PROJECT DESCRIPTION DOCUMENT

Skin Cancer Detection

Web Application Using AI and Deep Learning

Project Overview

Skin Cancer Detection is a web-based application developed to analyse uploaded skin lesion images and predict their possible lesion category using Artificial Intelligence and deep-learning techniques. The application provides a simple interface through which users can register, log in, upload a skin image, view the model's prediction and confidence score, and review previous prediction records.

The prediction component is based on a Convolutional Neural Network (CNN). The project uses the HAM10000 dataset, which contains 10,015 labelled dermatoscopic images across seven lesion categories, for model development and evaluation. AutoKeras was used during the model-selection process to explore a suitable model configuration.

Technology Stack

User Interface	HTML5, CSS3
Client-Side Scripting	JavaScript
Back-End	Python, Flask
AI / Deep Learning	Convolutional Neural Network (CNN)
Dataset	HAM10000
Model Selection	AutoKeras
Database	MySQL

Main Application Flow

Home Page → User Registration / User Login → User Dashboard → Select Skin Image → Submit Image for Prediction → View Predicted Class and Confidence → Prediction History. Users can also use the Reset Password page to change their account password.

Important: This application is an academic project and its output is intended for demonstration and educational purposes. It is not a substitute for professional medical advice.

Project Modules Description

The application is organised into the following functional modules. These modules work together to provide account access, skin-image prediction and access to previously saved results.

1. User Authentication Module

This module manages user registration and login. New users can create an account by providing their basic details and password. Registered users can sign in with their email address and password to access the dashboard. The module also includes the Reset Password functionality for changing an account password.

2. Skin Image Prediction Module

This is the core module of the application. It allows a logged-in user to select a skin lesion image, preview the selected file and submit it for analysis. The Flask application passes the image to the trained CNN-based prediction component. The result panel displays the predicted lesion category and the confidence score returned by the model.

3. Prediction History Module

This module allows users to view previously uploaded images and their prediction results. The history page presents each record with an image thumbnail and its predicted category, making earlier prediction activity easier to review.

4. Account and Navigation Features

The application provides navigation between the Home page, Registration, Login, Dashboard, Prediction History and Reset Password pages. A Logout option is available from the signed-in area to allow the user to exit the application.

Home Page



Figure 1: Home Page

The Home page is the entry point of the Skin Cancer Detection application. It introduces the AI-based system and explains that the application uses Artificial Intelligence and deep learning techniques to analyse skin lesion images and predict their possible categories. The page highlights the technologies used, including Python, Flask, Convolutional Neural Network (CNN), MySQL, HTML5, CSS3 and JavaScript. Visitors can navigate to User Registration or User Login to access the application.

