



CAD#EIR

DR square

# TEAM DETAILS

Name	Stream/Dept	Year	College
Roshnie	Computer Science	2	Sri Sivasubramaniya Nadar College of Engineering
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# TRACK

Health Tech

## PROBLEM STATEMENT

**AI-based tool for preliminary diagnosis of Dermatological manifestations**

# SOLUTION

## 1.Data Preparation:

HAM10000 data set has been used to train the model

Categorical labels are converted into numerical values using LabelEncoder.

Balance the data by resampling each class to have an equal number of samples.

## 2.Image Loading and Preprocessing:

Create a dictionary mapping image IDs to file paths.

Resize the images to a specified size (SIZE) and convert them into numpy arrays.

Store the numpy arrays representing images in a new column 'image' in the DataFrame.

## 3. Data Splitting:

Split the numpy array representing images (X) and the corresponding labels (Y\_cat) into training and testing sets using train\_test\_split.

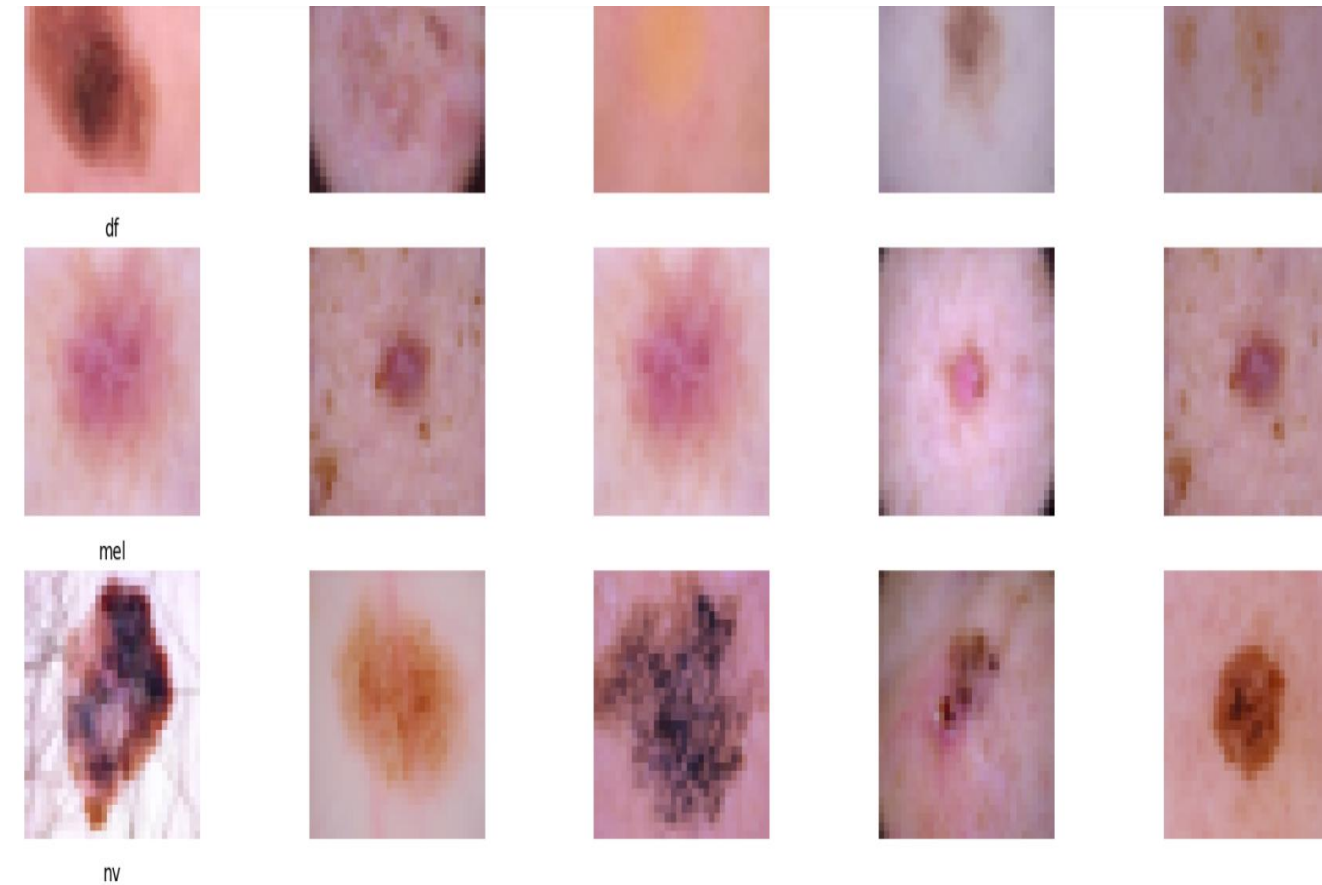
#### 4. Model Definition:

Define a sequential CNN model using Keras.

Include convolutional layers (Conv2D), max pooling layers (MaxPool2D), dropout layers (Dropout), and fully connected layers (Dense).

Use ReLU activation function in convolutional layers and softmax activation function in the output layer for multiclass classification.

lesion_id	image_id	dx	dx_type	age	sex	localization
HAM_0000	ISIC_00274	bkl	histo	80	male	scalp
HAM_0000	ISIC_00250	bkl	histo	80	male	scalp
HAM_0002	ISIC_00267	bkl	histo	80	male	scalp
HAM_0002	ISIC_00250	bkl	histo	80	male	scalp
HAM_0003	ISIC_00310	bkl	histo	75	male	ear
HAM_0003	ISIC_00278	bkl	histo	75	male	ear
HAM_0002	ISIC_00290	bkl	histo	60	male	face
HAM_0002	ISIC_00290	bkl	histo	60	male	face
HAM_0005	ISIC_00258	bkl	histo	70	female	back
HAM_0005	ISIC_00250	bkl	histo	70	female	back
HAM_0003	ISIC_00250	bkl	histo	55	female	trunk
HAM_0004	ISIC_00293	bkl	histo	85	female	chest
HAM_0004	ISIC_00259	bkl	histo	85	female	chest
HAM_0003	ISIC_00250	bkl	histo	70	male	trunk
HAM_0003	ISIC_00324	bkl	histo	70	male	trunk
HAM_0003	ISIC_00313	bkl	histo	65	male	back
HAM_0003	ISIC_00259	bkl	histo	75	male	upper extremity
HAM_0003	ISIC_00310	bkl	histo	75	male	upper extremity



```

lesion_id      image_id      dx dx_type      age  sex      localization \
9789 HAM_0003136 ISIC_0026645 akiec histo 65.0 male back
9957 HAM_0006587 ISIC_0025780 akiec histo 70.0 male face
9793 HAM_0005505 ISIC_0024450 akiec histo 50.0 male upper extremity
9758 HAM_0003455 ISIC_0027896 akiec histo 75.0 male hand
9789 HAM_0003136 ISIC_0026645 akiec histo 65.0 male back

label path \
9789 0 /content/drive/MyDrive/HAM10000_images_part_1/...
9957 0 /content/drive/MyDrive/HAM10000_images_part_1/...
9793 0 /content/drive/MyDrive/HAM10000_images_part_1/...
9758 0 /content/drive/MyDrive/HAM10000_images_part_1/...
9789 0 /content/drive/MyDrive/HAM10000_images_part_1/...

image
9789 [[155, 118, 107], [162, 126, 118], [174, 140,...
9957 [[138, 76, 82], [131, 64, 68], [139, 73, 81],...
9793 [[123, 86, 87], [174, 137, 137], [197, 161, 1...
9758 [[205, 149, 175], [207, 149, 169], [214, 158,...
9789 [[155, 118, 107], [162, 126, 118], [174, 140,...

```

## 5. Model Compilation:

Compile the model using categorical cross-entropy loss function and Adam optimizer. Specify accuracy metric to monitor the model's performance during training.

