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Early Detection Skin Cancer Using Deep Learning

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ABSTRACT: Now a days many people were commonly affected due to skin cancer and there unable to fine the skin cancer in early stages due to this problem many people are casing sever attacks the treatment become very expansive in the last stages and also recover rate is also very low many of them can't affect these treatment

It is 13th most common cancer in men 15th most common cancer in women there are more than 1,50,000 new cases of melanoma of skin in 2020 the survival rate at stage 0,1,2 is 98.4% at stage 3 the serval rate is 63.6% at stage 4 the serval rate is 22.5%

Our software solution, leveraging artificial intelligence, machine learning, and image processing, addresses the challenge of early skin cancer identification. By analyzing skin abnormalities through advanced techniques, including Convolutional Neural Networks (CNNs), our system learns intricate patterns for early-stage detection. This approach enhances overall survival rates and minimizes the severity of interventions. The software, continuously improving through diverse datasets, also mitigates the shortage of skilled dermatologists.

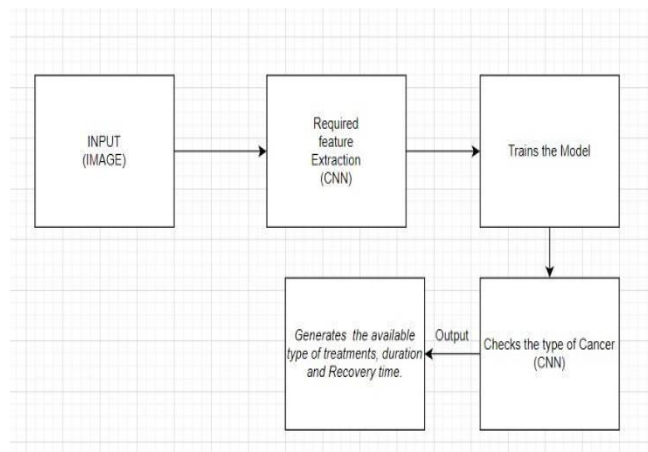
KEYWORDS: Image, Caption, CNN, LSTM, Neural Networks.

I. INTRODUCTION

In the field of machine learning, restrictions and limitations often revolve around ethical considerations, legal regulations, and specific application domains. Ethical guidelines may dictate how machine learning is applied in sensitive areas such as healthcare, finance, or criminal justice to ensure fair and unbiased outcomes. Legal frameworks may impose constraints on data privacy, security, and the use of certain algorithms.

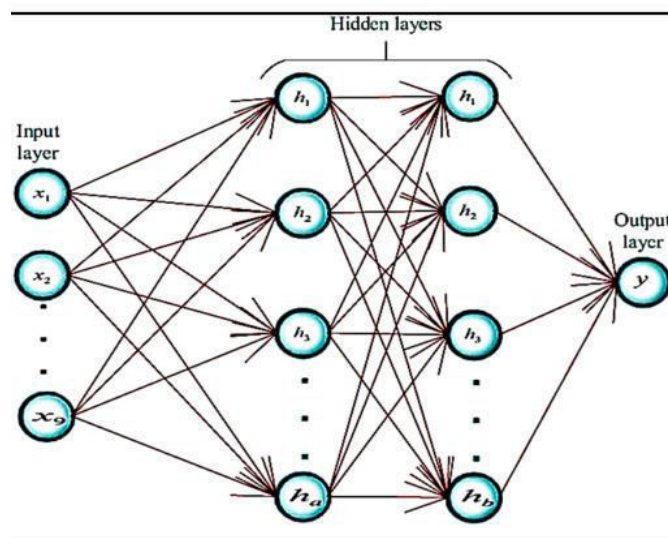
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Deep learning, a subset of machine learning, employs neural networks with multiple layers to automate the extraction of complex patterns from data. This approach is extensively utilized in diverse applications, including image recognition, natural language processing, and artificial intelligence. Despite its effectiveness, challenges may arise in terms of interpretability, computational complexity, and the need for substantial amounts of labelled data for training.



II. FEATURE EXTRACTION

Convolutional Neural networks are specialized deep neural networks that can process the data that has input shape like a 2D matrix. Images can be easily represented as a 2D matrix. CNN is crucial in working with images. It takes as input an image, assigns importance (weights and biases) to various aspects/objects in the image, and differentiates one from the other. The below Figure 3.3 demonstrates the architecture of CNN for object classification. The CNN makes use of filters which help in feature learning much the same as a human brain identifying objects in time and space. The architecture performs a better fitting to the image dataset due to the reduction in the number of parameters involved (from 2048 to 256) and the reusability of weights.



