TRIBHUVAN UNIVERSITY

INSTITUTE OF ENGINEERING

LALITPUR ENGINEERING COLLEGE

CHAKUPAT, LALITPUR

A Thesis Proposal On

"MERO HEALTH: A Report Sharing and Organization App"

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LEC077BCT030

Submitted to:

Department of Electronics and Computer Engineering

August, 2023

A Final Year Project Report
On

"MERO HEALTH: A Report Sharing and Organization App"

Submitted as a partial fulfillment of requirement of the curriculum of
Bachelor of Computer Engineering under TU

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

LALITPUR ENGINEERING COLLEGE
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August, 2023

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ABSTRACT

In modern healthcare, the effective digitization and management of medical documents are paramount challenges. The proposed medical report scanning and organizing application offers a transformative solution, using advanced technologies such as Optical Character Recognition (OCR) and Artificial Intelligence (AI). This innovative mobile application aims to revolutionize medical document management by transforming physical reports into searchable and categorical digital data. This transition from traditional paper-based systems to a digital ecosystem promises better accessibility, simplified organization, and informed decision making for healthcare professionals. and patients. This proposal outlines the basic functionality of the app, its technology platform, and its potential impact in the healthcare landscape in Nepal. With the integration of OCR and AI, the application of scanning and organizing medical reports represents a pioneering step towards improving medical information management and ushering in a new era of care practice. effective and patient-centered health.

Keywords: *OCR, AI,Digital data, Medical Document Management*

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CHAPTER 1 INTRODUCTION

1.1 Background

Optical Character Recognition (OCR) technology is a process by which printed or handwritten text is converted into machine-readable text. It involves using computer algorithms and pattern recognition to analyze images of text and extract the characters and words from them. OCR technology is widely used for digitizing physical documents, enabling text search and analysis in digital archives, and facilitating data entry automation.

Digitalizing reports using OCR involves the application of Optical Character Recognition technology to convert printed or handwritten textual content within reports into machine-readable data. OCR algorithms employ image preprocessing techniques to enhance the quality of scanned documents, followed by pattern recognition methods to extract individual characters and words. This converted text is then digitized and encoded into a format that can be stored, edited, and analyzed digitally.The combination of OCR and AI technologies in the app brings a major change to how medical reports are managed. AI works alongside OCR to smartly sort and understand the digital content. It automatically organizes reports by patient names, report types, and medical details, making it faster for healthcare providers to work with documents. This helps to make better decisions and provide personalized care.

1.2 Motivation

In Nepal's changing healthcare world, where technology is getting better to help patients, there's a big problem we need to solve: how to handle medical papers well. Lack of proper data and management system has become a hassle for the health consumer. There's lots of patient information, and we need to find it quickly. We need new ideas to make things easier. That's where the Mero Health App comes in. It uses smart tools like OCR and AI to make medical papers easy to use. This app can really change how we deal with medical reports in Nepal and make things better for everyone. When we look at Nepal, bringing OCR and AI together in the app can bring big changes. OCR changes paper papers into digital words, so we can find things fast, even if we're far apart. AI helps put papers in groups by patient names, types of reports, and medical stuff. This makes dealing with papers easy, helps doctors make good choices, and focuses on patients. This mix not only makes healthcare work better but also lines up with Nepal's goal of good and safe healthcare for everyone.

1.3 Objective

- To streamline medical document handling by digitizing and organizing paper-based reports using OCR and AI technologies.
- To promote collaborative care by facilitating sharing of reports among healthcare providers.

1.4 Scope of the Work

The project is about creating a smart mobile app that makes managing medical reports much easier. This app is carefully designed to make the process of handling medical papers simple and efficient. It does this by using special technologies called Optical Character Recognition (OCR) and Artificial Intelligence (AI). The main goal of the app is to solve the problems that come with dealing with traditional paper-based medical documents. This app helps both doctors and patients by providing a secure, easy-to-use platform. This platform can turn paper reports into digital ones, organize them, and help find important medical information quickly.

To make this happen, the app has a user-friendly design. People can easily take pictures of paper medical reports using their phone cameras. The app uses OCR to turn these pictures into words that can be easily searched and edited. AI also helps by organizing the reports automatically based on things like patient names and the type of report. This makes it much quicker to find the right information, helping doctors make better decisions.

The app takes data security seriously. It keeps sensitive patient information safe using strong encryption and secure cloud storage. This means that patient data is kept private, but doctors and patients can still access it whenever they need it. The combination of OCR and AI not only improves how medical reports are managed but also supports Nepal's goal of better healthcare. This app has the potential to change how medical information is handled, which could lead to better healthcare outcomes for people in Nepal.

