



REPSAN-ANDROID HEALTHCARE APPLICATION

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ABSTRACT

A diagnostic test is a method used to determine the presence or absence of disease in a person who has been suspected of having it. Interpreting the diagnostic test results can be quite daunting for an individual with little to no familiarity with the healthcare terms. Mobile, nowadays has become an integral part of one's life so designing and developing a prototype that is compatible with mobile user interface that can monitor and track the health regime of an individual will be helpful. Therefore, we have developed an android application named 'RepScan', a one stop application for users with multiple modules wherein no Internet connection is required, developed using Java and XML as languages and Android Studio as Integrated Development Environment (IDE) for the Android platform. The objective of the application is to assist the user to understand their diagnostic test reports (CBC, Blood glucose test, Thyroid Hormone test) in an uncomplicated manner. It is designed with an approach to give output based on the values entered for various entities present in the diagnostic reports. Furthermore, one can learn more about the possible causes, future complications, and home remedies related to their diagnosis with this app. In addition to interpreting the test results, RepScan also offers multiple health calculators to the users, where one can calculate their Body Mass Index (BMI), Basal metabolic rate (BMR) and Total body water (TBW). The RepScan "Track It" feature is added to help an individual keep track of their menstrual cycle. In the future, RepScan will have more modules integrated to make it a more sophisticated, self-help tool providing a wide range of facilities to the end-user.

Keywords: Healthcare, Android Application, Diagnostic Reports, Health Calculator.

1. INTRODUCTION

Humans are eukaryotic multicellular organisms consisting of billions of cells of many types which come together to form tissues and different tissues come together to form organs. All these organ systems work together for the normal, healthy and efficient functioning of the complex organism i.e., humans. Failure in functioning of any one of the organ systems may lead to a state of unease i.e., disease. In order to detect the cause behind the disease, one needs to undergo several in-vitro diagnostic tests which may pinpoint us towards the exact cause of disease [1]. Diagnosis may be carried out on a sample of blood, urine, stool or tissue in clinical laboratories, or nowadays, at home using ready-to-use home kits [2]. Most commonly prescribed diagnostic tests are complete blood count (CBC), thyroid tests, urine tests, blood glucose tests, etc.

This paper presents the implementation of a software application to monitor and track the health regime of a subject via a mobile platform. The presented prototype

application "RepScan" which includes three tests, namely, CBC, TSH test and blood glucose allows the user to enter their test values and get an idea about the result. Furthermore, depending on the result they can learn more about the possible causes for their results, future complications they may encounter and remedies they can try at home. In addition, they can calculate and keep track of their BMI, BMR, TBW while women can be in tune with their period cycle with the help of "track it".

CBC is a common type of blood test that evaluates a number of health-related issues and is often prescribed as a part of routine check-up. The test aims at analysis of different components of blood such as: Red Blood Cells, White Blood Cells, platelets and hemoglobin etc [3]. These can help in reviewing anaemic conditions, body immunity, infections, inflammation, clotting issues and signs of blood cancer [4].

Thyroid tests are a group of blood tests that helps in determining the healthy functioning of thyroid gland. This test is requested to confirm cases of

hyperthyroidism, hypothyroidism, thyroid-suppression, anxiety disorders, atrial fibrillation etc [5].

A Blood glucose test is a procedure to determine glucose status within the human body. It helps in diagnosing diseases like diabetes mellitus, hypoglycaemia or potential risk of developing diabetes. Patients suffering from abnormal blood sugar levels need to undergo this test at frequent intervals [6].

Body Mass Index (BMI), Basal Metabolic rate (BMR) and Total Body Water (TBW) are general health parameters which take height, weight, age and gender into consideration [7]. The body mass index (BMI) is a method of measuring weight status in a person and identifying potential health issues in individuals. BMR is the total number of calories the body burns at rest while TBW is the total amount of fluid (water) in the human body [8].