III. CNN METHODS

CNN Methods

In simple terms, a Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm which can take in an input skin image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. [11] A CNN has multiple layers of convolutions and activations, often pooling layers are interspersed within these. The network is trained using backpropagation and gradient descent as for standard artificial neural networks. CNNs typically would have fully connected layers at the end whence the final outputs will be computed.

A. Convolutional layers:

In the convolutional layers the activations from the previous

layers with skin images are convolved with a set of small

parameterized filters, collected in a tensor $W(j,i)$, where j is the filter number and i is the layer number. Each filter sharing the exact same weights across the whole input there is a drastic reduction in the number of weights that need to be learned. The motivation for this weight-sharing is that features appearing in one part of the image likely also appear in other parts.[9]. The tensor of feature maps is produced by applying all the convolutional filters in all locations.

B. Activation layer:

Through the nonlinear activation functions the feature maps produced in previous step are fed. This makes it possible to detect Skin cancer to approximate almost any nonlinear function by the entire neural network[12]. The activation functions are generally the very simple rectified linear units, or ReLUs, defined as $\text{ReLU}(z) = \max(0, z)$, or variants like leaky ReLUs or parametric ReLUs. Feeding the feature maps through an activation function produces new tensors, typically also called feature maps.

C. Pooling:

Each feature map produced by feeding the data through one or more skin cancer convolutional layer is then typically pooled in a pooling layer. Pooling operations take small grid regions as input and produce single numbers for each region. The number is usually computed by using the max function (max-pooling) or the average function (average pooling). Since a small shift of the input image results in small changes in the activation maps, the pooling layers gives the CNN some translational invariance[15]. Removing the pooling layers simplifies the skin care network architecture without necessarily sacrificing performance.

D. Dropout regularization:

It is an averaging technique based on stochastic sampling of neural networks. Neurons are randomly removed during training which ends up in slightly different networks for each batch of training data. The weights of the trained network are tuned based on optimization of multiple variations of the network[18].

E. Batch normalization:

Typically activation layers are placed before the batch normalization layers producing normalized activation maps. Inclusion of normalization forces the network to periodically change its activations to zero mean and unit standard deviation as the training batch hits these layers, which speeds up training .This also makes it less dependent on careful parameter initialization. [13]

IV. EXISTING SYSTEM

The current system for skin cancer identification involves individuals visiting a doctor to obtain reports and determine the stages of the disease. This traditional approach is expensive, making it financially challenging for the average person to cope with the associated costs. Patients must rely on healthcare professionals to assess and diagnose skin cancer, often requiring multiple visits and extensive medical examinations.

The reliance on this manual, resource-intensive process contributes to delays in diagnosis and treatment initiation. Additionally, the financial burden may discouraindividuals from seeking timely medical attention, impacting overall healthcare outcomes. There is a need for a more accessible and cost-effective system for skin cancer identification that can empower individuals to proactively manage their health.

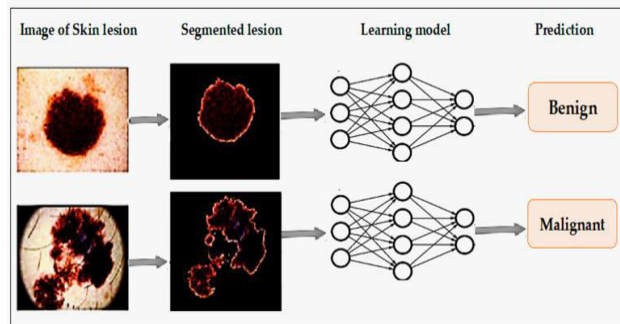
V. PROPOSED SYSTEM

The proposed system employs Convolutional Neural Networks (CNNs) to enhance skin cancer identification through image-based knowledge acquisition. Utilizing machine learning algorithms and advanced image processing techniques, the CNN-based system predicts skin cancer stages by analyzing patterns in input images. This innovative approach eliminates the need for extensive manual assessments, providing a quicker and more efficient means of diagnosis.

The integration of CNN ensures the extraction of hierarchical features crucial for accurate cancer stage predictions. Moreover, the system extends its functionality by suggesting the most suitable hospital based on the diagnosed stage and estimating the treatment cost. This comprehensive approach not only advances skin cancer detection but also facilitates informed decision-making for optimal patient care.