## 6. Model Training:

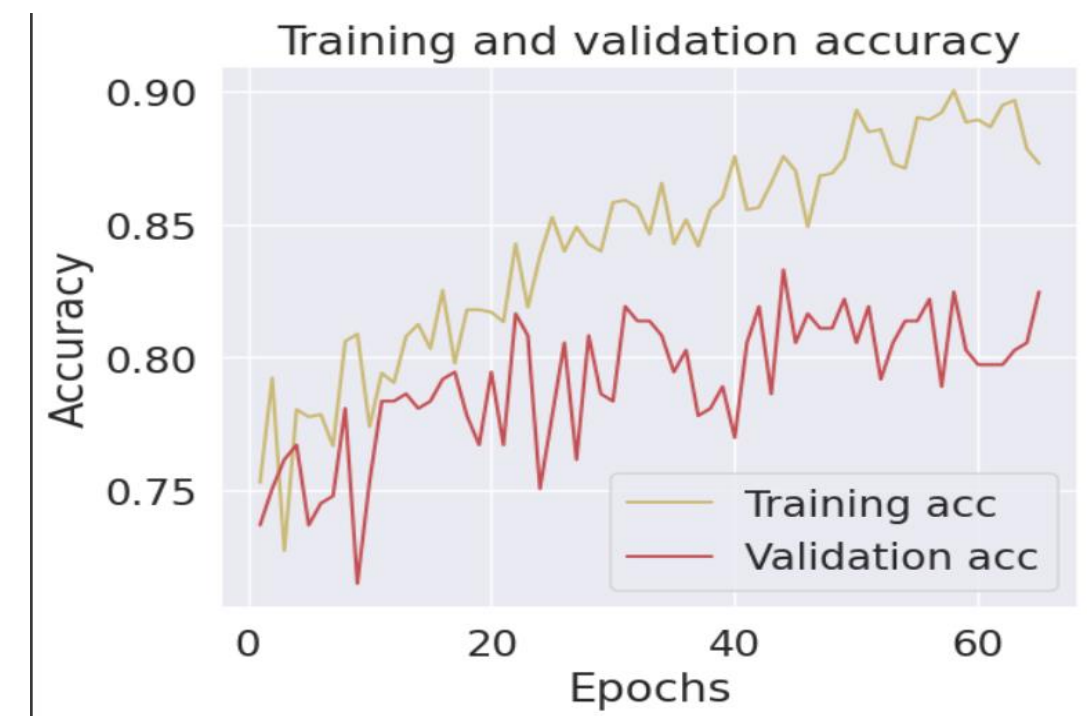
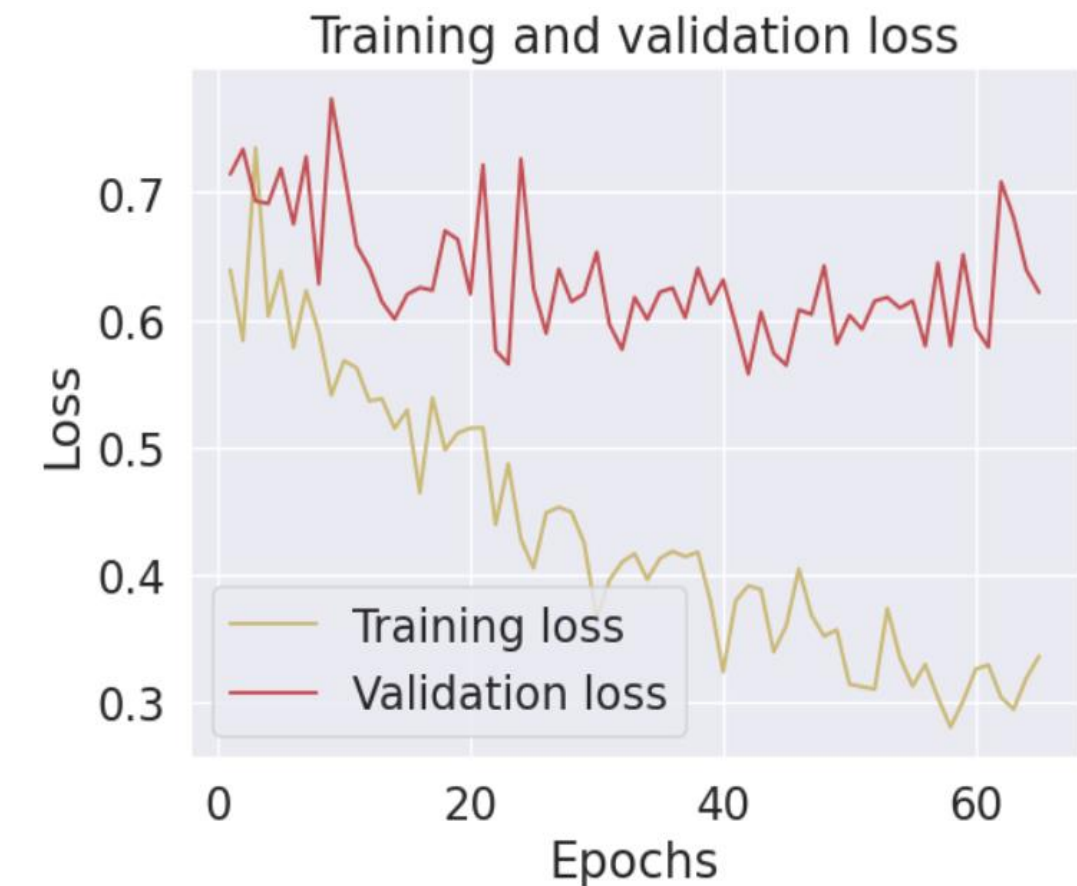
Train the model on the training data (x\_train and y\_train) using the fit method. Provide validation data (x\_test and y\_test) to evaluate the model's performance during training. Specify batch size and number of epochs for training.