User Registration

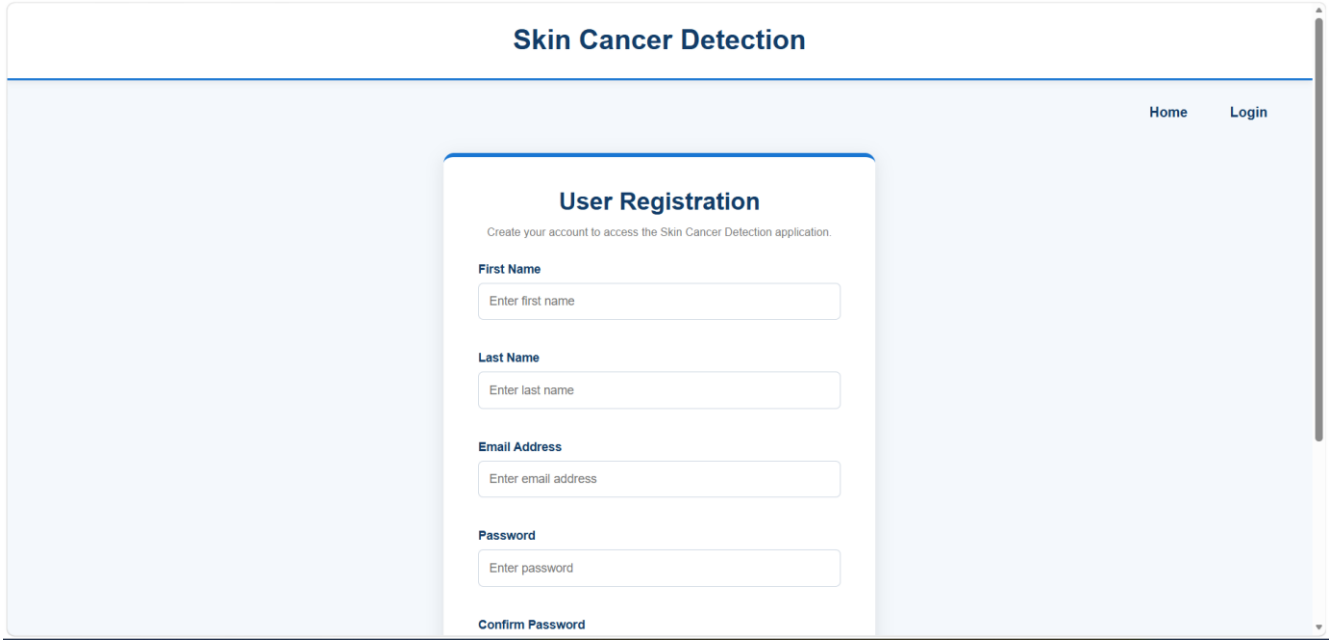

Figure 2: User Registration

The User Registration page allows a new user to create an account to access the application. The form collects the user's first name, last name, email address, password and password confirmation. After providing the required information, the user submits the form to register. Registration provides an account through which the user can access the image prediction functionality and related features.

User Login

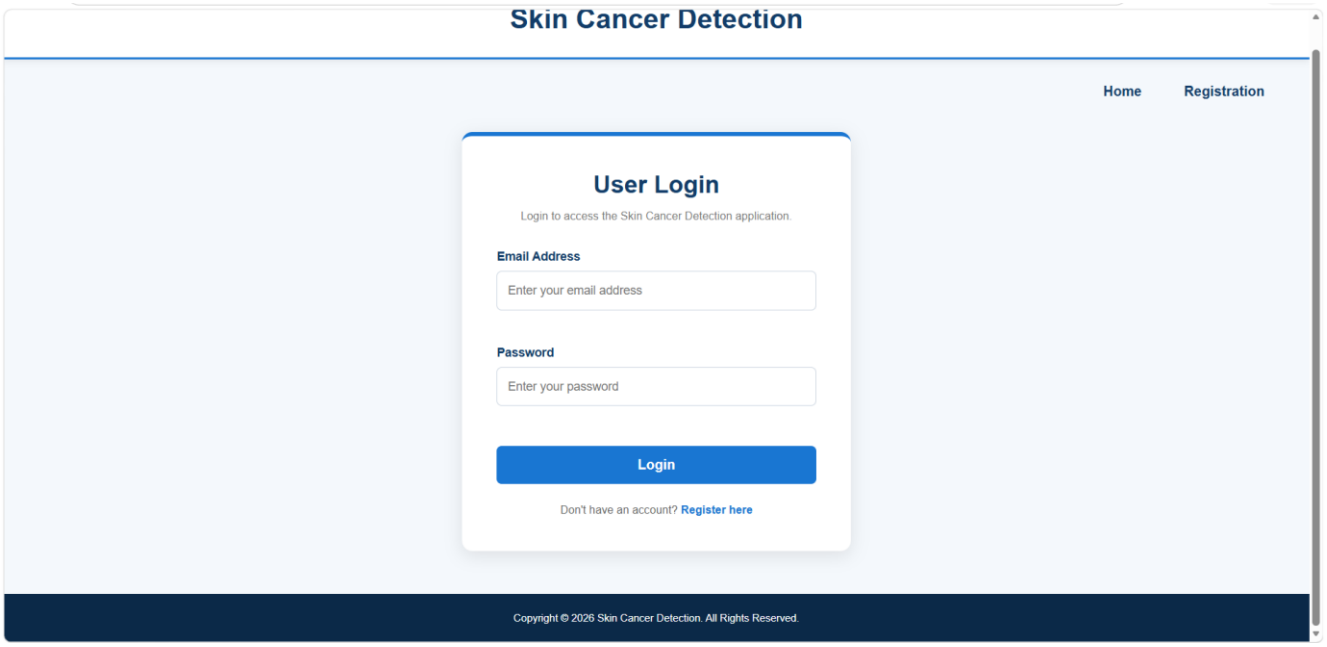

Figure 3: User Login

The User Login page allows an existing user to access the application by entering a registered email address and password. After successful authentication, the user is taken to the User Dashboard. The page also provides navigation to the Home page and User Registration for visitors who do not yet have an account.