The implementation of Convolutional Neural Networks (CNNs) in our proposed system revolutionizes skin cancer identification by leveraging image-based knowledge acquisition. Machine learning algorithms and advanced image processing techniques empower the CNN-based system to predict skin cancer stages through pattern analysis in input images. This innovative approach accelerates diagnosis, eliminating the need for time-consuming manual assessments and providing a more efficient diagnostic process

The integration of CNN ensures the extraction of hierarchical features, enhancing the accuracy of cancer stage predictions. Going beyond identification, our system suggests the most suitable hospital based on the diagnosed stage and estimates treatment costs. This comprehensive functionality not only advances skin cancer detection but also facilitates informed decision-making, empowering patients and healthcare professionals alike for optimal patient care.



VI. SYSTEM ARCHITECTURE

Here we upload an image which is related to skin cancer, it will check for whether the image is skin image or not if it is a skin image then it will check for whether it has cancer or not if it has cancer it will check for type of skin cancer and it will give the information about the cancer like available type of treatments, duration and recovery time for it etc...

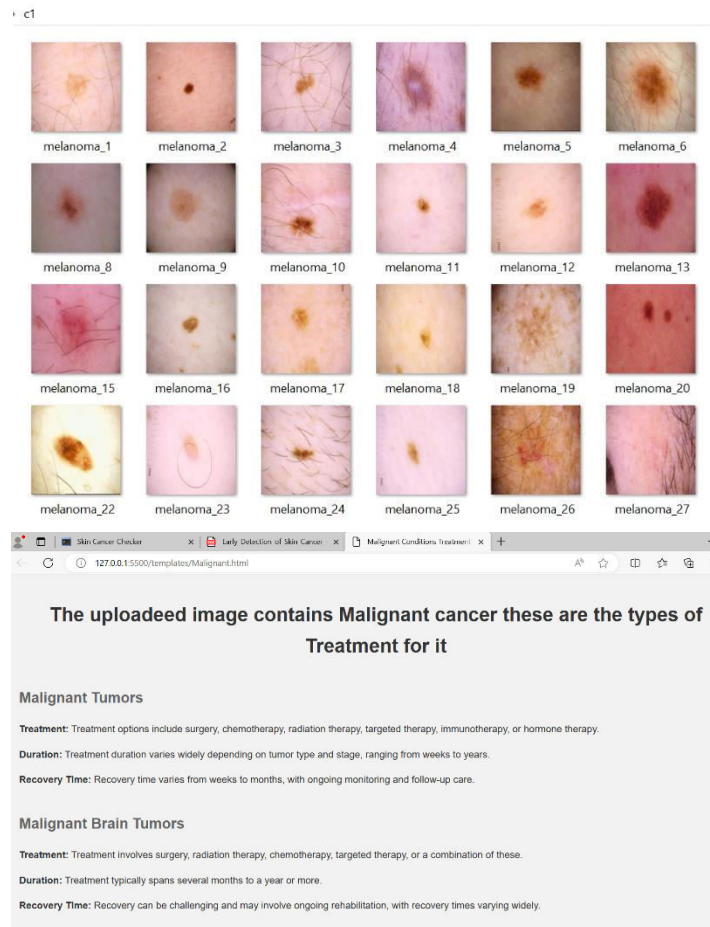


VII. LITERATURE

Skin cancer is a significant global health concern, with over 10 million new cases reported annually. Detecting this disease in its early stages is critical for improving survival rates. Artificial Intelligence (AI) holds promise in aiding early diagnosis through medical image analysis. However, AI systems for classifying skin lesions are still in early clinical stages, particularly in the context of the Indian subcontinent.

In our paper, we explore advancements in AI solutions for digital image-based computer vision in skin cancer diagnosis. We address the challenges and future opportunities in this field, focusing on improving early detection capabilities. Our research aims to bridge the gap in skin cancer diagnosis in the Indian subcontinent, where there's a lack of significant research efforts.

Utilizing the HAIS AI tool, we propose a computer-aided method employing computer vision and image analysis algorithms for skin cancer diagnosis, with enhanced accuracy. Our solution is tailored to the specific needs of the Indian subcontinent and is designed to be adaptable to various business requirements. By providing flexibility in adoption and use, we aim to facilitate widespread implementation of AI-driven solutions for skin cancer diagnosis, ultimately improving patient outcomes in this region.



VIII. CONCLUSION

In conclusion, our proposed deep learning model is used to identify the skin cancer at early stage so that many people can be saved from the threat of cancer. By mentioning the types of cancers, the ways of treatment, duration and recovery time we help many patients to learn more about the condition they are in. Thus Cancer can be detected at early stages and can be cured.

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