in saving data space as large-sized files are not occupying much cloud storage space.
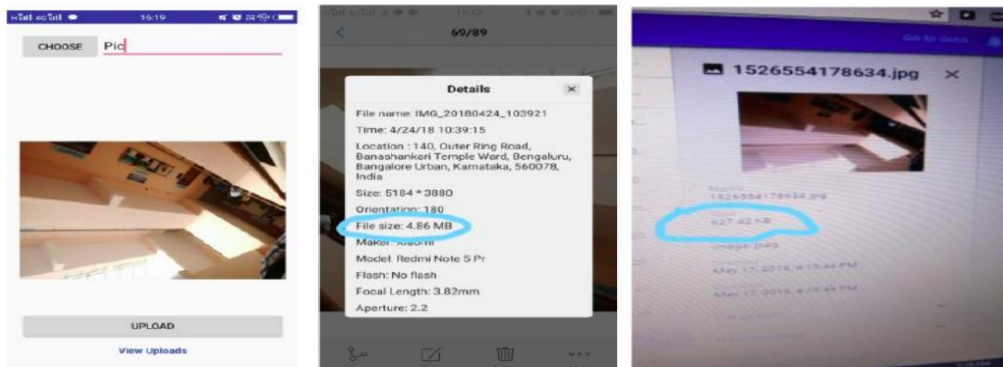

Figure 2: Compression Ratio.

Original size = 4860KB
Compressed image size = 627.42KB
Reduction = 4860.00-627.42 = 4232.58KB
Compression = 87.09%

The compression percentage is higher for large sized file than for files of a smaller size.

2. Upload time delay.

The system provides uploading reports to the cloud which are stored in a compressed format and can be accessed by doctors and patients. The delay in upload time refers to the interval between depressing the "upload" button on system and storage of the file in cloud storage.
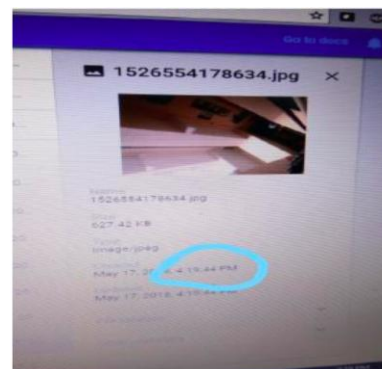

Figure 3: Upload time delay.

Time of upload on device = 4:19:44 PM
Time of creation of entry on loud storage= 4:19:44 PM
Delay = 0:0:0 (no delay in seconds)

Therefore, the observed delay in uploading reports is negligible as it is up to second's levels

3. User engagement.

This feature estimates the user-engagement at different screens/activities in the system and the total time spent daily in user engagement. Note that this experiment only reflects the results of the development and trial phase for this system.
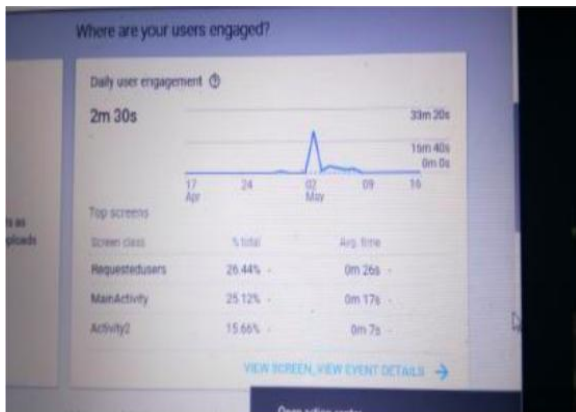

Figure 4: User engagement.

4. Active Users.

The following graph tracks the active users of this system on a daily, weekly and monthly basis. The development phase of system is analyzed.
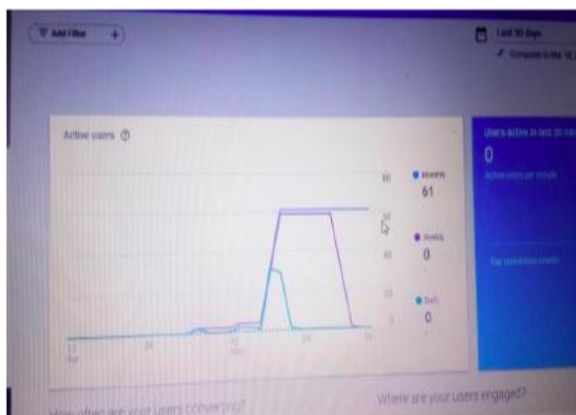

Figure 5: Active Users.

5. General overview of project.

The system has two applications one for doctor and one for patient. The results for both applications overview of general properties are shown below.
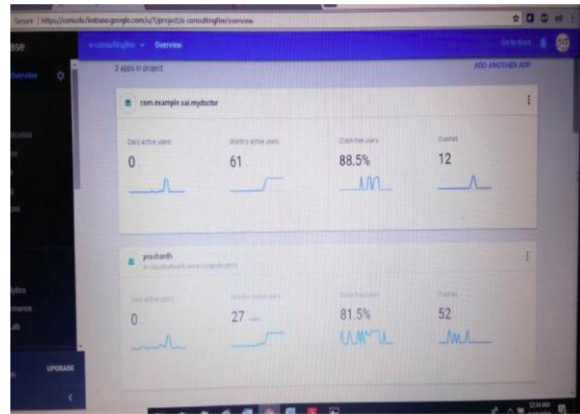

Figure 6: General overview of project

CONCLUSION

The proposed application is based on a cloud computing approach to store doctor and patient details and provide an interface between them. The main objective of this system is to automate the complete operations of the e-Consulting Services. To make it easy for patients, he can directly upload his current reports regarding any health issues and can refer to any specialist doctor in the nearby area. So the doctor can accept or reject the patient proposal and the notification would be sent to the patient regarding the request. Some of the conclusive points that can be taken out from this application are:

- Helps patients to be able to communicate with and select doctors without the need to visit. No need for rural people to travel to cities for all medical assistance.
- Facilitates instant uploading as well as comprehensive storage for a patient's medical records. These records can be accessed immediately by a doctor who has accepted the request from that patient regarding treatment.
- Serves as a medium of communication between a large number of doctors and patients. Provides the patient with a large number of preferences among doctors. The doctors can also find clients they are best trained to treat via this system
- Provides localization facility by offering language preferences to rural people to

help them benefit from the healthcare system.

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