1.5 Application

Our system project has significant potential for various major applications within the healthcare sector. These include:

Healthcare Professionals and Clinics

For healthcare professionals and clinics, the app presents an opportunity for enhanced diagnostics, streamlining the retrieval of past medical reports to inform accurate diag-

noses and well-informed treatment strategies. During patient consultations, physicians can readily access organized medical records, facilitating more insightful discussions and informed decision-making. Additionally, the app supports efficient treatment monitoring by enabling healthcare providers to seamlessly track patient progress over time through a comparison of historical and recent medical reports.

Patients and Personal Health Management

Patients themselves stand to benefit significantly from the app's capabilities. By maintaining personalized digital health records, individuals can take charge of their health management journey, incorporating lab results, prescriptions, and imaging reports for informed decision-making and self-care. This empowerment extends to engagement with healthcare providers, as patients can actively participate by conveniently sharing digital reports with specialists and practitioners.

Healthcare Administration and Records Management

Administrative aspects of healthcare management can also be streamlined. The transition to digital records facilitates simplified records keeping within healthcare facilities, reducing the need for physical storage and enhancing administrative efficiency. Furthermore, the app aids insurance processing by providing insurers with secure access to digitized medical reports, expediting claims processing and verification.

Telemedicine and Remote Consultations

In the realm of telemedicine and remote consultations, the app becomes a valuable tool for remote diagnoses. Telemedicine practitioners can remotely access digitized reports to provide accurate assessments and appropriate treatment recommendations, bridging geographical gaps in healthcare access. This feature is especially pertinent in facilitating efficient virtual care, enabling patients to transmit their medical history to virtual healthcare providers for comprehensive online consultations.

Health and Wellness Apps Integration

Integration with health and wellness apps further amplifies the app's utility. It offers users a comprehensive view of their health status, facilitating personalized fitness and wellness plans that are grounded in a holistic understanding of their medical history.

CHAPTER 2 LITERATURE REVIEW

The use of technology into healthcare systems has witnessed remarkable progress in recent years.The management of medical reports, a critical aspect of patient care has become a focal point for innovation. In this section, we review existing literature on the utilization of Optical Character Recognition (OCR) and Artificial Intelligence (AI) technologies in healthcare settings, with a specific focus on medical report scanning applications.

AI for Analyzing Medical Information:

Using AI in healthcare has changed how we analyze medical information, helping us understand things better and make decisions. AI computer with deep learning models, have shown they're really good at putting medical information into categories, picking out important parts, and explain them. Zhang and their team (in 2020) [1] showed that AI can put medical images into groups accurately, which could help classify images automatically. Also, AI with natural language processing or NLP has been used to pull organized information out of messy medical text . Liu and others (in 2019)[2] worked on this.

Apps for Sorting and Organizing Medical Reports:

New mobile apps that focus on sorting and organizing medical reports are changing how we manage healthcare papers. These apps use OCR and AI to make things smoother and improve how healthcare is given. A study by Smith and their team (in 2021)[3] showed that one of these apps was easy to use and worked well. It helped healthcare workers scan and put medical reports into groups quickly, saving a lot of time and making data easier to get. These apps help doctors and nurses take care of patients better and make smarter choices.

In summary, the use of OCR and AI technologies within medical report scanning and organization applications holds immense promise for healthcare efficiency and patient care. The reviewed literature emphasizes the significance of these technologies in digitizing medical records, categorizing reports, and extracting meaningful insights. Building upon this foundation, our proposed Medical Report Scanning App seeks to use these technologies to create a seamless, user-friendly platform that empowers healthcare professionals and patients .

CHAPTER 3 REQUIREMENT ANALYSIS

3.1 Functional Requirements

Functional requirements are detailed descriptions of the features, capabilities, and interactions that a software system or application must possess in order to fulfill its intended purpose. The functional requirements for our project are given below :

- The app should provide the ability to capture images of physical medical reports using the device's camera.
- AI algorithms should be able to categorize medical reports based on patient identifiers, report types, and medical procedures.
- The app should be able to automatically organize and tag reports for efficient storage and retrieval.
- Users should be able to share reports through QR code.
- Users should be able to scan codes to access the reports.
- The AI module should identify anomalies or unusual patterns in reports to verify the report.
- Users should be able to send reports to other user.

3.2 Non-Functional Requirement

Non-functional requirement are a set of specifications that describe the system's operation capabilities and constraints and attempt to improve its functionality. The non-functional requirements for our project are given below :

- The application should be user-friendly and intuitive for ease of use.
- The application should be scalable and should accommodate a growing user base.
- The application should be efficient with better response time
- The application should have user-friendly UI/UX.
- The project should be tamper proof and secure digital report storage
- The system should be able to handle all types of medical reports.

