SKIN SLEUTH APPLICATION

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SKIN DISEASE SLEUTH APPLICATION

NAGA NARVEEN A/L SIVAJI GANESAN

This report is submitted in partial fulfilment of the requirements for the Bachelor of Computer Science (Artificial Intelligence) with Honours.

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2023

DECLARATION

I hereby declare that this project report entitled

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STUDENT : S. S. Narveen . Date : 19/09/2023

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I hereby declare that I have read this project report and found this project report is sufficient in term of the scope and quality for the award of Bachelor of Computer Science (Artificial Intelligence) with Honours.

SUPERVISOR : Date : 20/09/2023

(DR. ZERATUL IZZAH BINTI MOHD YUSOH)

DEDICATION

I would like to dedicate this Final Year Project to my friends who are studying pharmacy and all those who had supported me in completing this project, especially to my supervisor, Ts. Dr. Zeratul Izzah Binti Mohd Yusoh, who had guided me along this project.

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ABSTRACT

The bond between patients and medicines is unbreakable. Medicines have been a survival factor for patients and to attain better health as well. Most patients would face a hard time when tons of medications have been prescribed and no proper monitoring has been done. Besides, it would also be frustrating when patients need to visit doctors just for the sake of getting prescriptions. Patients also lack knowledge of their medications at times and this further makes the medicine consumption process harder. Sometimes, patients may not figure out that skin changes may indicate the development of skin disease. To address these issues, a mobile application is proposed that aims to provide patients with a seamless digital experience when engaging with their medications, specifically focusing on the skin domain. The application will act like a medicine guide which able to provide the medicines' details along with its way to practice the medicine after capturing the physical QR imprinted on the medicines. It also allows users to conduct skin disease detection by capturing the area which is infected and does an early diagnosis of the disease by stating the type of disease. It is also able to provide recommendations for medicines based on the disease detected. The application will also aid users as a medicine reminder by reminding the time of medications. The technique used in the function to detect the disease will be the image recognition where an image recognition model will be trained out using Convolutional Neural Network. The recommendation function will be developed using the rule-based approach, while the medicine reminder will be developed using the push notification method. In conclusion, the proposed application is expected that all its functions stated above are working and fulfilled all the requirements of this project.

ABSTRAK

Ikatan antara pesakit dan ubat tidak boleh dipecahkan. Ubat telah menjadi faktor kelangsungan hidup bagi pesakit dan juga untuk mencapai kesihatan yang lebih baik. Kebanyakan pesakit akan menghadapi masa yang sukar apabila banyak ubat telah ditetapkan dan tiada pemantauan yang betul telah dilakukan. Selain itu, ia juga akan mengecewakan apabila pesakit perlu melawat doktor hanya untuk mendapatkan preskripsi. Pesakit juga kadangkala kurang berpengetahuan tentang ubat-ubatan mereka dan ini seterusnya menyukarkan proses pengambilan ubat. Kadangkala, pesakit mungkin tidak mengetahui bahawa perubahan kulit mungkin menunjukkan perkembangan penyakit kulit. Untuk menangani isu-isu ini, perkembangan aplikasi mudah alih dicadangkan yang bertujuan untuk membantu pesakit mendapat pengalaman digital yang lancar apabila terlibat dengan ubat-ubatan dan khususnya menyasarkan domain kulit. Aplikasi ini akan bertindak seperti panduan ubat yang dapat memberikan butiran ubat-ubatan bersama-sama dengan caranya untuk mengamalkan ubat selepas menangkap QR fizikal yang dicetak pada ubat-ubatan. Ia juga membolehkan pengguna menjalankan pengesanan penyakit kulit dengan menangkap kawasan yang dijangkiti dan melakukan diagnosis awal penyakit dengan menyatakan jenis penyakit. Ia juga mampu memberikan cadangan untuk ubat-ubatan berdasarkan penyakit yang dikesan. Aplikasi ini juga akan membantu pengguna sebagai peringatan ubat dengan mengingatkan masa mengambil ubat. Teknik yang digunakan dalam fungsi untuk mengesan penyakit ini ialah pengecaman imej di mana model pengecaman imej akan dilatih menggunakan Rangkaian Neural Konvolusional. Fungsi pengesyoran akan dibangunkan menggunakan pendekatan berasaskan peraturan, manakala peringatan pengambilan waktu ubat akan dibangunkan menggunakan kaedah penghantaran notifikasi. Kesimpulannya, aplikasi yang dicadangkan diharapkan mempunyai semua fungsi yang dinyatakan di atas dan memenuhi keperluan projek ini.

