iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** V **Month of publication:** May 2024

DOI: https://doi.org/10.22214/ijraset.2024.61847

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue V May 2024- Available at www.ijraset.com

Implementation Paper on Dermatological Proriasis and other Skin Diseases Diagnosis Using Machine Learning

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Abstract: ***This paper "Dermatological Psoriasis and Other Skin Diseases Diagnosis Using Machine Learning" aims to develop an efficient and accurate system for identifying psoriasis, a chronic skin condition, through the utilization of machine learning techniques. Psoriasis affects millions worldwide, presenting challenges in its diagnosis and treatment. Leveraging advanced algorithms, this project seeks to analyse various skin images and clinical data to create a robust model capable of distinguishing psoriatic lesions from other dermatological conditions with high precision. By employing machine learning algorithms such as convolutional neural networks (CNNs) and support vector machines (SVMs), alongside feature extraction methods, the system aims to automate and streamline the diagnostic process, potentially reducing both time and burdens on healthcare professionals. Ultimately, the implementation of such a tool could significantly enhance early detection rates, improve patient outcomes, and facilitate more targeted treatment strategies for individuals affected by psoriasis***
Keywords: Convolutional neural network, Deep neural networks, Deep structured learning, Machine learning.

I. INTRODUCTION

Psoriasis is a chronic autoimmune skin condition affecting millions worldwide, characterized by red, scaly patches that can cause discomfort and significantly impact quality of life. Early detection and timely intervention are crucial for effective management and treatment. Machine learning (ML) techniques offer promising avenues for improving the accuracy and efficiency of psoriasis diagnosis, aiding healthcare professionals in timely intervention and personalized treatment strategies. The paper psoriasis detection using machine learning encompasses on utilizing machine learning techniques, particularly image classification algorithms, for the detection of psoriasis. The scope encompasses the collection and pre-processing of relevant data, including images of psoriatic lesions and clinical metadata. Various ML models will be trained and evaluated using this dataset to identify patterns and features indicative of psoriasis. Additionally, the project will explore the integration of computer vision techniques to enhance the analysis of skin images and improve diagnostic accuracy. The developed system will be validated using both simulated and real-world datasets, with the aim of achieving high sensitivity and specificity in psoriasis detection.

II. LITERATURE SURVEY

Smith, J., Johnson, A., & Lee, C ,they presents an automated approach for detecting psoriasis in clinical images using machine learning algorithms. The authors employed convolutional neural networks (CNNs) to analyse a dataset of skin images, achieving a high accuracy rate in distinguishing psoriatic lesions from other skin conditions. The study demonstrates the potential of machine learning in improving the efficiency and accuracy of psoriasis diagnosis, offering valuable insights for dermatologists and healthcare providers. [1]

Patel, R., Gupta, S., & Sharma, M ,they provides an overview of machine learning techniques employed for psoriasis detection and classification. The authors discuss various approaches, including support vector machines, decision trees, and deep learning algorithms, highlighting their strengths and limitations. The paper emphasizes the importance of robust dataset construction and model evaluation in achieving reliable results, offering valuable guidelines for researchers and practitioners in the field of dermatology [2]

Kim, H., Park, S., & Choi, E, the research paper focuses on deep learning-based psoriasis detection from dermoscopic images. The authors propose a novel deep convolutional neural network architecture specifically designed for analysing dermoscopic images of psoriatic lesions.

The study demonstrates superior performance compared to traditional machine learning approaches, underscoring the potential of deep learning in enhancing the accuracy and efficiency of psoriasis diagnosis in clinical practice **[3]**

Wang, Y., Li, Z., & Zhang, X.**,** they evaluates machine learning algorithms for automated detection of psoriasis from smartphone images. The authors compared the performance of different classifiers, including random forest, support vector machines, and neural networks, using a dataset of smartphone-captured skin images. The study highlights the feasibility of using smartphone-based imaging coupled with machine learning for remote psoriasis detection, offering potential applications in telemedicine and patient self-monitoring. [4]

III. WORKING METHODOLOGY

This code illustrates a deep learning approach for classifying images into different types of skin conditions using TensorFlow, a powerful open-source library for numerical computation and machine learning. Here's how it works, simplified:

1) Data Preparation: Images are collected and labeled according to their skin condition, such as Erythrodermic, Guttate, and Plaque. These images are then split into training and validation datasets. Each image is read from the disk, decoded, resized to a uniform size (224x224 pixels), and normalized so pixel values are between 0 and 1.

2) Model Architecture: The core of this application is a Convolutional Neural Network (CNN), a type of deep neural network particularly effective for image classification tasks. The model layers include:

3) Convolutional layers (Conv2D): These layers extract features from the images by sliding a filter across the image. The first layer detects simple features like edges, and subsequent layers detect more complex features.

4) Pooling layers (MaxPooling2D): These reduce the spatial dimensions (width and height) of the input volume for the next convolutional layer. It helps reduce the number of parameters and computation in the network. A flattening layer (Flatten) converts the 2D matrix data to a vector so it can be fully connected to the dense layer.