3.3 Feasibility Study

3.3.1 Eonomic Feasibility

The proposed Medical Report Scanning and Organization App demonstrates strong economic viability. Initial costs includes development, integration, training, and quality assurance. Revenue streams, including subscription models and data analytics services, are anticipated to provide significant returns. The app's potential to save time, enhance efficiency, and improve patient care contributes to a positive cost-benefit analysis. With scalability and innovation potential, the app is sure for sustained success within the dynamic digital healthcare landscape.

3.3.2 Operational Feasibility

Seeing how well the app works in real-life situations, it's clear that it's a practical and user-friendly solution. The app's easy-to-use design makes it simple for doctors, patients to use without much trouble. It can easily fit in with the technology and systems that healthcare places already have. This means it won't cause a lot of disruption and can be added to daily routines without much problem. The app is built in a way that allows it to grow as more people use it, and it can help doctors and healthcare teams work together better by making it easier to access and share important medical reports. Overall, the app fits well into how things already work in healthcare and can help make processes smoother and more efficient.

3.3.3 Technical Feasibility

Utilizing React Native to construct the Medical Report Scanning and Organization App is both practical and advantageous. React Native's compatibility across devices and platforms ensures accessibility, while its integration with Optical Character Recognition (OCR) and Artificial Intelligence (AI) technologies is well-supported and documented. The app's adaptability to evolving technologies, modular structure, and accessible development tools further reinforce its technical feasibility, making it a sound choice for creating a user-friendly and future-ready solution for medical report management.

CHAPTER 4 METHODOLOGY

4.1 Software Development Life Cycle

The process of making software applications is like building something step by step. One common way to do this is called the Software Development Life Cycle (SDLC). It's a structured method to create software that's efficient, effective, and meets what users need.This model is great for managing risks, being flexible, and always making things better as you go along. Using the Spiral Model for making the Medical Report Scanning App has many benefits. It helps make sure everything is well-organized, lets us manage any problems that might come up, and allows us to keep improving the app as we work on it.

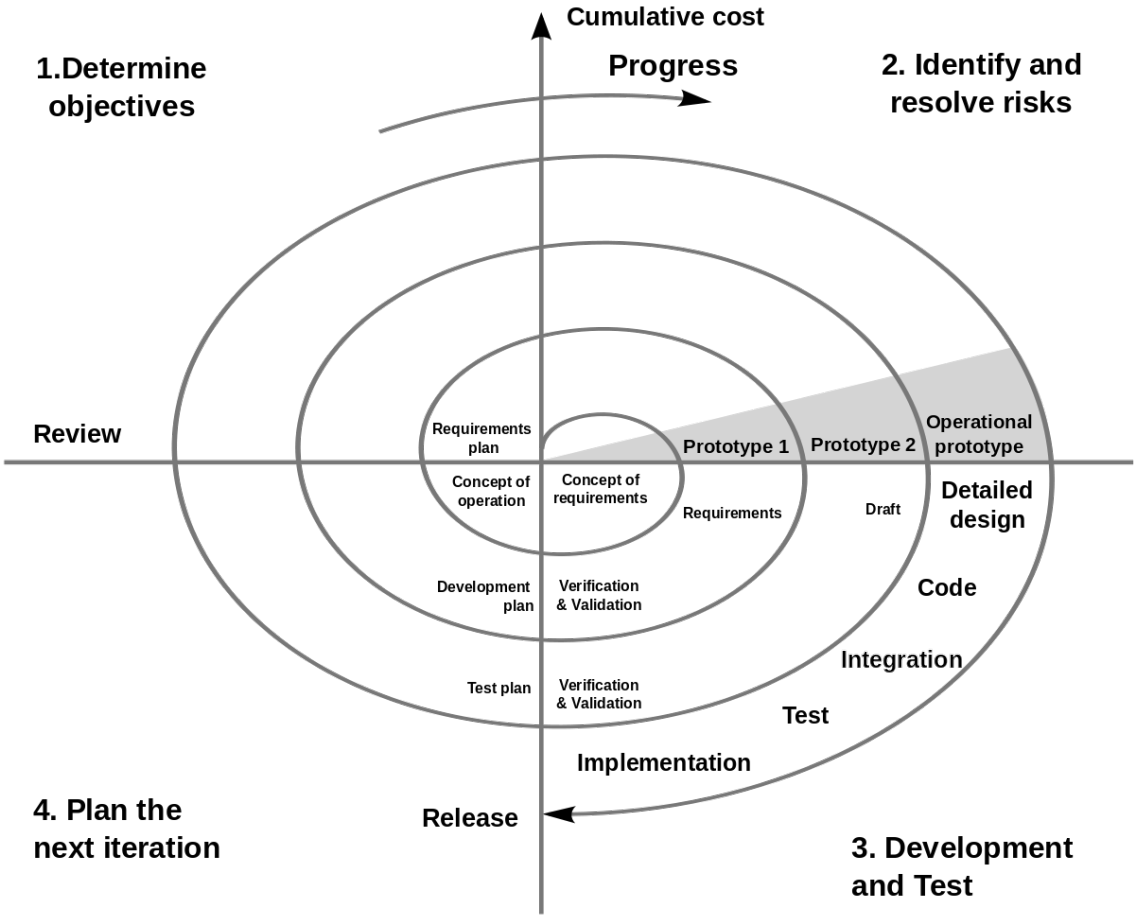

Figure 4.1: Spiral Model

Identification and Requirement Gathering

During this phase, the project's objectives, requirements are defined. The goals of the Medical Report Scanning App, such as OCR integration, AI categorization, and secure

data management, are outlined. User needs are identified, and a preliminary scope is defined.

