A Mini Project Report on

SAM HEALTHCARE

TE: IT Engineering

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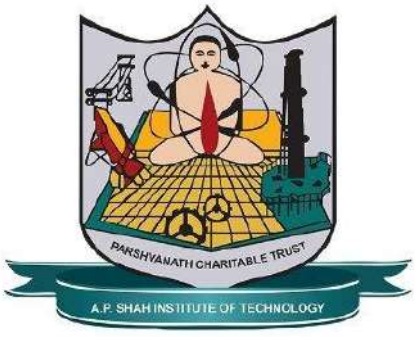

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CERTIFICATE

This to certify that the Mini Project report on **SAM HEALTHCARE** has been submitted by **Suraj Singh (20104032), Himanshu Rane (20104008)** and **Atharva Takle (20104022)** who are a Bonafede students of A. P. Shah Institute of Technology, Thane, Mumbai, as a partial fulfilment of the requirement for the degree in **Information Technology**, during the academic year **2022-2023** in the satisfactory manner as per the curriculum laid down by University of Mumbai.

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ABSTRACT

SAM healthcare is an innovative approach that utilizes machine learning algorithms to predict the probability of a person being affected by a specific disease based on various factors. The application allows users to input their and other relevant information, which is then analysed by the machine learning model to provide a diagnosis or a probability of having a specific disease. The system can be useful in improving healthcare services, particularly in remote areas where access to medical facilities is limited. The application provides a user-friendly interface that enables patients to check their symptoms and take appropriate measures before their condition worsens. The system can also provide healthcare professionals with valuable insights into patient health patterns and trends, allowing for more targeted interventions and better healthcare outcomes.

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Chapter 1

Introduction

SAM Healthcare is a system that is used to predict the diseases from the symptoms which are given by the patients or any user and helps doctor to predict disease accurately. The system processes the symptoms provided by the user as an input and gives output as the probability of disease. By leveraging machine learning algorithms, the system can provide accurate and timely diagnosis or probabilities of having specific diseases, allowing patients to take appropriate measures to manage their health.

The increasing prevalence of chronic diseases such as diabetes, heart disease, and cancer has placed significant pressure on healthcare systems worldwide. The limited availability of healthcare services and the high cost of medical treatments further exacerbate this problem. The disease prediction system using an Android application can help address this issue by providing a user-friendly and affordable solution that enables patients to check their symptoms and get quick feedback about their health status.

The Android application is an ideal platform for deploying such a system since it is widely used, easy to access, and affordable. The application is designed to be user-friendly, ensuring that patients can use it without any technical expertise. Additionally, the application provides patients with relevant health information, such as disease symptoms, risk factors, and prevention strategies, enabling them to make informed decisions about their health.

In conclusion, the disease prediction system using an Android application is a promising technology that has the potential to revolutionize healthcare services. It can empower patients to take control of their health and enable healthcare professionals to provide more personalized and targeted interventions. The following sections will discuss the various aspects of the system, including the system architecture, algorithms, and evaluation metrics.

1.1 Purpose:

The purpose of a SAM Healthcare is to provide a tool that can identify and predict diseases based on images of the affected area. This type of application has the potential to improve healthcare outcomes by enabling faster and more accurate diagnosis, particularly in areas where access to healthcare is limited. The application could be used for initial screening and triage, assisting healthcare professionals in their decision-making process, and enabling remote consultations. Overall, the goal of this type of application is to improve patient outcomes and facilitate more efficient use of healthcare resources.

1.2 Problem Statement:

The problem statement for a SAM healthcare is based on the need for a fast, accurate, and reliable diagnostic tool that can help identify and predict diseases based on images of the affected area. The current healthcare system faces several challenges, including limited access to healthcare resources and a shortage of medical professionals. These challenges can lead to delays in diagnosis and treatment, which can have serious consequences for patients, particularly those with serious or life-threatening conditions.

Moreover, some diseases may present with similar symptoms, making it difficult for healthcare professionals to identify the correct diagnosis. For example, skin rashes may appear similar in different diseases, which can lead to misdiagnosis and inappropriate treatment. This can result in delayed treatment, which can exacerbate the condition and potentially lead to long-term health complications.

By developing SAM Healthcare, we can address these challenges and provide patients with a tool to quickly and accurately identify potential diagnoses. This application can leverage the power of artificial intelligence and machine learning to analyze images of affected areas and predict potential diseases. The application can provide preliminary screening and triage, which can help identify serious cases that require urgent medical attention. It can also assist healthcare professionals in their decision-making process by providing accurate and reliable diagnostic information.

In addition, SAM Healthcare can enable remote consultations, which can help to reduce the need for in-person appointments and enable more efficient use of healthcare resources. The application can also facilitate more efficient use of healthcare resources by reducing the need for unnecessary tests and procedures.

Overall, SAM Healthcare is the need for a fast, accurate, and reliable diagnostic tool that can help to improve patient outcomes and facilitate more efficient use of healthcare resources.

1.3 Objectives:

- The primary objective of a disease prediction system is to identify the disease at an early stage.

- To achieve high accuracy, sensitivity, and specificity in predicting disease.

- To be scalable and able to handle a large volume of patient data.

- To adhere to the privacy regulations and ensure the protection of patient data.