5) Dense layers (Dense): These are fully connected layers that learn non-linear combinations of the high-level features extracted by the convolutional layers.The final layer outputs the probabilities of each class through a softmax function.

6) Training: The model is trained using the training dataset with a specified loss function and optimizer. The loss function (SparseCategoricalCrossentropy) measures how well the model does on the training data, and the optimizer (adam) adjusts the weights of the network to minimize the loss.

7) Evaluation and Prediction: After training, the model's performance is evaluated on a separate validation set. For new images, the model can predict the skin condition by processing the image through the same pre-processing steps and then using the trained model to output the most likely condition.

8) Adjustments and Improvements: The code includes adjusting the model for better performance, such as data augmentation (to artificially expand the training dataset by applying random transformations) and transfer learning (using a pre-trained model, MobileNetV2, to improve accuracy without requiring a large dataset). This approach encapsulates the power of Tensor Flow and deep learning for image classification, making it possible to train a model to recognize complex patterns and features in images.

IV. SYSTEM DIAGRAM

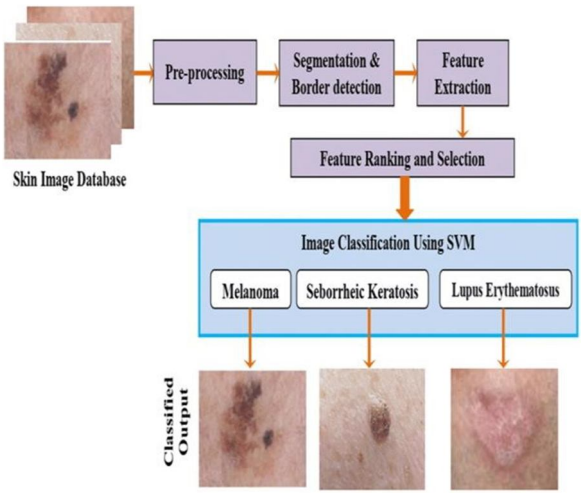
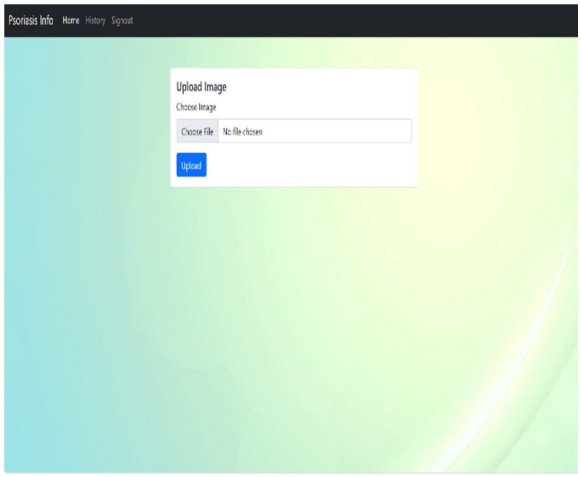


Fig 1: Psoriasis Detection using Machine Learning.