Risk Analysis

In this phase, potential risks and challenges associated with the app's development are assessed. Risks related to integrating OCR and AI technologies, data security, and user adoption are identified. Strategies for mitigating these risks are developed, allowing for informed decision-making.

Development

The development phase focuses on creating the app's core functionalities. Using the Spiral Model's iterative approach, the app's features, such as document scanning, AI categorization, and report retrieval, are developed in incremental cycles. Each cycle results in a more refined and functional version of the app.

Evaluation

At the end of each development cycle, a thorough evaluation of the app's progress is conducted. Stakeholders, including healthcare professionals and users, provide feedback on the app's usability, functionality, and performance. This feedback guides improvements and refinements in subsequent cycles.

Planning

Based on the evaluation results, plans for the next cycle are refined and adjusted. Changes in requirements, user feedback, and emerging risks are incorporated into the development roadmap. This adaptive planning ensures that the app remains aligned with user needs and project goals.

Deployment

Once the app reaches a mature stage with all intended features, it undergoes thorough testing and quality assurance. The final product is deployed to a limited user group for a pilot test, allowing for real-world validation and identifying any remaining issues.

Maintenance and Enhancement

After deployment, the app enters the maintenance phase, where ongoing support, bug fixes, and updates are provided. User feedback and evolving needs are addressed through continuous enhancements, ensuring the app remains relevant and effective.

4.2 System Development Tools

Mongodb

MongoDB serves as an agile and scalable NoSQL database solution for the Medical Report Scanning App, thanks to its document-oriented structure that accommodates diverse medical report formats. With dynamic schema support, MongoDB flexibly manages changing data needs, while its efficient indexing and querying enable quick access to specific reports. MongoDB's seamless integration with Node.js and React Native facilitates development, and its security features, including encryption and access control, safeguard sensitive patient data. Overall, MongoDB's versatility and compatibility contribute to efficient medical report management and enhanced user experiences within the app.

Node.js

Node.js, powered by Chrome's V8 engine, is a versatile runtime environment crucial to the Medical Report Scanning and Organization App's development. By using JavaScript for both frontend and backend development, Node.js offers unified coding. Its extensive package ecosystem and npm support streamline development and code reuse, while integration with React Native ensures smooth component communication. Ultimately, Node.js contributes to the app's high performance, scalability.

Express.js

Express.js, which works together with Node.js, is like a powerful tool for the backend of the Medical Report Scanning App. It helps make things work smoothly and efficiently. It simplifies creating connections between the app's front part and the database behind the scenes. It has a lot of helpful tools that speed up the app's development, making it easier to add useful features like user logins, checking data, and handling errors. Express.js makes the app's backend work really well, making it fast, able to handle many users, and responsive.

React Native

React Native is a powerful tool for building mobile apps, like the Medical Report Scanning and Organization App. It's a versatile framework that allows developers to create apps that work on both Android and iOS devices using just one codebase. This means less work and more efficiency. React Native takes care of making the app look and feel right on different devices, so users get a consistent experience. It also lets

developers use JavaScript, a popular programming language, for building both the app's front part that users see and the back part that handles data. This makes development faster and more organized. With React Native, the Medical Report Scanning App can be built quickly, look great, and work well on different devices, making it a smart choice for creating a user-friendly and effective app.

Git and Github

Git is a version control system that lets you manage and keep track of your source code history. GitHub is a cloud-based hosting service that lets you manage Git repositories.For the development of the Medical Report Scanning App, Git and GitHub provide invaluable advantages. Different team members can work on distinct parts of the app simultaneously, making progress without stepping on each other's toes. Any changes made can be tracked, allowing for easy identification of who did what and when.

Optical Character Recognition (OCR)

Optical Character Recognition (OCR) is a technology that can recognize and understand text from images or scanned documents. OCR is a powerful tool that transforms pictures of words into editable and searchable text, making it easy to manage and use information. For the app, OCR acts as a smart translator, converting physical medical reports into digital text that can be searched, sorted, and shared. This users can quickly find specific information they need without flipping through piles of paper.