1.4 Scope:

1. Clinical Decision-Making: Disease prediction systems can provide healthcare providers with valuable insights that can inform clinical decision-making. It can help improve patient outcomes, reduce healthcare costs, and promote preventive interventions. With the increasing availability of electronic health records and the growth of machine learning algorithms, disease prediction systems are becoming an increasingly important tool in the healthcare industry.
2. Personalized Health Monitoring: A disease predicting app can provide patients with personalized health monitoring. Personalized health monitoring can provide individuals with actionable insights into their health status and help them make informed decisions about their health. The system can detect early warning signs of diseases and provide recommendations for preventive interventions.
3. Research: Disease predicting apps can provide valuable data for research. The system can be used for research and development purposes, enabling researchers to analyze large amounts of patient data to identify new patterns and trends in disease prevalence and develop new treatment strategies. The system can be used for clinical trials, enabling researchers to identify eligible patients and monitor the progress of the trial. For example, the system can help researchers identify patients with a specific disease or medical condition and track their response to a new treatment.
4. Remote Healthcare: SAM Healthcare in remote healthcare can be a game-changer for patients and healthcare professionals. Remote healthcare is becoming increasingly popular due to its convenience and accessibility, particularly for patients in remote or underserved areas. The application can be used to provide remote consultations, enabling patients to upload images of their affected areas and receive preliminary screening and triage. Healthcare professionals can use the application to diagnose conditions and provide treatment recommendations, improving access to healthcare for patients who may not have access to medical facilities.

Chapter 2

Literature Survey

Sr.no	Title	Author(s)	Year	Algorithms	Limitations	Result
1	Disease Prediction Application Using Machine Learning: MEDSCAN	Sahil Sandhu	2022	NET algorithm is used in Brain Tumour Prediction and Corona Prediction, ResNet is used in Retino Pathy, CNN is used in Malaria prediction, ImageNet is used in Normal Chest X - Ray	Focuses on some specific diseases. Lacks accuracy	The paper aims to evaluate previous disease prediction efforts, explore disease evaluation and technology implementation in medicine.
2	Mobile Application Development for Disease Diagnosis based on Symptoms using Machine Learning Techniques	Anirudh Sridhara, Ahmed Mawiaa , A L Amuthaa	2023	Data preprocessing is done and then the data is passed through various machine learning classification models, like K Nearest Neighbor, Support Vector Machine, Decision Tree, Random Forest Classifier, Naïve Bayes and Artificial Neural Network.	Lacks in accuracy. No use of Image classification user has to manually select symptoms.	The output vectors of all the models, and this has yielded a training accuracy of 98.9% and when the model was tested on test data it yielded an accuracy of 98.08%.

3	Disease Prediction Application Using Machine Learning	Arnab Das, A. Udith Sai, P. Asha		System focuses on the prediction of three most deadly disease heart disease and breast cancer using Random Forest Classifier and diabetes diseases using Logistic Regression.	Focuses on only three diseases. Lacks in accuracy. No use of Image classification user has to manually select symptoms.	The output vectors of all the models, and this has yield training accuracy of 96.4% and when the model was tested on test data it yields accuracy of 97.3%.

Chapter 3

Proposed System

The proposed system for SAM Healthcare involves following components, including:

1. User Interface: The application has an intuitive user interface that enables patients to easily upload images of their affected areas.
2. Image Processing: The application uses advanced image processing techniques to analyze images of the affected area and identify potential diseases. Machine learning algorithms are used to improve the accuracy of the analysis.
3. Disease Detection: The application Detection potential diseases based on the image analysis results. The predictions could be ranked based on the likelihood of the disease.
4. Database: The application stores patient data and image analysis results in a secure database. This would enable healthcare professionals to access patient information and provide treatment recommendations based on previous diagnoses and treatments.
5. Security: The application is designed with robust security features to ensure the privacy and confidentiality of patient data.

Overall, the proposed system of SAM Healthcare would provide a fast, accurate, and reliable diagnostic tool that can help to improve patient outcomes and facilitate more efficient use of healthcare resources. By leveraging advanced technologies like machine learning and image processing, the application can provide accurate diagnostic information and enable healthcare professionals to provide the best possible care for their patients.

3.1 Features and Functionalities

1. **User Authentication:**
   User can authenticate themselves using their phone number.
2. **Brain Tumor & Pneumonia detection:**
   Brain Tumor and Pneumonia are detected by getting the input in form of MRI and Chest X-ray from the user.
3. **User- friendly Interface:**
   User can easily understand and navigate the application in efficient way.
4. **30+ disease detection:**
   30 diseases can be detected by taking input in form of Symptoms.
5. **Security:**
   The application ensures that the user's data is kept private and secure, and should comply with all relevant data protection regulations.
6. **Data Storage and Management:**
   The application can store and manage user data, such as preferences, settings, and user-generated content.

Chapter 4

Requirement Analysis

Requirement Analysis for a Disease prediction Flutter application using Image classification involves gathering information about the needs, goals, and objectives of the application. It involves identifying the functional and non-functional requirements of the application, as well as the user requirements and the technical requirements.

Functional Requirements:

1. User Registration and Authentication: The application should allow users to register and authenticate themselves securely.
2. Image Uploading: The application should allow users to upload images of the affected area securely.
3. Image Processing and Analysis: The application should process and analyze the images of the affected area to identify potential diseases.
4. Disease Prediction: The application should predict potential diseases based on the image analysis results.
5. Treatment Recommendation: The application should provide treatment recommendations based on the predicted diseases.

Non-functional Requirements:

1. Security: The application should have robust security measures in place to ensure the confidentiality and integrity of user data.
2. Scalability: The application should be scalable to accommodate a growing user base and increased image processing and analysis requirements.
3. Usability: The application should be easy to use and navigate for both patients and healthcare professionals.
4. Performance: The application should provide fast and accurate results in real-time to ensure prompt diagnosis and treatment.

User Requirements:

1. Patients: Patients should be able to easily upload images of their affected areas and receive accurate diagnostic information and treatment recommendations.
2. Healthcare Professionals: Healthcare professionals should be able to view patient images and diagnostic information securely and provide accurate treatment recommendations.