User Dashboard – Initial View

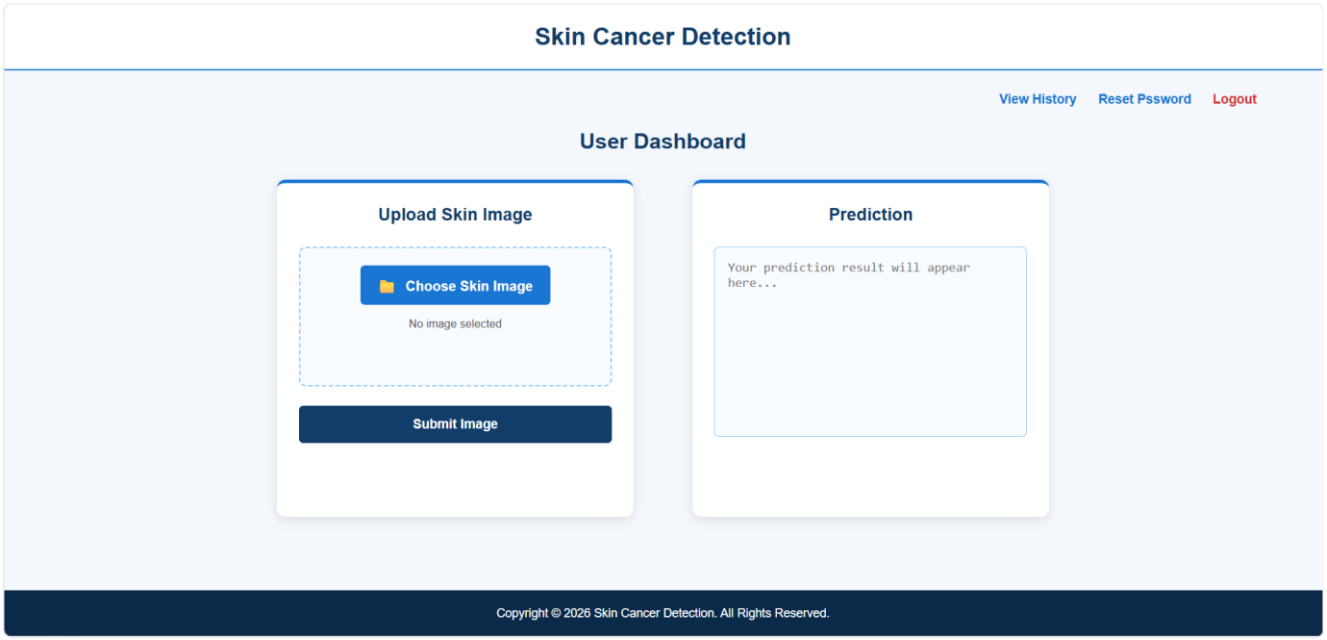

Figure 4: User Dashboard – Initial View

The User Dashboard is the main workspace for image-based skin lesion prediction. It provides an image upload area with a Choose Skin Image control and a Submit Image button. The Prediction panel displays the output after image analysis. Before a prediction is submitted, the panel shows a message indicating where the prediction result will appear.