CHAPTER 5 SYSTEM DESIGN

5.1 Use Case

Figure 5.1: Use case Diagram

5.2 Activity Diagram

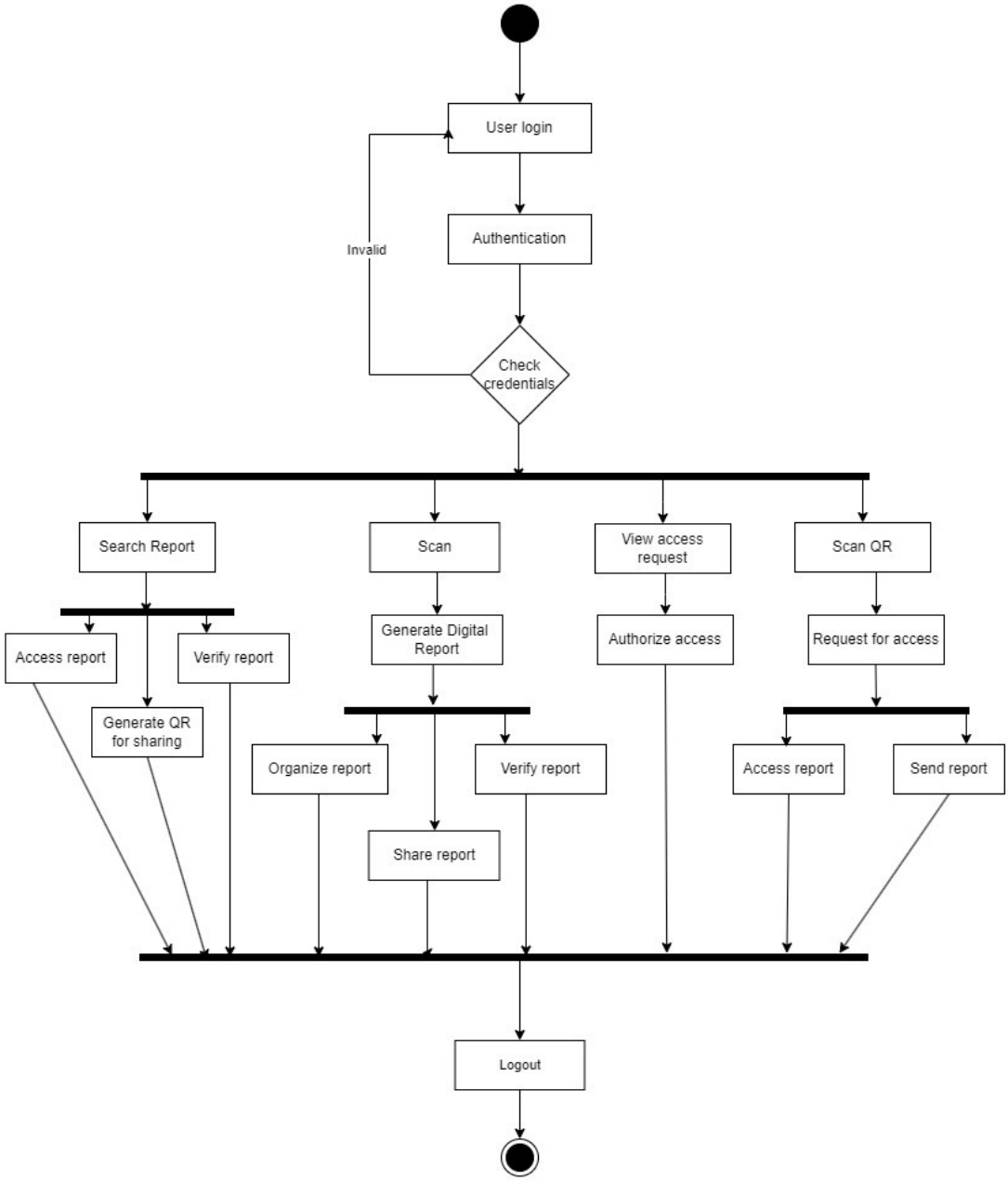

Figure 5.2: Activity Diagram

5.3 Sequence Diagram

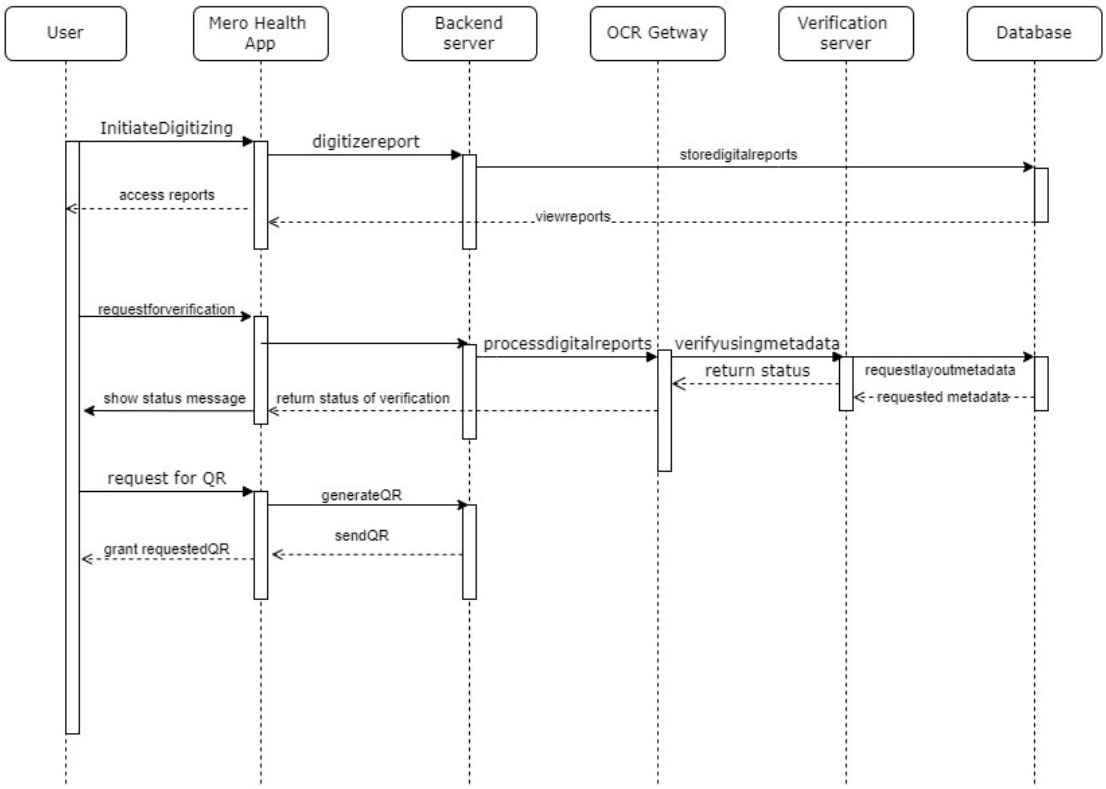

Figure 5.3: Sequence Diagram

5.4 Class Diagram

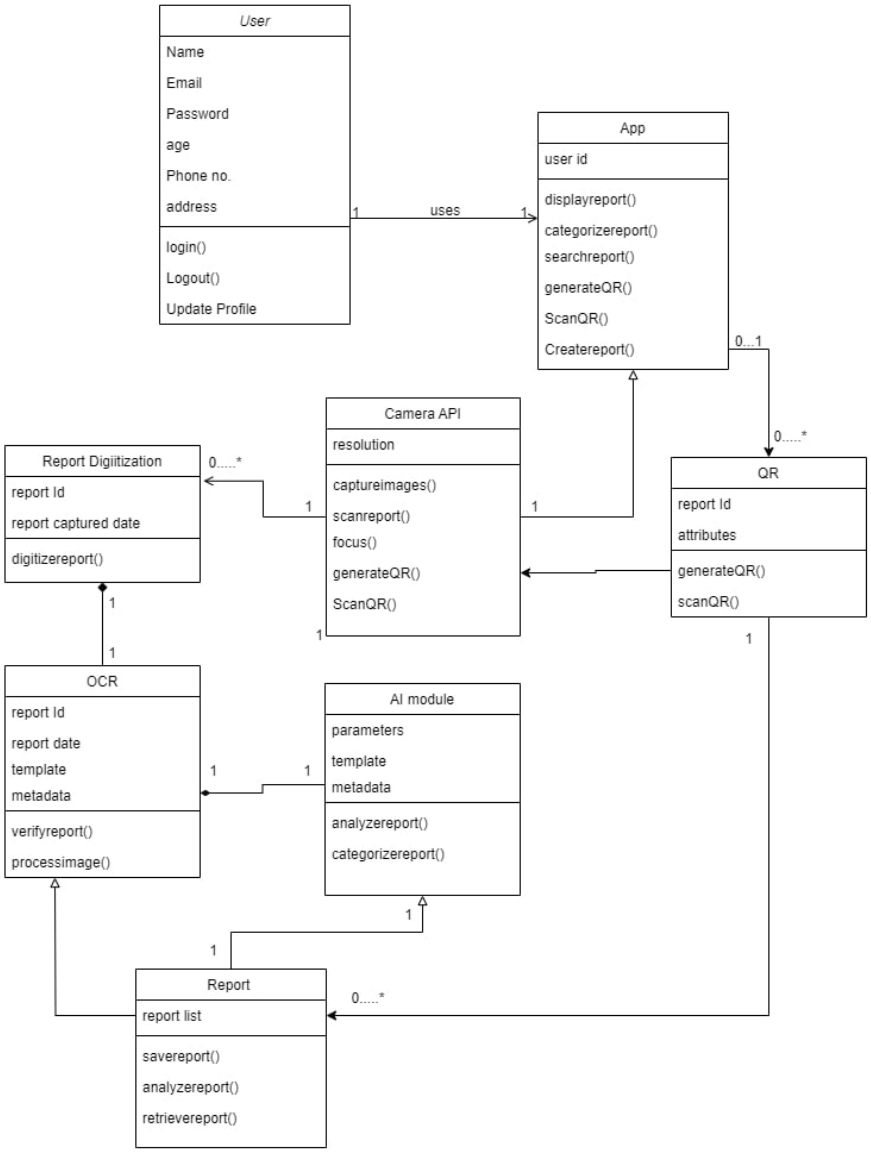

Figure 5.4: Class Diagram

5.5 Entity Relationship Diagram

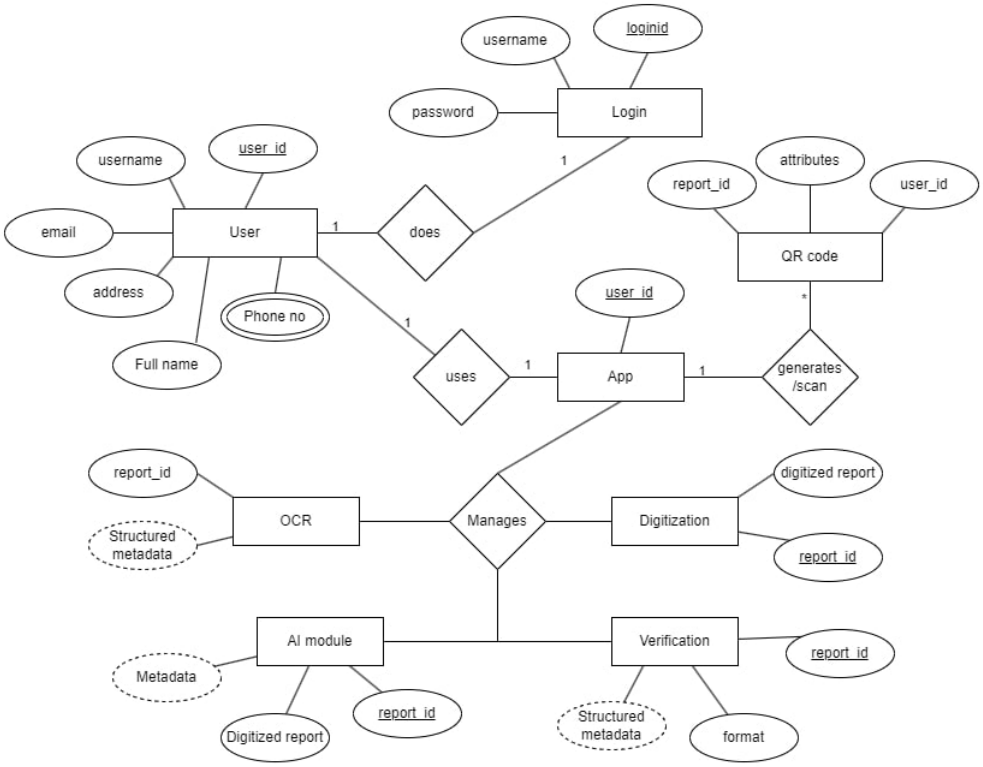