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LIST OF ABBREVIATIONS

FYP	-	**Final Year Project**
QR	-	**Quick Response**
CNN	-	**Convolutional Neural Network**
ReLU	-	**Rectified Linear Unit**
SVM	-	**Support Vector Machine**
IBCF	-	**Item-based Collaborative Filtering**
UBCF	-	**User-based Collaborative Filtering**
ANN	-	**Artificial Neural Network**
GUI	-	**Graphical User Interface**
APK	-	**Android Application Package**
SDK	-	**Software Development Kit**
USB	-	**Universal Serial Bus**

LIST OF ATTACHMENTS

CHAPTER 1: INTRODUCTION

1.1 Introduction

The bond between patients and medicines is unbreakable. Patients need medicines to survive or attain better health. Thus, medicines will be an important thing to pay attention to. Returning from a pharmacy or clinic with tons of medicines will be frustrating a lot of times as patients need to remember the process of medications and eat them on time. On top of that it would also be frustrating to visit the doctor just for the sake of getting medicines. Patients also lack knowledge of their medications at times and this further makes the medicine consumption process harder. To serve as the beacon of information for both patients and general users, a centralized application will be the best possible way to cater for everything. Skin Sleuth is the name of the application that particularly targets the skin domain that can assist patients and users by utilizing the functions available in the application. The application can act like a medicine guide, which provides details and ways to practice the medication upon scanning the physical Quick Response (QR) code imprinted on medicines. The application also lets users capture the area of skin which is infected to detect if is there any skin disease as an early diagnosis. The application recommends medicines to the user based on the disease detected. The application provides reminder functionality for medications prescribed.

1.2 Problem Statements

Pharmacy is always the famous destination for patients to seek their medicines from. They just come back with tons of medicines which will only have basic details of the medicine on the printed label on top of it. It is human tendency to forget if

something is too much. Besides, legit details regarding important stuff are crucial to continue their usage of them. One of the problems is that patients have a limited understanding of medicine knowledge. They lack the general knowledge that could be gained regarding medicines and patients have a limited understanding of medicine practice as having zero knowledge of them will surely result in unexplainable side effects. Most patients tend to practice the medications in the wrong way over time because of the problem of mishearing the pharmacist's explanation. Patients may have a limited understanding of the steps for consuming the medications and it could impact adherence to treatment plans.

The next problem is the patients could not identify basic skin diseases. There are several challenges associated with the identification of basic skin diseases, which may include various types of rashes, infections, allergies, and dermatological conditions. Identifying these skin diseases accurately and promptly is crucial for effective treatment and management.

Besides, patients also fail to comply with their medication. The main problem over here is the tendency to forget things as well and patients forget to take medicine on time and also at times consume too much medicine which will be a headache for them, especially the ones with tons of medications to adhere to.

Therefore, Skin Sleuth Application is proposed which particularly targets the skin domain to assist the patients facing the problems above. This application can help user to get the details of medicines and the way to practice them by scanning the QR imprinted on the medicines. Since the skin domain has been given importance, it also can detect skin disease by capturing the area of skin on the body to give insights to the patients as an early diagnosis and medicines will be recommended based on the disease detected. The application also has a medicine reminder function to curb forgetfulness situation.

1.3 Objective

The objectives of the Skin Sleuth Application are:

i. To implement an image recognition technique in determining the disease in the images captured by the user.

ii. To implement a rule-based approach in medicine recommendation function in the application.

iii. To develop a mobile application which acts as a medicine advisor that is accessible to all patients and general people.

1.4 Scope

1.4.1 Modules

The Skin Sleuth application has four modules that will be developed as shown in the table below. The artificial intelligence techniques will be applied in two modules where the Skin Disease Detection module will use the image recognition technique, and the Medicine Recommendation module will contain the rule-based system. Artificial Intelligence techniques were not applied in the two modules where the Medicine Details & Practice module will be an information hub for the medicines through the scanning of QR imprinted on medicines, the Medicine Reminder module will notify the users on when to consume the medicines.

Table 1.1: Modules in the Skin Sleuth Application

Modules	Functions
Medicine Details & Practice	Able to display procedures of medicine intake will be given in an extensive manner which includes the dosage, frequency, typical wrongdoings and warnings. The details of the medicines will be shown which delivers the users with general knowledge regarding the medicines available in the database. Users can also get straight to a particular medicine practice

	and details by scanning the QR printed on the medicines.
Skin Disease Detection	Able to detect skin disease by either capturing or uploading from the gallery. The disease in the picture will be detected using image recognition.
Medicine Recommendation	Able to recommend medicines to the user based on the disease selected. The system will recommend the medicines that would be beneficial for the users if such skin disease that has been selected is diagnosed.
Medicine Reminder	Able to notify the users on time to remind intake of medicine and also the correct dosages to not overdo the process.

1.4.2 Target User

The target user of this project is patients and general users to manage medicines and also be updated on their very own tailored medications. This project even caters for the features for users where they can significantly gain knowledge on medicines as it will be readily available for everyone.

1.5 Project Significance

By developing this mobile application, we can assist patients and general users by using this application and thus can increase the affordability of automating pharmacists' tasks. It can detect skin diseases from the images captured by the users on their skin area and recommend relevant medicines according to the diseases detected. This application is also convenient for those who have tons of medications to follow and tend to forget things quickly. Clear and precise information regarding

the medicines will be available in the application and targeted medicine information could also be retrieved by just scanning the QR printed on the medicine. Not only that, but this application also will notify the users right on time to take their medication.

1.6 Expected Outcome

This application is expected to assist patients and general users when engaging with medicines related to skin disease. It is supposed to display the details and practice of medicines as a whole or by scanning the QR printed on the medicines if the information on one particular medicine is needed. It should also be able to detect skin disease after detecting the skin area affected in the pictures captured by the user. It also should recommend medicines to the user based on the disease detected. This application also should be able to remind the users on time before consuming medicines.

1.7 Conclusion

To conclude, the problem statements and objectives have been discussed before building the application. The modules and target users have also been identified to narrow down the process. Next, the review of related works and the methodology of the project will be discussed in the following chapter.