User Dashboard – Image Selected

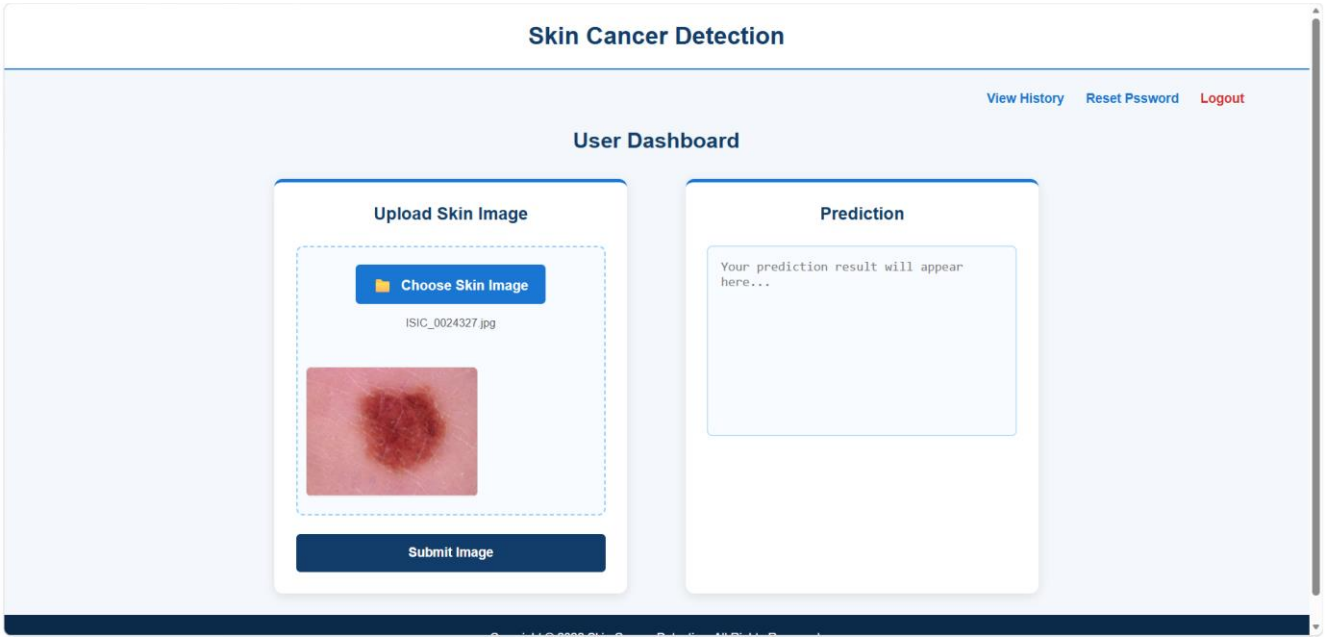

Figure 5: User Dashboard – Image Selected

This screen shows the dashboard after a skin image has been selected. The selected file name and an image preview are displayed in the upload panel so that the user can review the image before submitting it. The user can then select Submit Image to start the prediction process. The Prediction panel is reserved for the model output.