Figure 5.5: ER Diagram

5.6 Data Flow Diagram

5.6.1 Level 0 Diagram

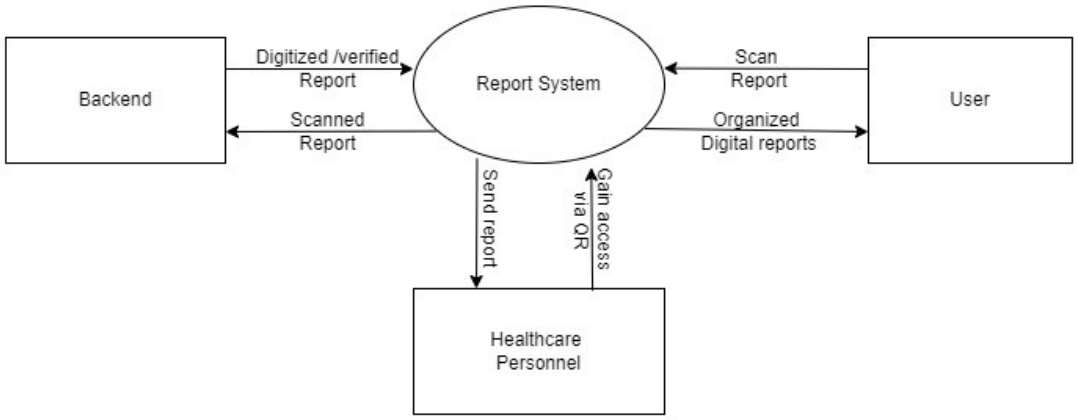

Figure 5.6: Level 0 Diagram

5.6.2 Level 1 Diagram

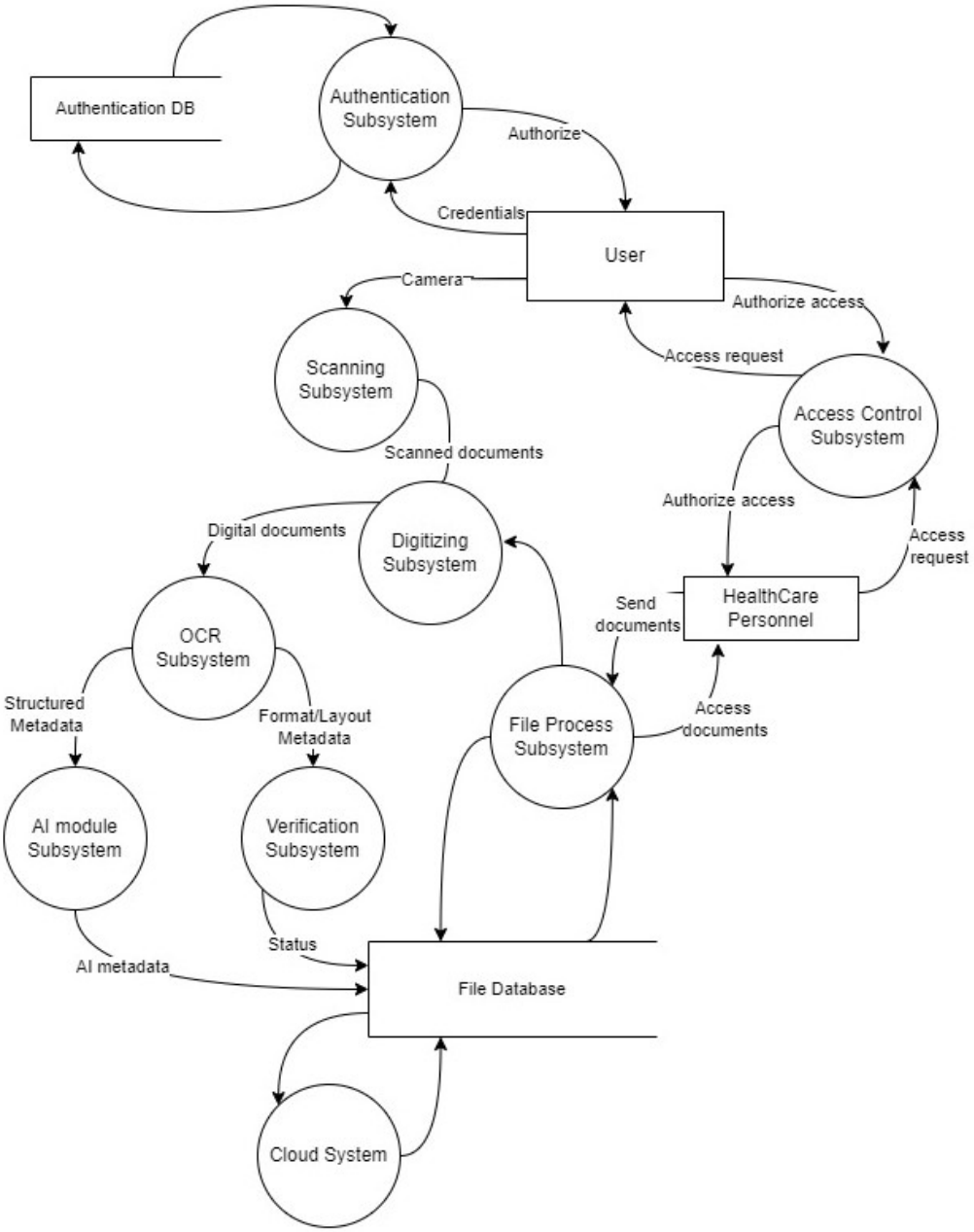

Figure 5.7: Level 1 Diagram

CHAPTER 6 EXPECTED RESULTS

The expected result of the Medical Report Scanning and Organization App proposal is a sophisticated and user-friendly mobile application that revolutionizes the management of medical reports within Nepal's healthcare landscape.The Medical Report Scanning App aims to make managing medical information easier. If it's successful, it could help doctors and healthcare workers quickly find important patient details, leading to better decisions. This app might also let patients keep track of their own medical history and share it with their doctors. The app will use smart technology to organize reports, which could help doctors understand trends in patients' health. And don't worry, the app will keep all the information safe and private. If it works well, this app could improve how healthcare is done in Nepal, making it more organized and accessible for everyone involved.

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