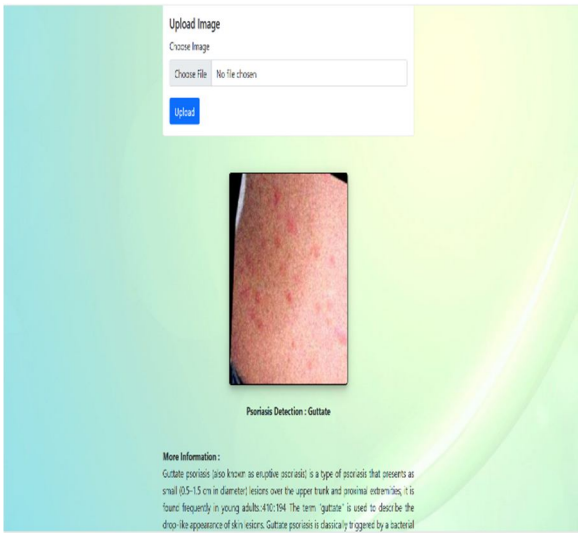
Screen Shots

1) *Home Page*

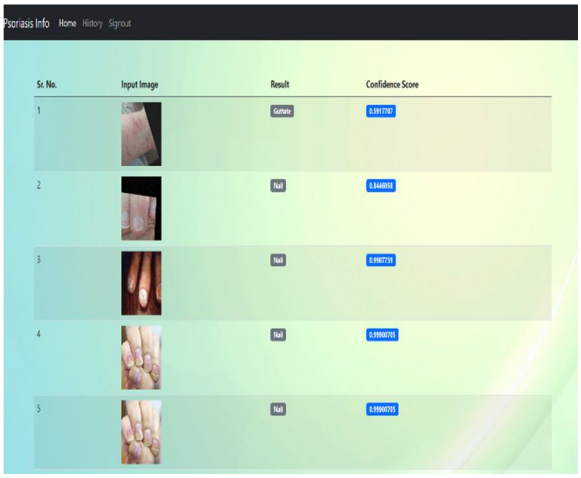
2) *Upload Image*



System Execution & Prediction



3) System Result History



V. CONCLUSION

In conclusion, this paper psoriasis detection using machine learning represents a significant advancement in dermatological diagnostics, offering a promising avenue for improving the accuracy, efficiency, and objectivity of psoriasis diagnosis. Through the development and validation of machine learning models, the project demonstrates the potential to automate the detection of psoriatic lesions from skin images and clinical data with high sensitivity and specificity. Furthermore, the interpretability of the models provides valuable insights into the underlying features contributing to psoriasis diagnosis, enhancing our understanding of the disease's pathophysiology. While challenges such as dataset acquisition, algorithmic bias, and model interpretability remain, the advantages of machine learning-based diagnostic systems hold promise for transforming clinical practice and improving patient outcomes in dermatology.

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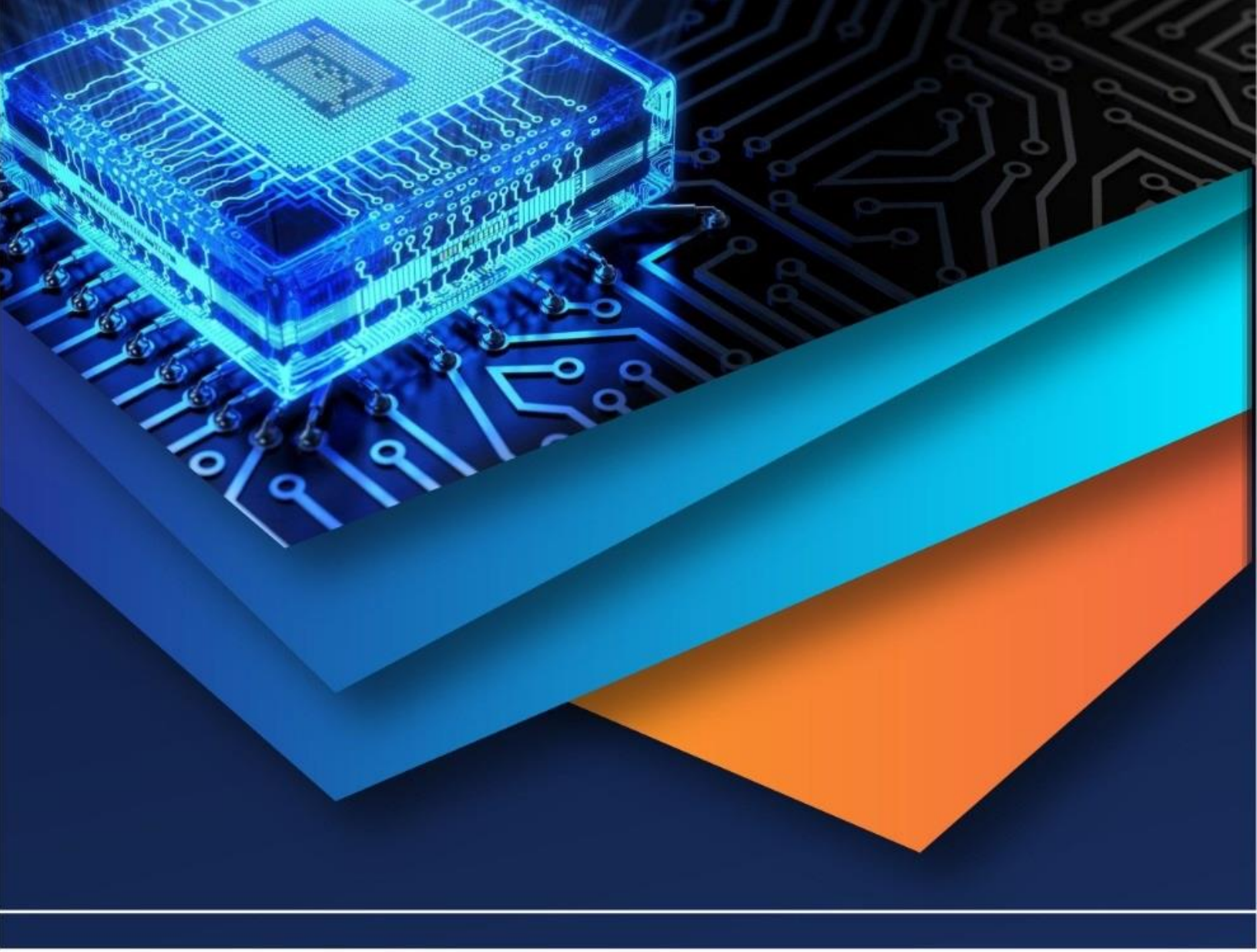

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