User Dashboard – Prediction Result

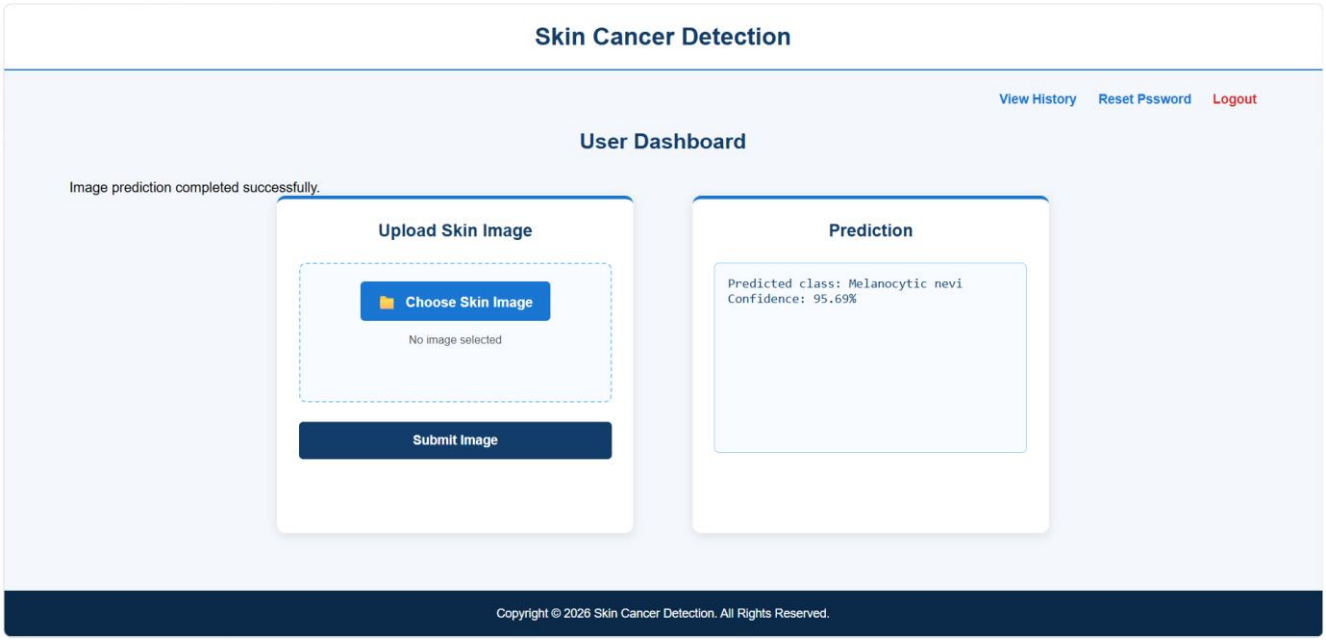

Figure 6: User Dashboard – Prediction Result

After the user submits an image, the application processes it using the trained deep-learning model and displays the predicted lesion class along with a confidence score. The illustrated result shows the predicted class as Melanocytic nevi with a confidence value of 95.69%. This result is an AI-generated prediction for project demonstration and should not be treated as a medical diagnosis.

Prediction History

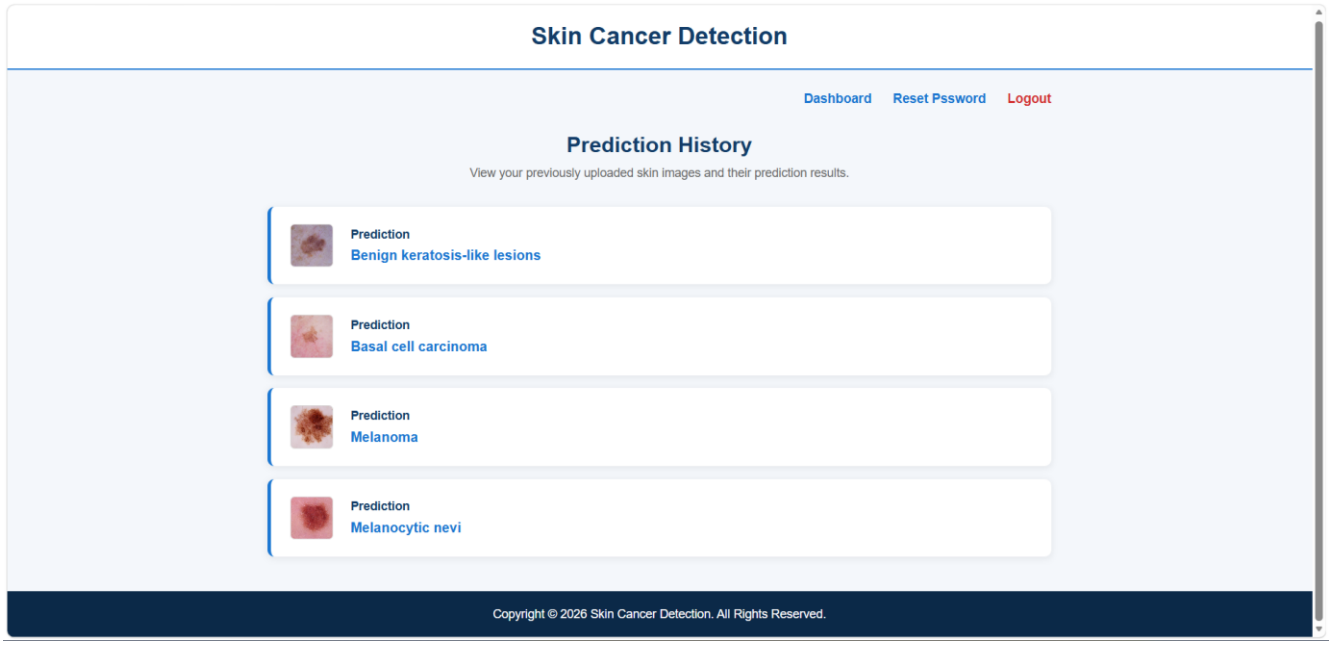

Figure 7: Prediction History

The Prediction History page displays previously uploaded skin images and their corresponding prediction results. Each history entry includes a thumbnail of the uploaded image and the predicted lesion category. This page allows a user to review earlier prediction activity in one place. The screenshot illustrates entries for Benign keratosis-like lesions, Basal cell carcinoma, Melanoma and Melanocytic nevi.