## 7. Model Evaluation:

Evaluate the trained model on the test data using the evaluate method. Print the test accuracy to assess the model's performance.

## Chatbot development:

Chatbot interface using OpenAI's GPT-3.5 model. It iteratively prompts the user for input, sends it to the chatbot model for processing, and displays the responses until the user enters a stop keyword.





# Sample Output

CAD#ER



```
Welcome to Derm Check!!
.....

How can we help you?
1. Diagnosis of skin disease
2. Chat with AI Doctor
3. Exit
Enter your choice: 1

1. Click on choose files

2. Upload the photo in jpg format

3. Click on open

4. Wait for the diagnosis!!

Choose Files ISIC_0025964.jpg
• ISIC_0025964.jpg(image/jpeg) - 261882 bytes, last modified: 4/5/2024 - 100% done
Saving ISIC_0025964.jpg to ISIC_0025964 (1).jpg
1/1 [=====] - 0s 88ms/step
Predicted skin disease: Dermatofibroma
.....

How can we help you?
1. Diagnosis of skin disease
2. Chat with AI Doctor
3. Exit
Enter your choice: 2
```

```
How can we help you?
1. Diagnosis of skin disease
2. Chat with AI Doctor
3. Exit
Enter your choice: 3
Exiting Derm Check!!
```