Ovulation is the process of release of egg from ovary into the fallopian tube for fertilisation. Knowing the day of ovulation (fertile window) can help women get pregnant or avoid pregnancy by engaging in intercourse on those particular days [9].

2. MATERIAL AND METHODS

2.1. Why android operating system?

Android is a complete open-source platform designed for cellular gadgets. It is supported by Google and is owned by the Open Handset Alliance. Android has a Linux-based operating system that is mostly used to power mobile devices like smartphones and tablets [10]. Its usability isn't always restrained to cellular devices. Android has a hardware-independent operating system that operates on a variety of devices from various manufacturers. Android has been complete software stack for mobile devices. Android APIs has a set of class file which provides easy access to several features like location, web, telephony, WiFi, media, camera, and so on. All of the tools, frameworks, and software required to create a mobile application are free [11].

2.2. Developing stage

For developing Repscan app we have used Android Studio for app development. Android Studio is the official Integrated Development Environment (IDE) for Android app development it is based on IntelliJ IDE. Android studio improves productivity while developing Android apps by adding even more features to IntelliJ's excellent code and developer tools. Every project consists of modules which includes source code and resource files.

3. REQUIREMENT AND ANALYSIS

3.1. Hardware Requirements

The Hardware requirement to build this application is given below:

Operating System	Microsoft Windows 7/8/10 (32 or 64 bit)
RAM	3 GB RAM minimum 8 GB RAM recommended 1 GB for Android Emulator
Disk Space	4 GB Disk Space Recommended. 500 MB for IDE + 1.5 GB for Android SDK and Emulator System Image 2 GB Minimum
Screen Resolution	1280 X 800 Minimum.
Processor	Intel i3 Dual Core

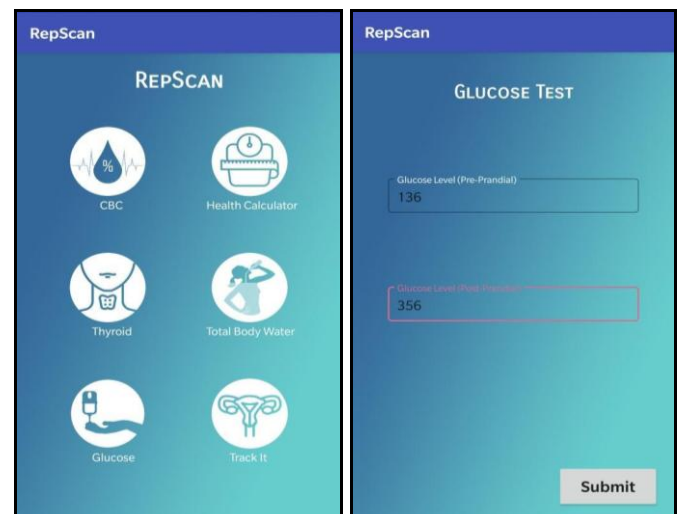
3.2. Software Requirements

Software required to build an android app is android studio or eclipse. However, we have chosen Android studio for a multitude of reasons.

Android plugins can be installed in IDE like Eclipse, NetBeans, etc. Eclipse is an all-purpose IDE while Android Studio is a standalone IDE specifically for creating android applications developed by Google Developers. Android studio makes exporting and uploading APK on PlayStore easy with a single click.

The two official programming languages for Android are Java and Kotlin. Java is the official language of Android development. We chose Java as our coding language as we were already familiar and comfortable with the language, and wanted to put a use to what we learnt in java.

4. RESULTS



RepScan

RESULT

You maybe diabetic

Normal range for blood glucose:

CATEGORY	BEFORE MEAL mg/dl	AFTER MEAL mg/dl
Hypoglycemia	below 70	below 70
Normal	70-100	70-140
Pre-diabetes	100-125	140-199
Diabetes	126 and above	200 and above

To know more, click [here](#).