Technical Requirements:

1. Machine Learning: The application should leverage machine learning algorithms to improve the accuracy of image analysis and disease prediction.
2. Image Processing and Analysis: The application should use advanced image processing and analysis techniques to identify potential diseases.
3. Cloud Computing: The application should use cloud computing technologies to ensure scalability and availability.

Overall, the requirement analysis for SAM Healthcare involves gathering information about the functional and non-functional requirements, user requirements, and technical requirements to develop a comprehensive application that meets the needs of both patients and healthcare professionals.

Chapter 5

Project Design

The Project Design for SAM Healthcare involves the following steps:

1. Designing the User Interface:

   The first step in designing the application is to create an intuitive user interface that enables patients to upload images of their affected areas and healthcare professionals to view the images and diagnose the condition. The interface is designed to be simple, user-friendly, and accessible across multiple devices.
2. Developing the Image Processing and Analysis System:

   The next step is to develop the image processing and analysis system using advanced machine learning algorithms and image processing techniques. This would involve creating a database of labeled images to train the machine learning algorithms and building a pipeline to process and analyze the uploaded images.
3. Integrating the Disease Prediction System:

   The disease prediction system involves integration with the image processing and analysis system to predict potential diseases based on the image analysis results. The predictions could be ranked based on the likelihood of the diseases.
4. Building the Database:

   The application requires a secure database to store patient data and image analysis results. This would enable healthcare professionals to access patient information and provide treatment recommendations based on previous diagnoses and treatments.
5. Implementing Security Measures:

   The application is designed with robust security features to ensure the privacy and confidentiality of patient data. Encryption and authentication mechanisms could be implemented to protect patient data from unauthorized access

5.1 Use Case diagram

There are 3 Stakeholders of SAM Healthcare: Doctor, Patient/User and Doctor. The Patient/User has to authenticate themselves to avail the services. These Services include prediction of diseases using either symptoms or X-rays or MRI reports as input. The application detects Disease based symptoms, Brain Tumour and pneumonia. The Application provides an easy and quick way to predict a medical condition based on a captured or uploaded image. For doctors, the application can act as a preliminary screening tool, providing them with additional information to aid in diagnosis. The application can also assist doctors in identifying cases that require further examination or treatment. Developers can create an accurate and reliable CNN model that can accurately predict various medical conditions based on input images.

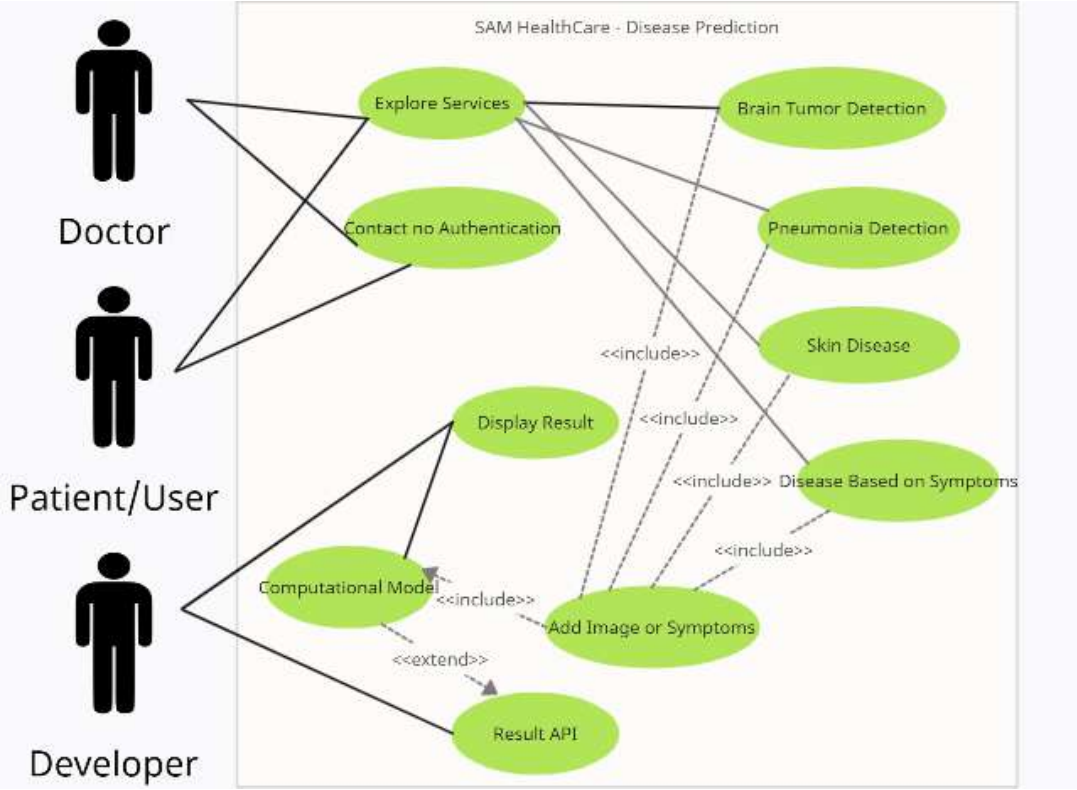


Fig 5.1.1 Use Case Diagram

5.2 DFD (Data Flow Diagram)

The Patient or User gets an image of X-Ray or MRI report from the gallery and loads the image from phone to app. Then various Deep learning operations are performed on the image. The image is then pre-processed, normalized, and converted into a format that can be fed into the CNN algorithm. The trained CNN model is then used to predict the type of disease based on the image input. The prediction result is displayed to the user in the form of text or image. Then user is given output as Disease Percentage using TF functions. The output of the system can be used by medical professionals to confirm or rule out the presence of a particular disease. Healthcare professionals can use the application to diagnose conditions and provide treatment recommendations. The Training process can be summarize as collecting data, pre-processing it for the CNN algorithm, training the model, testing the model.