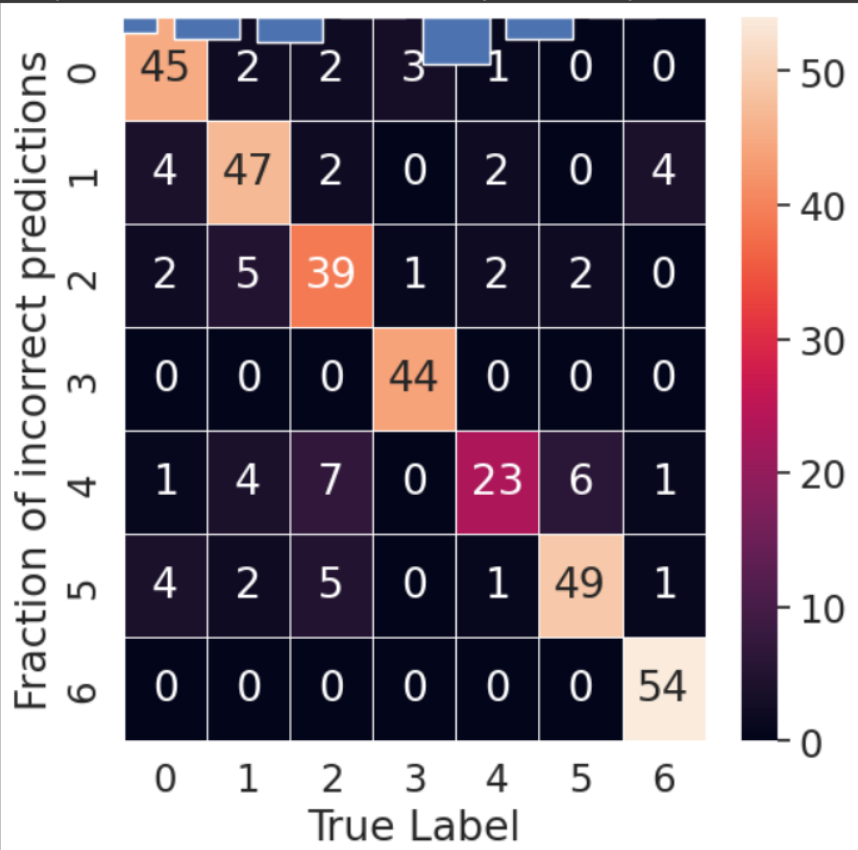
```
Assistant: Hi, I am Your Doctor AI. How can I help you?

User: Explain more about Dermatofibroma
Assistant: Hi, I am Your Doctor AI. How can I help you?

Explain more about Dermatofibroma

Assistant: Dermatofibroma is a common benign (non-cancerous) skin lesion that usually appears as a firm, raised nodule on the skin. It is most commonly found on the legs, but can also occur on the arms, trunk, or other parts of the body. Dermatofibromas typically have a pink, brown, or red color, and may have a slightly dimpled or "dimpled" appearance on the surface. The exact cause of dermatofibromas is not well understood, but they are thought to be a result of an abnormal reaction of the skin to an injury or irritation, such as a bug bite or a scratch. They are more common in women and usually develop in adults. Dermatofibromas are generally harmless and do not require treatment unless they are causing symptoms such as pain, itching, or bleeding. In some cases, a dermatologist may recommend removal of the lesion for cosmetic reasons or to rule out any other more serious skin conditions. It is always a good idea to have any new or changing skin lesions evaluated by a dermatologist to ensure an accurate diagnosis and appropriate management.

User: stop
Chatbot stopped.
.....
```



# NOVELTY SELLING POINT

## 1. Personalized Recommendations:

Incorporate a feature that provides personalized recommendations based on the user's skin type, past diagnoses, or chat history with the AI doctor. This can enhance user engagement and satisfaction by offering tailored advice and suggestions.

## 2. Time Efficiency:

The tool reduces the time required for initial assessments, allowing healthcare providers to focus more on treatment planning and patient care.

## 3. Accessibility:

Patients can use the tool for self-assessment, leading to quicker identification of potential skin issues and timely medical intervention.

As we also used chatbot which allows us to seek medical guidance at anytime and also user can expect the result with 80% accuracy.

## 4. 24/7 Support:

Offers round-the-clock support, allowing users to seek guidance and advice at any time, especially during urgent or non-office hour



# TECHNICAL REQUIREMENTS

Libraries used to train the model:

- >matplotlib.pyplot
- >numpy
- >pandas
- >os
- >glob
- >seaborn
- >PIL
- >keras
  - >sklearn
- >scipy

For Chatbot:

- i)OpenAI API
- ii)Python libraries:
  - >textwrap
  - >wrap

Activation Function in model:

Convolution layers:ReLU  
Output layer:Softmax  
Optimizer:Adam  
Regularisation:drop out  
Test Accuracy:0.825

# FUTURE ENHANCEMENTS

1. Use the device's camera to capture the image and upload, apart from uploading the image directly
2. Provide a more user friendly UI
3. Integration with Electronic Health Records (EHR): Allow users to securely link their electronic health records (EHR) with the application. This integration would enable the application to access relevant medical history and provide more personalized recommendations.
4. Educational Resources: Provide users with access to educational resources such as articles, videos, and FAQs about common skin conditions, preventive measures, and treatment options.