SMART INDIA HACKATHON 2023

Problem statement :

AI - based tool for preliminary diagnosis of Dermatological manifestations

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STEP 1

Image input from user

STEP 2

Image to Data Conversion

STEP 3

Data Augmentation

STEP 4

Training CNN Model

STEP 5

Result Generation & Display

PROFILE TEAM HELP CONTACT

AGE:

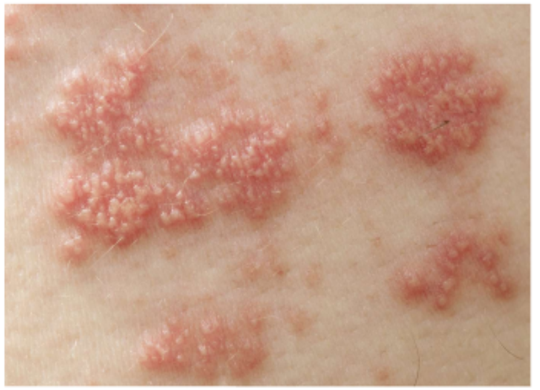
GENDER:

BODY PART:

Insert a picture of you skin condition for better diagnosis!

DONE

RESULTS!



Skin Condition: Eczema

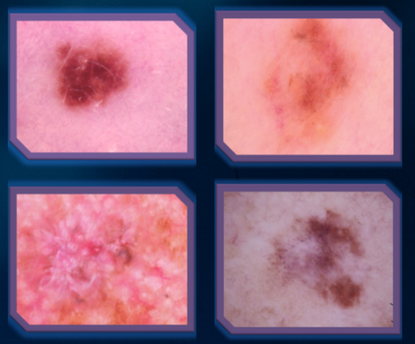
Medicine: Topical Steroids

Percentage Accuracy of Diagnosis: 95%

Recommended Hospital: Harmony Skin Center

IMAGE TO DATA CONVERSION

DATASET - We are using the HAM10000 dataset from Kaggle which consists of 10015 dermatoscopic images



•**Loading the image:** Initially, the image is loaded into memory using OpenCV's imread function. This ensures that the image is accessible and ready for further processing.

•**Preprocessing**: Preprocessing techniques are employed to standardize the image for compatibility with the CNN model. Common preprocessing steps include resizing the image to a fixed input size required by the model and potentially converting color spaces (e.g., from RGB to BGR).

•**Feature Extraction**: For some applications, feature extraction may be necessary. This involves identifying and extracting specific regions of interest or characteristics from the image, depending on the problem at hand. Common techniques include edge detection or feature mapping.

•**Reshaping and Formatting**: To feed the image into a CNN, it must be reshaped into the appropriate input tensor shape. This typically involves adding batch dimensions an d adjusting the number of color channels based on the model's requirements.

We are basically using a 3D matrix of 28 * 28 * 3 to represent each image . There are 3 channels of red , green , blue.

We will be dividing the dataset into three segments

1. Train 2. Test 3. Cross - Validation

ige	sex	localization
80	male	scalp
80	male	scalp
80	male	scalp
80	male	scalp
75	male	ear
75	male	ear

pixel0000	pixel0001	pixel0002	pixel0003	pixel0004	pixel0005	pixel0006	pixel0007	pixel0008	pixel0009	pixel0010	pixel0011	pixel001
192	153	193	195	155	192	197	154	185	202	162	192	208
25	14	30	68	48	75	123	93	126	158	128	158	172
192	138	153	200	145	163	201	142	160	206	149	165	207
38	19	30	95	59	72	143	103	119	171	125	134	177
158	113	139	194	144	174	215	162	191	225	179	214	232
8	1	3	19	5	10	26	8	13	34	13	24	100
194	147	137	197	148	139	197	148	132	200	154	142	202
161	121	105	169	128	119	172	129	116	176	134	125	181
125	84	85	165	114	118	181	120	125	188	133	142	189
228	179	194	227	174	191	226	165	182	215	157	175	206
23	13	16	22	12	14	29	20	24	76	63	65	127

DATA AUGMENTATION

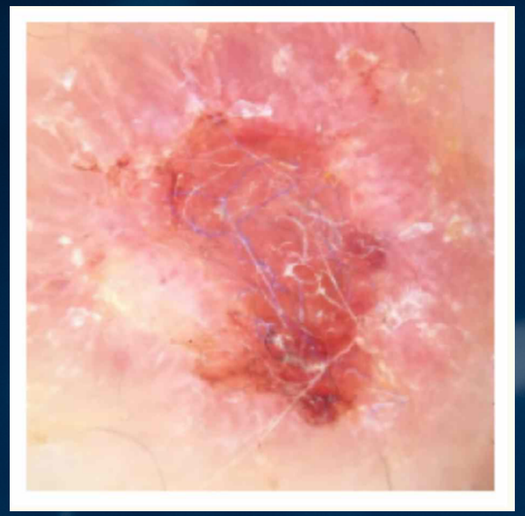
Data augmentation in machine learning is a technique used to artificially increase the size of a dataset by applying various transformations and modifications to the existing data. These transformations can include operations like rotation, scaling, cropping, flipping, adding noise, or changing brightness and contrast.