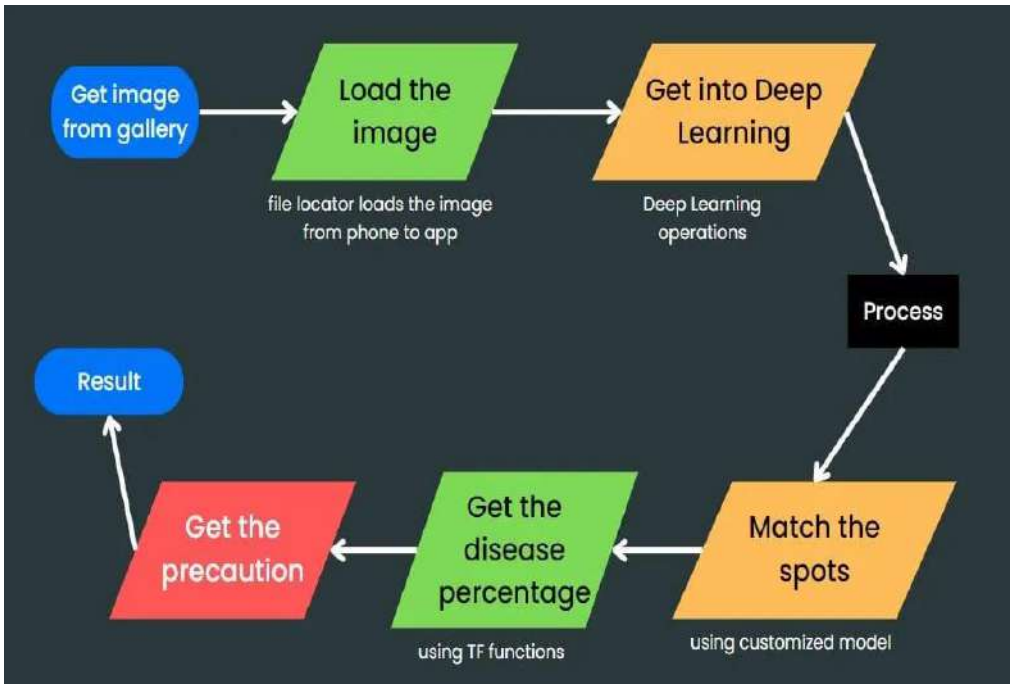


Fig 5.2.2 Data Flow Diagram

5.3 System Architecture

The system architecture for a disease prediction Flutter application using image classification and CNN algorithm involves a user interface (UI), image acquisition and pre-processing, a convolutional neural network (CNN) model, a backend server, a database, cloud storage, and analytics tools. The UI interacts with the user and displays information, while the CNN model predicts the disease based on pre-processed images. The application uses advanced image processing techniques to analyze images of the affected area and identify potential diseases. The application predicts potential diseases based on the image analysis results. The backend server communicates between the frontend and CNN model, and the database stores medical images and relevant information.

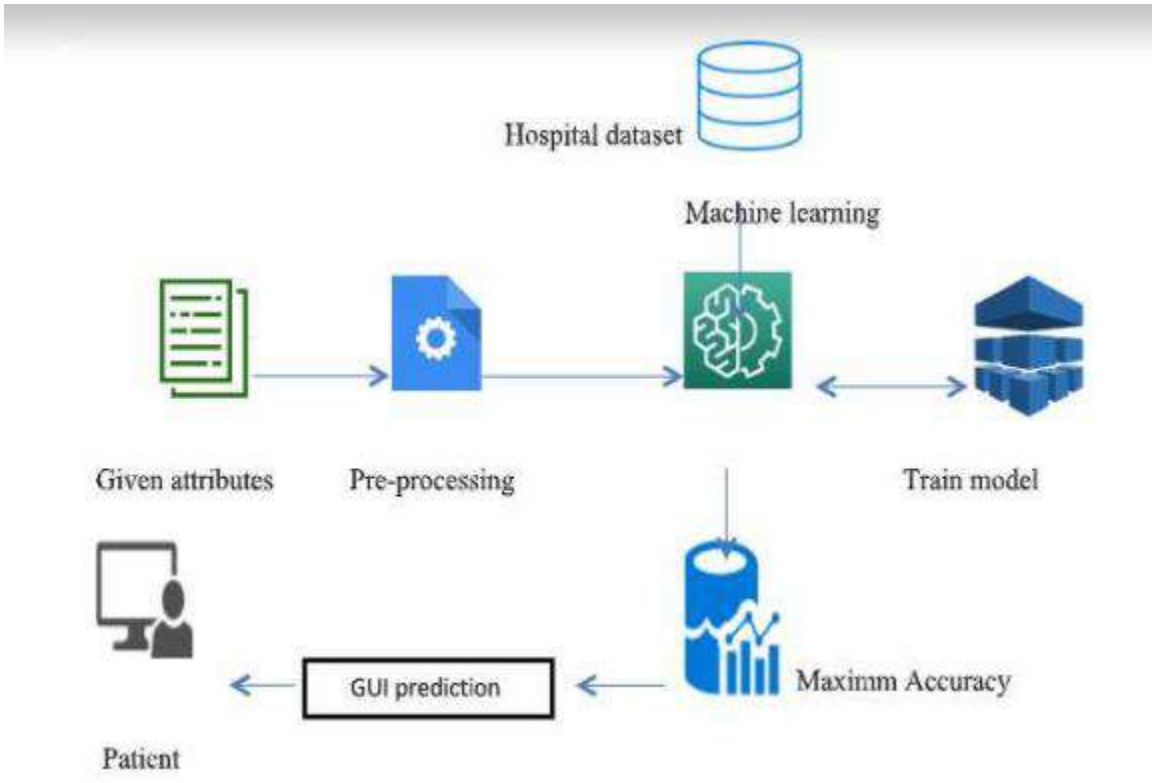


Fig 5.3.1 System Architecture

Chapter 6

Technical Specifications

Frontend:

- Flutter - For Building the GUI and overall application structure

Backend:

- Firebase - For handling user authentication, data storage and hosting backend of app.
- Flask - For building the backend server that communicates with TensorFlow model.

Programming:

- Dart
- Python
- TensorFlow & keras
- Pandas
- Scikit-learn

Platform:

- Android Studio
- Google Colab/Jupyter Notebook

Chapter 7

Project Scheduling

Date	Week	Contents
11/01/2023 To 22/01/2023	1	Group formation and Topic finalization.Identifying the scope and objectives of the Mini Project
25/01/2023 To 05/02/2023	2	Identifying the functionalities of theMini Project
08/02/2023 To 19/02/2023	3	Discussing the project topic with the help ofpaper prototype.
22/02/2023 To 09/03/2023	4	Designing the Graphical User Interface (GUI)
19/03/2023 To 23/03/2023	5	Database Design
12/03/2023 To 16/03/2023	6	Review 1 Presentations
19/032023 To 23/03/2023	7	Database Connectivity of all modules
26/03/2023 To 30/03/2023	8	Integration of all modules and Report Writing
03/04/2023 To 07/04/2023	9	Preparing Project presentation & Final reportfor allotted Project topic
04/04/2023 To 07/04/2023	10	Final report for allotted Project topic
17/04/2023 To 20/04/2023	11	Review 2 Presentations

Chapter 8

Implementation

Code:

BRAIN TUMOR DETECTION: The code is used to classify the image and to detect the brain tumor or not. The code below sends the image to the model and then model classify the inputed date and gives result. This code is similar for Pneumonia detection as well.

```
import 'package:cloud_firestore/cloud_firestore.dart';
import 'package:firebase_auth/firebase_auth.dart';
import 'package:flutter/material.dart';

class lastresultbrain extends StatefulWidget {
  @override
  _lastresult createState() => _lastresult();
}

class _lastresult extends State<lastresultbrain> {
  ScrollController? _scrollController;
  var top = 0.0;
  final FirebaseAuth _auth = FirebaseAuth.instance;
  String? _uid;
  String? _userImageUrl;
  @override
  void initState() {
    super.initState();
    _scrollController = ScrollController();
    _scrollController?.addListener(() {
      setState(() {});
    });
    getData();
  }

  void getData() async {
    User? user = _auth.currentUser;
    _uid = user?.uid;
      // to get Data from fire base
    final DocumentSnapshot userDoc = await FirebaseFirestore.instance.
    collection('users').doc(_uid).get();
    if (userDoc == null) {
      return;
    } else {
      setState(() {
        _userImageUrl = userDoc.get('imageurl2');
      });
    }
    // print("name $_name");
  }
```

```
  @override
  Widget build(BuildContext context) {
    return Scaffold(
      appBar: AppBar(
        elevation: 0,
        automaticallyImplyLeading: false,
        backgroundColor: Colors.transparent,
        leading: IconButton(
          onPressed: (){
            Navigator.pop(context);
          },
          icon: const Icon(Icons.arrow_back_ios_rounded , size: 30, color: Colors.black,),
        ),
        title: const Text(
          'My last Result',
          style: TextStyle(
            fontSize: 28,
            fontWeight: FontWeight.w700,
            fontFamily: 'seguisb',
            color: Color(0xff03045E),
          ),
        ),
      ),
      body: Container(
        alignment: Alignment.center,
        child: Image.network(
            _userImageUrl??
                'https://t3.ftcdn.net/jpg/01/83/55/76/240_F_183557656_DRcvOesmfDl5BIyhPKrcW
ANFKy2964i9.jpg'),
      ),
    );
  }
}
```

Glimpse of the Project:

Fig 8.1 Homepage of SAM HealthCare

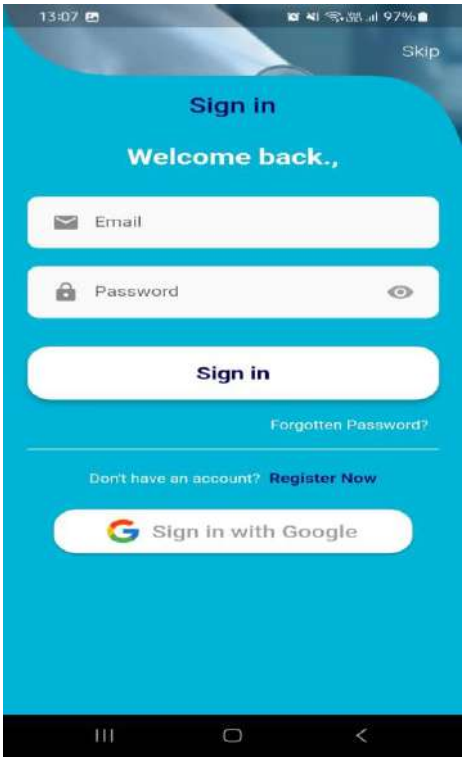


Fig 8.2 Sign In page for the users

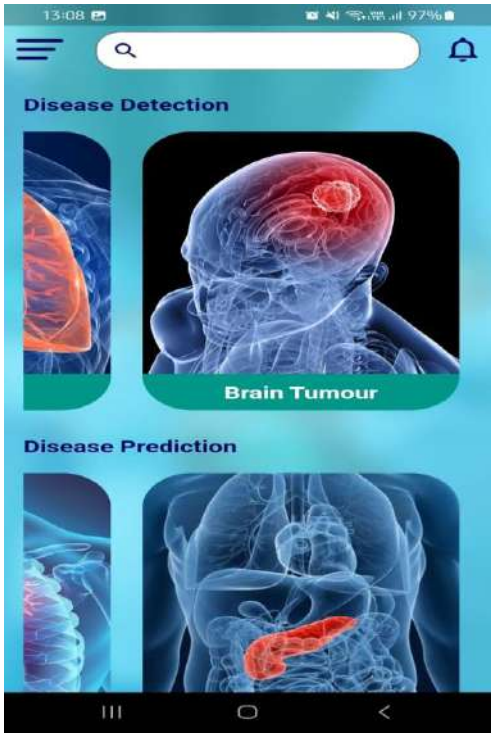


Fig 8.3 User Interface for Disease Detection

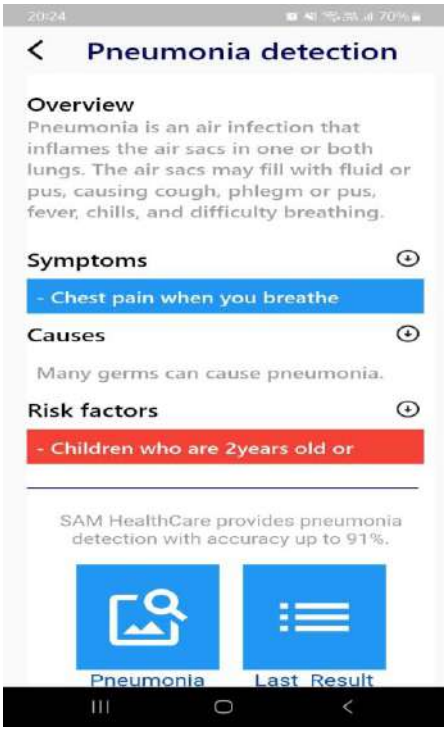


Fig 8.4 Dashboard for Pneumonia Detection

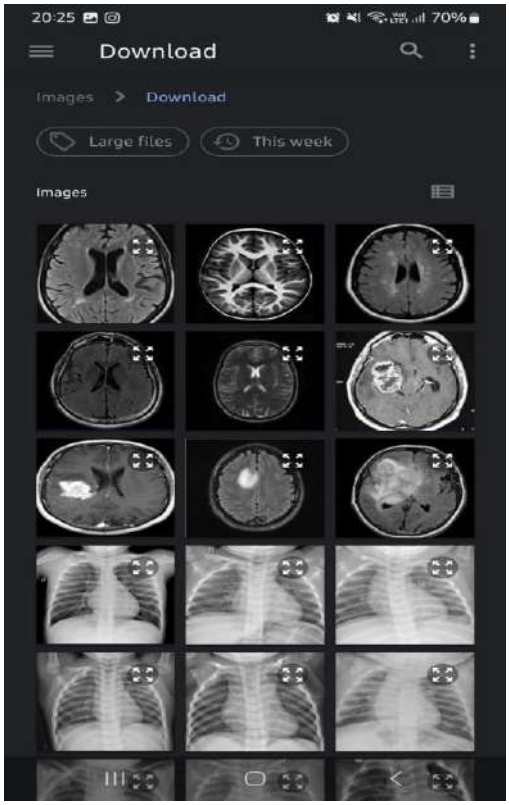


Fig 8.5 Uploading X-rays or MRI images

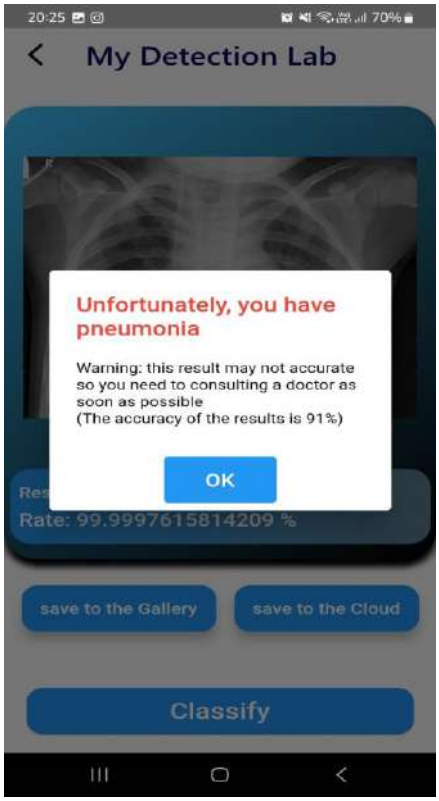


Fig 8.6 Disease Prediction (Pneumonia)

