early stage disease diagnosis system using human nail image processing using deep learning

Project Report

1. Introduction

In today's world, early detection of diseases plays a very important role in healthcare. Nail diseases can indicate various health problems, and manual diagnosis may require a dermatologist. This project aims to provide an automated solution for detecting nail diseases using image processing and deep learning.

The system uses a Convolutional Neural Network (CNN) model to analyze nail images and predict:

Whether the nail is diseased or not

The type of nail disease

The percentage (confidence) of the disease

Basic suggestions on what should be done next

A user-friendly web interface is developed using Flask, HTML, CSS, and JavaScript, where users can upload nail images and get instant results.

2. Objectives of the Project

The main objectives of this project are:

To detect nail diseases using image processing and deep learning.

To classify nail images into different disease categories using a CNN model.

To show the disease name, confidence percentage, and basic recommendations.

To build a simple and user-friendly web interface using Flask.

To help users get a quick preliminary analysis before consulting a doctor.

3. System Overview

The system works in the following way:

The user uploads a nail image through the web interface.

The image is preprocessed (resized, normalized, etc.).

The processed image is passed to the trained CNN model.

The model predicts:

The disease class

The confidence percentage

The result is displayed on the web page along with basic guidance.

4. Technologies Used

Programming Language: Python

Deep Learning Framework: TensorFlow / Keras

Model Type: Convolutional Neural Network (CNN)

Backend Framework: Flask

Frontend: HTML, CSS, JavaScript

Dataset:

Nail images dataset

Disease-related dataset (labels / classes)

5. Dataset Description

This project uses two datasets:

Nail Images Dataset:

Contains images of healthy and diseased nails.

These images are used to train the CNN model.

Disease Dataset:

Contains information about different nail diseases and their labels.

Used to map the predicted class to the disease name and details.

The dataset is divided into:

Training set

Validation set

Testing set

6. Methodology

6.1 Image Preprocessing

Images are resized to a fixed size required by the CNN model.

Pixel values are normalized.

Data augmentation techniques (if used) like rotation, flipping, etc. improve model accuracy.

6.2 CNN Model

A Convolutional Neural Network is used for feature extraction and classification.

The model consists of:

Convolution layers

Pooling layers

Fully connected (Dense) layers

The model is trained on the nail image dataset to learn different disease patterns.

6.3 Model Training

The dataset is fed into the CNN model.

The model learns features from images.

After training, the model is saved and used for prediction in the Flask application.

6.4 Prediction

The uploaded image is passed to the trained model.

The model outputs:

Predicted disease class

Confidence (percentage)

The result is shown on the web page.

7. System Architecture

User uploads nail image (Frontend – HTML/CSS/JS)

Image is sent to Flask backend

Flask loads the trained CNN model

Image is preprocessed and passed to the model

Model predicts disease and confidence

Result is sent back to frontend and displayed to the user

8. Features of the System

Upload nail image through web interface

Automatic nail disease detection

Shows:

Disease name

Confidence percentage

Basic suggestions

Simple and user-friendly UI

Fast and efficient prediction

9. Advantages

Quick preliminary diagnosis

Reduces dependency on manual checking

Easy to use

Can be accessed through a web browser

Helps in early detection of nail diseases

10. Limitations

Accuracy depends on the quality and size of the dataset

Works only for the diseases included in the dataset

Not a replacement for professional medical diagnosis

11. Future Scope

Add more nail disease categories

Improve accuracy with a larger dataset

Add doctor consultation feature

Deploy the system online

Create a mobile application version

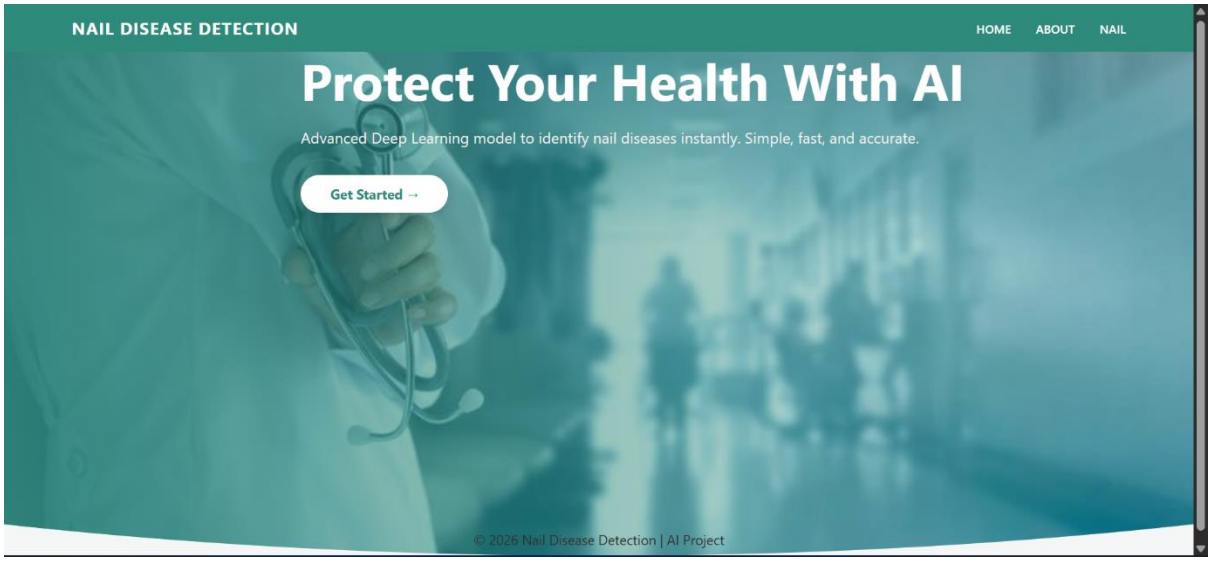
12. Conclusion

This project successfully demonstrates how deep learning and image processing can be used to detect nail diseases from images. By using a CNN model and a Flask-based web application, the system provides an easy-to-use platform for users to upload nail images and get instant predictions