DIABETES

Causes:

a. Type 1 diabetes is caused by genes and environmental factors, such as viruses, that might trigger the disease.

b. Type 2 diabetes:

- There's a history of diabetes in your family
- You're middle-aged or older
- You're overweight or obese
- You're middle-aged and have high blood pressure (hypertension)
- You've given birth to a child weighing more than 4.5kg, was diagnosed with gestational diabetes or have/had polycystic ovarian syndrome (PCOS)

Type 2 diabetes is also associated with insufficient physical activity, poor diet and extra weight carried around the waist.

Complications:

- Cardiovascular disease,
- Nerve damage (neuropathy),
- Kidney damage (nephropathy),
- Eye damage (retinopathy),
- Foot damage, Skin conditions,
- Hearing impairment,
- Alzheimer's disease,
- Depression

RepScan

RESULT

Your RMR is 1258.44

Your BMI is 23.011177

You may be overweight.

HEALTH CALCULATOR

Gender: ☐ Male ☒ Female

Age:

Weight (kg):

Height (cm):

Submit

RepScan

TRACK IT

Number of days in your cycle:

Start date of your recent period: Thursday, May 2, 2019

SELECT DATE

Your next period starts on: Thursday, May 30, 2019

Next Ovulation date: Thursday, May 16, 2019

Your most fertile days are: Thursday, May 16, 2019
Wednesday, May 15, 2019
Tuesday, May 14, 2019

TRACK IT

2019
Wed, May 8

May 2019

S M T W T F S

1 2 3 4

5 6 7 8 9 10 11

12 13 14 15 16 17 18

19 20 21 22 23 24 25

26 27 28 29 30 31

CANCEL OK

5. DISCUSSION

5.1. Definition of Problem

At present, there are numerous smartphone applications freely available on the playstore that help track medical records, provide diet plans according to respective diseases and deficiencies. However, there is no such application which takes diagnostic test values as input from the user and provides them with inference of that specific test. For a person who has little to no knowledge of biological terms, it can be quite daunting for them to make sense of the test results obtained and such an application can be of great use to them.

Also, a number of apps for calculation of health parameters like BMI, BMR, TBW, ovulation prediction are available as stand-alone apps. This raises the problem of downloading multiple applications to check one's health which requires more phone space. Also, multiple icons on the phone screen are simply unappealing and confusing.

5.2. Objective of the proposed system

The main objective of the proposed application RepScan was to overcome the above-mentioned problems. It takes test values as input from diagnostic tests (CBC, Blood Glucose, TSH test) or home kits like glucometers and predicts the results of the test, possible causes and complications associated with the disease and suggests some home remedies to improve your health. RepScan also incorporates calculators like BMR, BMI, TBW and Track it. These calculators require basic inputs like weight, height, gender, age and date of previous menstrual cycle.

5.3. Survey of Existing Apps

Few applications we came across while surveying for this project:

- **BMI calculator** by Splend Apps and **BMI Calculator Free** by Fox planning are standalone apps that only calculate BMI and do not give a promising UI.
- **RMR Calculator** by Soft Informative Technology calculates RMR without proper description of the result.
- **Premom Ovulation Calculator** by premom.com asks for sign in, without which it won't predict the dates.
- **My Ovulation Calculator** by Baskaran Arunasalam asks for a password at almost every step which is quite tedious and overwhelming at times.

There are different applications explaining various diagnostics tests and giving suggestions according to the given query. However, there is no such application which takes the input or test values from the users to interpret them. Some of the examples are:

- **Lab Test Reference Range** by Rishikshav Acharya: provides just the Literature information about various diagnostics and biochemistry tests such as Hematology test, Fecal Analysis, Histopathology, and Urinalysis etc.
- **Lab Values Reference (Free)** gives information for increased and decreased counts of parameters.

5.4. Advantage of RepScan

- The application will help users to understand their diagnostic reports in an efficient way.
- Single application with multiple modules.
- Internet connection not required.
- It provides a better user interface.
- No patient's privacy breach.

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Conflict of interest

The Authors declare no conflict of interest.

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