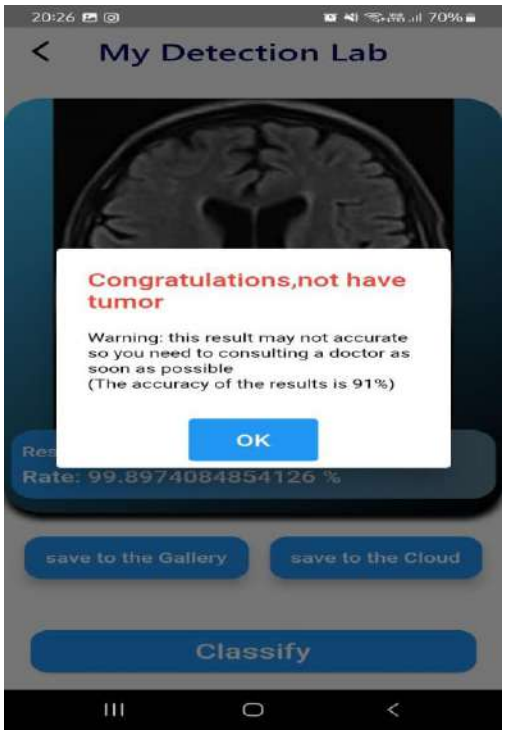


Fig 8.7 Disease Prediction (Brain tumor)

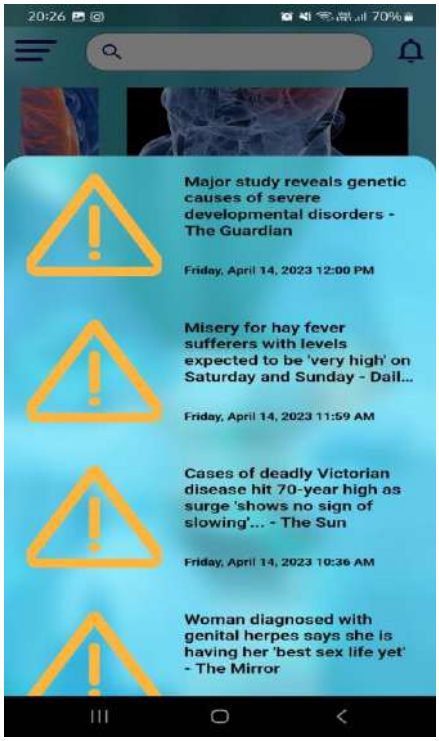


Fig 8.8 Health related News Feed

Chapter 9

Result Discussion

SAM Healthcare is a promising tool for early detection and diagnosis of various diseases, including brain tumor and pneumonia. The system uses deep learning techniques to classify medical images into different categories based on the patterns and features present in the images. The output of the system can be used by medical professionals to confirm or rule out the presence of a particular disease.

The performance of the system is dependent on the quality and quantity of the input data used for training and testing the CNN algorithm. The accuracy of the system can be improved by increasing the number of images used for training and by ensuring that the images are of high quality and represent the various stages and types of the disease accurately.

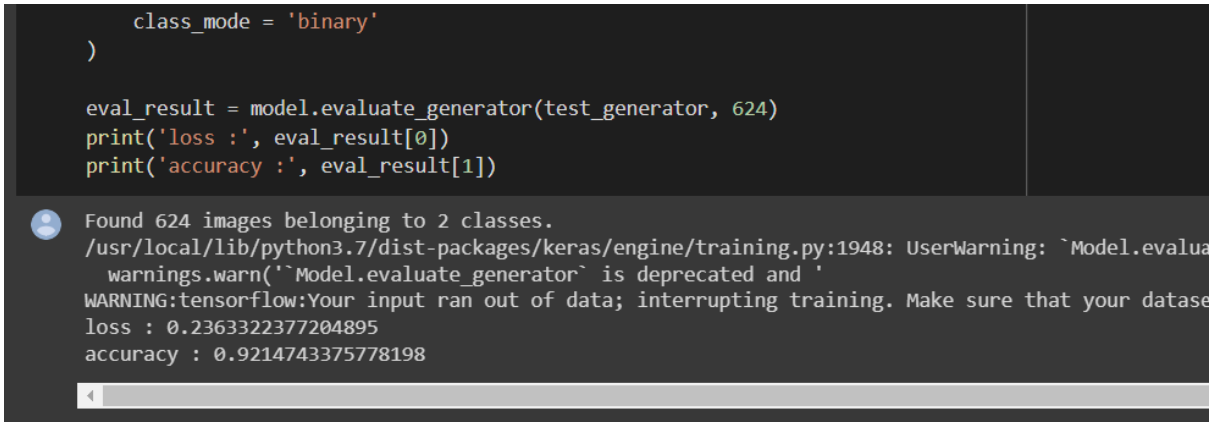
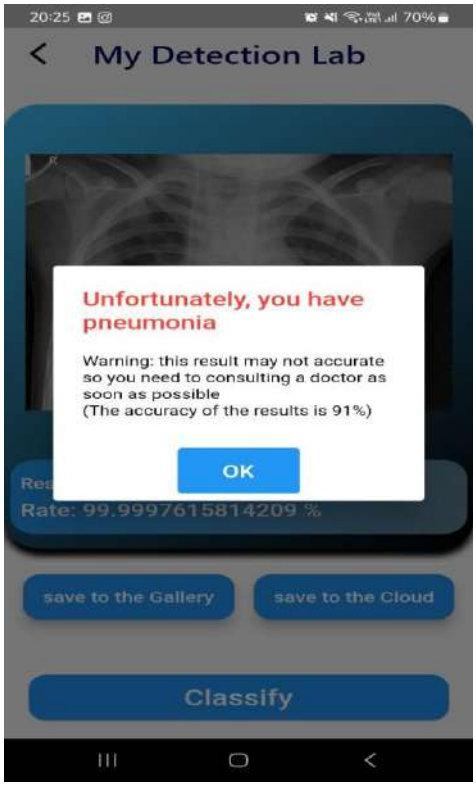
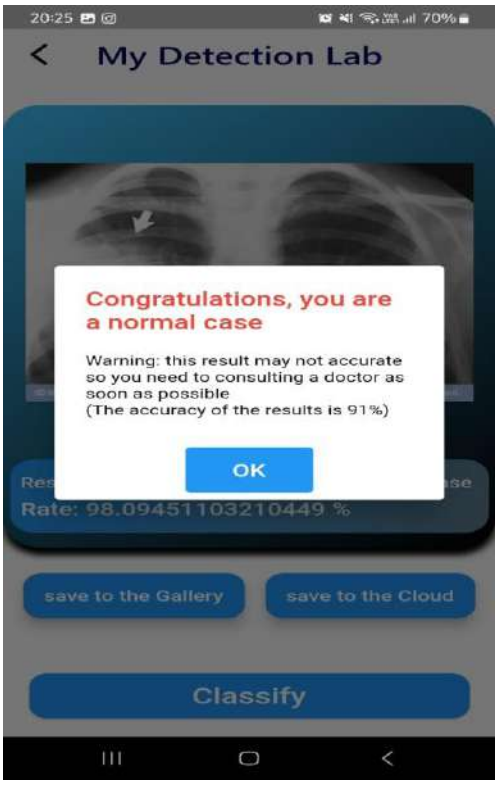