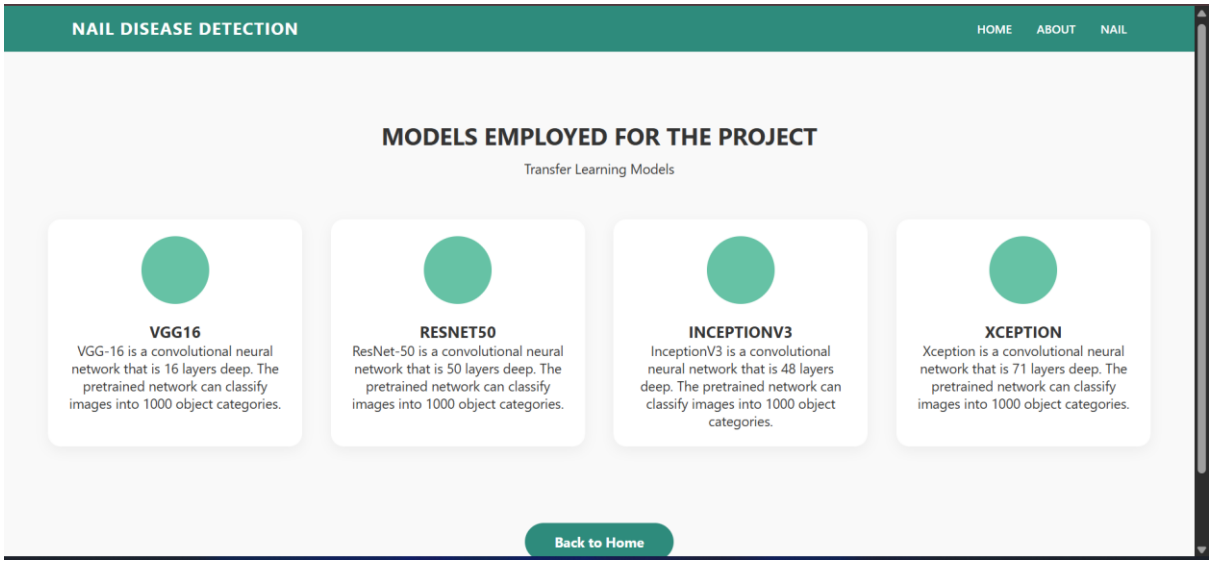
along with confidence percentage and basic guidance. This project can be further enhanced and used as a supportive tool in healthcare.

13. project Screenshot

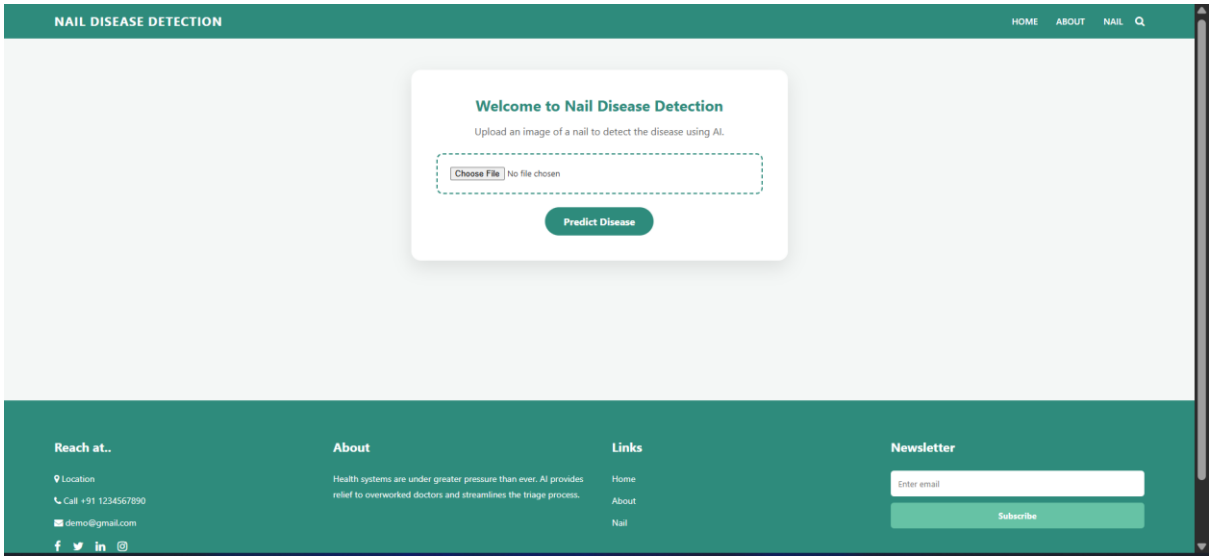
1.Home Screen



2.About Screen



3.Nails Predection Page



4.Final Output