Reset Password

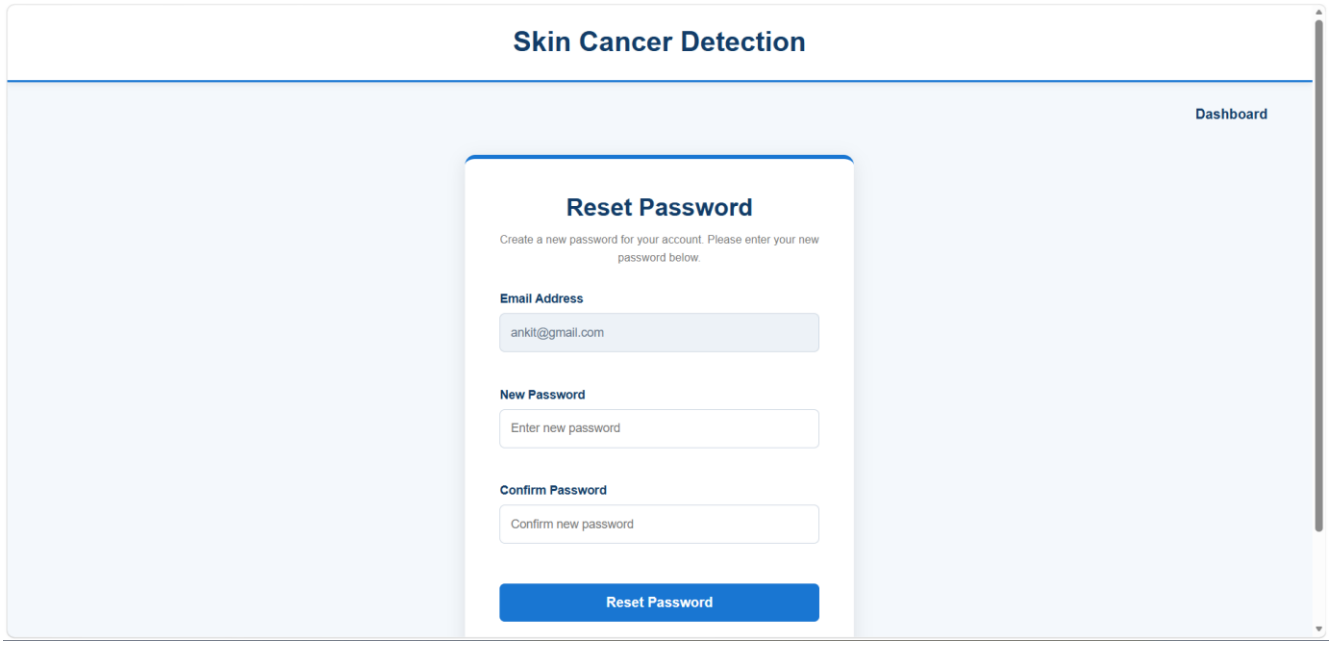

Figure 8: Reset Password

The Reset Password page allows a user to create a new password for an account. The registered email address is displayed, and the user enters a new password and confirms it. The user then selects Reset Password to submit the change. This feature supports account access recovery and password maintenance.

Prediction Categories and Project Scope

The HAM10000 dataset used in this project contains images belonging to the following seven lesion categories:

- Melanocytic nevi (nv)
- Melanoma (mel)
- Benign keratosis-like lesions (bkl)
- Basal cell carcinoma (bcc)
- Actinic keratoses (akiec)
- Vascular lesions (vas)
- Dermatofibroma (df)

Project Outcome

The completed application demonstrates an end-to-end workflow in which a user can access the web application, upload a skin lesion image, receive an AI-generated class prediction with a confidence score, and review previous prediction records. The project combines a Flask-based web application, a CNN prediction component and a MySQL database in one system.

The prediction result should be interpreted only as an output of the project's trained model. It does not confirm whether a person has skin cancer and must not be used to make medical decisions without assessment by a qualified healthcare professional.