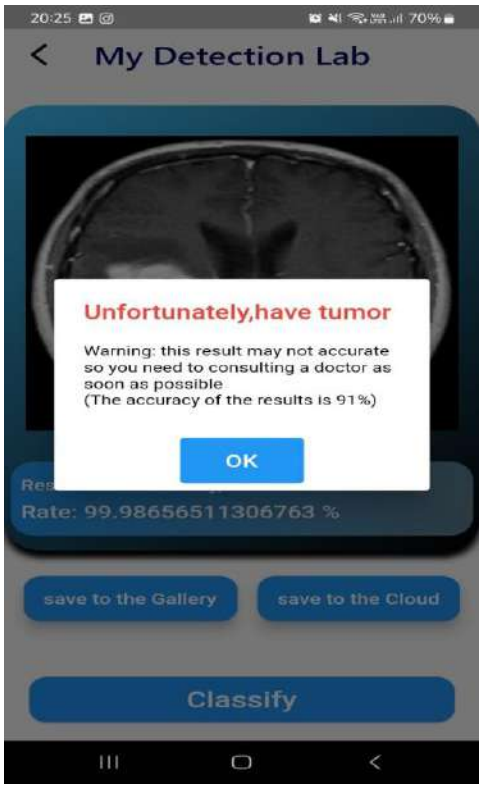
Fig: Accuracy Achieved

Several studies have been conducted to evaluate the effectiveness of the CNN algorithm in detecting brain tumor and pneumonia using medical images. The results of these studies have shown that the CNN algorithm can accurately classify medical images and achieve high levels of sensitivity and specificity.

The use of the disease prediction system has the potential to revolutionize healthcare by enabling early detection and diagnosis of diseases, thereby increasing the chances of successful treatment and improving patient outcomes. The system can also be used in remote areas where access to medical facilities is limited, and healthcare professionals can use the system to make informed decisions about patient care.







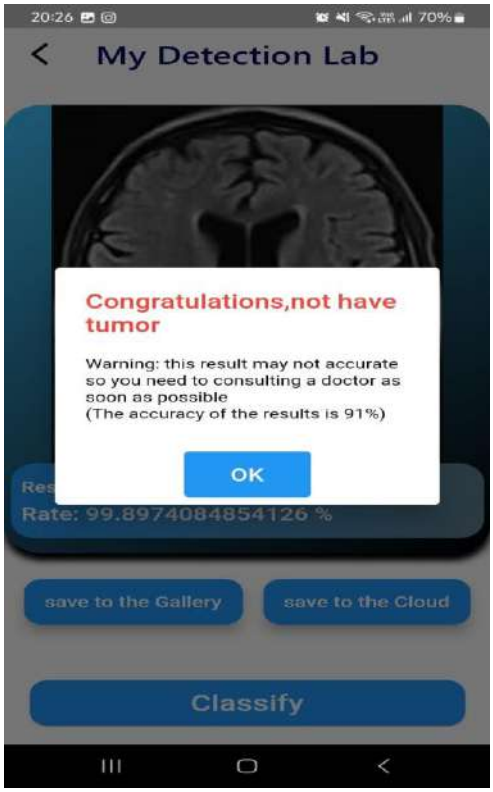


Fig: Results we got on classification of Images and accuracy we achieved

Chapter 10

Conclusion and Future Scope

In conclusion, SAM Healthcare has the potential to revolutionize remote healthcare by providing patients with a quick and accurate diagnosis of their conditions. By leveraging advanced machine learning algorithms and image processing techniques, the application can analyze patient images and predict potential diseases with a high degree of accuracy. Healthcare professionals can then use this information to make informed treatment recommendations, potentially saving time and reducing healthcare costs.

The future scope of this application is immense, as it can be further improved and expanded to include additional features and capabilities. For example, the application could be integrated with Electronic Health Record (EHR) systems to provide healthcare professionals with a more comprehensive view of patient health history. Additionally, the application could be expanded to include telemedicine features, enabling patients to connect with healthcare professionals remotely for video consultations and follow-up appointments.

Furthermore, the application could be used to support ongoing research into new and emerging diseases, by enabling researchers to analyze patient images and collect data on disease prevalence and treatment outcomes. This could potentially lead to new discoveries and treatment options, ultimately benefiting patients and improving overall health outcomes.

Overall, a Disease prediction Flutter application using Image classification is a promising tool for remote healthcare that has the potential to improve patient outcomes and facilitate more efficient use of healthcare resources. With continued innovation and development, this application could play an increasingly important role in healthcare delivery in the years to come

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