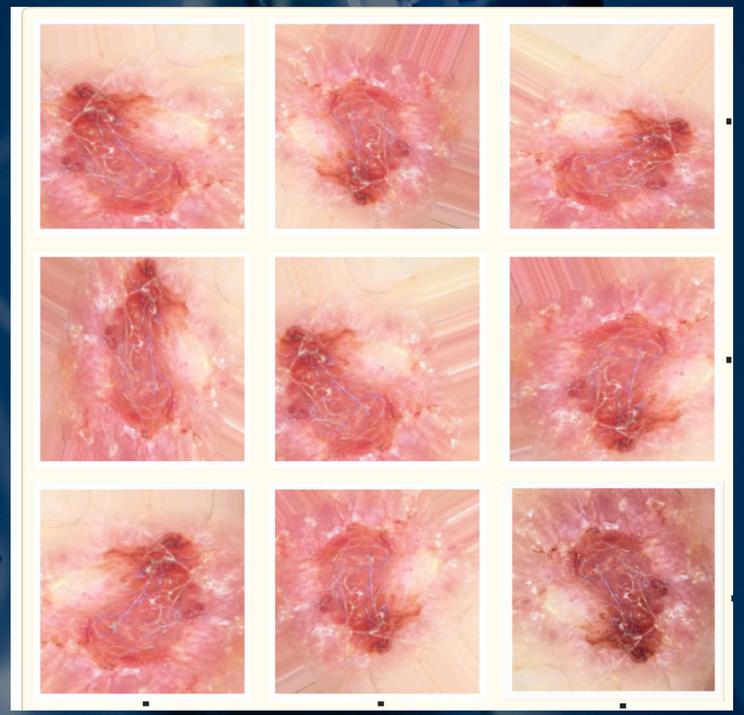
BENEFITS

1)Enhanced Model Performance by Reducing Overfitting

2)Improved Model Robustness

3)Reducing Data Collection Cost

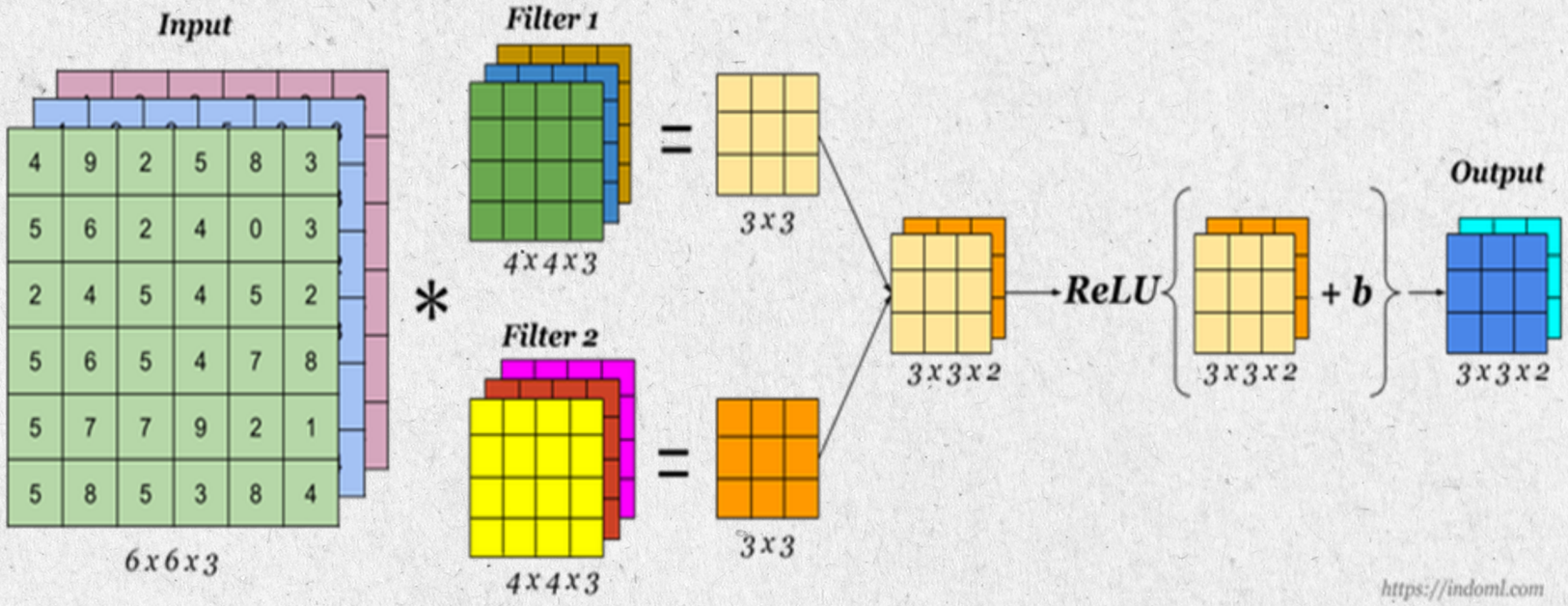




IMPLEMENTATION

Can be implemented using various libraries in Python. We will be using Keras preprocessing image library in Tensorflow. It has various functions like rotation, zoom, flip, contrast etc.

CONVOLUTION NEURAL NETWORK



ADVANTAGES OF CNN:-

1)Reduces the number of input nodes

2)Tolerates small shifts in the images

3)It takes the advantages of the image pixels correlations to classify images

4)For these features, the memory usage by the model parameters is low compared to the traditional network.

CONVOLUTION NEURAL NETWORK

Convolution operator:

The convolution operator works by applying a convolution operation between an input signal (or data) and a small filter (also known as a kernel or mask). The result of this operation is often referred to as the convolution output.

1. Input Data: You start with your input data, which can be a one-dimensional signal, a two-dimensional image, or even a higher-dimensional data structure.
2. Filter (Kernel): You also have a small filter (kernel) that you want to apply to the input data. The filter is typically a smaller matrix (or tensor) with learnable parameters.
3. Convolution Operation: The filter is systematically moved (convolved) over the input data. At each step, the filter is placed on a local region of the input data, and an element-wise multiplication is performed between the filter and the values in that region of the input data.
4. Summation: After the element-wise multiplication, the results are summed up. This sum represents the output value at that particular position of the convolution.