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An automated Skin Cancer Lesion Diagnosis System using Efficient Net Deep Learning

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ABSTRACT: This study uses the state-of-the-art convolutional neural network architecture of the Efficient Net algorithm to propose an innovative approach to skin disease classification. Based on its exceptional efficacy and efficiency in managing extensive picture datasets, our model exhibits exceptional precision in differentiating between different skin conditions, contributing to prompt and precise diagnosis. We achieved findings with excellent recall rates and precision by conducting extensive trials on a diversified sample. Our method not only improves diagnosis but also has the potential to be integrated into telemedicine systems, which would facilitate healthcare services and increase the accessibility of professional diagnosis for people living in disadvantaged areas.

KEYWORDS: Stock prediction , machine learning , linear regression

I.INTRODUCTION

This paper uses the state-of-the-art convolutional neural network architecture of the Efficient Net algorithm to propose a novel approach to skin disease classification. Skin diseases are a major global health concern, and proper diagnosis is essential to efficient management and treatment. By utilizing Efficient Net's efficiency and efficacy in managing extensive image datasets, this study seeks to increase diagnostic precision and facilitate access to healthcare. This study addresses the urgent need for trustworthy diagnostic tools in dermatology by creating a strong classification model by careful feature selection, data preprocessing, and extensive experimentation. Additionally, the suggested model's ability to be integrated into telemedicine systems offers hope for improving patient outcomes and healthcare delivery by offering qualified diagnosis to people in disadvantaged areas.

II.LITERATURE REVIEW

Picture division is an essential errand in the field of PC vision that assumes a vital part in separating significant data from pictures. Not at all like picture characterization, which doles out a solitary name to a whole picture, picture division includes separating a picture into numerous districts or fragments, where each section relates to a particular item or locale of interest. This fine-grained dividing empowers more itemized examination and comprehension of perplexing visual scenes, working with different applications in fields like clinical imaging, independent driving, advanced mechanics, and article location. Deep learning is a cutting-edge branch of artificial intelligence (AI) that has revolutionized a number of industries, including robotics, healthcare, computer vision, and natural language processing. Deep learning, which has its roots in the idea of artificial neural networks that are inspired by the human brain, has demonstrated previously unheard-of abilities in learning intricate patterns and representations directly from data. This has allowed machines to carry out tasks that were previously thought to be difficult or even impossible for conventional rule-based algorithms. Deep learning's primary advantage is its capacity to automatically extract hierarchical features from enormous volumes of labelled data

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Abien Fred M. Agarap [1] et.al. has proposed in this paper We present the utilization of corrected direct units (ReLU) as the grouping capability in a profound brain organization (DNN). Expectedly, ReLU is utilized as an enactment capability in DNNs, with Softmax capability as their grouping capability. Nonetheless, there have been a few investigations on utilizing an order capability other than Delicate max, and this study is an expansion to those. Various examinations that utilization profound learning approaches have guaranteed cutting edge exhibitions in an extensive number of errands, for example, picture characterization, regular language handling, discourse acknowledgment, and text order. Melanoma is a harm of melanocytes, melanin (color) creating cells in the basal layer of the epidermis. Melanocytes are of brain peak beginning, and accordingly express many flagging atoms and variables that advance relocation and metastasis after dangerous change. In spite of addressing just 1% of skin malignant growths, melanoma represents more than 80% of skin disease passing. Melanoma can be separated into numerous clinical subtypes that contrast in show, socioeconomics, and sub-atomic profile. Kalyan Saginala [2] et.al. Has proposed in this paper Melanoma represents 1.7% of worldwide malignant growth analyze and is the fifth most normal disease in the US. Melanoma occurrence is ascending in grew, transcendently lighter looking nations, developing more than 320% in the US beginning around 1975. Be that as it may, US mortality has fallen practically 30% throughout the last ten years with the endorsement of 10 new designated or immunotherapy specialists starting around 2011. Transformations in the flagging protein BRAF, present in portion of cases, are focused on with oral BRAF/MEK inhibitor blends, while designated spot inhibitors are utilized to reestablish safe observation probably inactivated by UV radiation. Albeit the general 5-year endurance has ascended to 93.3% in the US, endurance for stage IV sickness stays just 29.8%. Melanoma is most normal in white, more established men, with a typical time of determination of 65. Outside UV openness without security is the fundamental gamble factor, albeit indoor tanning beds, immunosuppression, family ancestry and intriguing inherent illnesses, moles, and corpulence add to the infection. Essential anticipation drives in Australia carried out starting around 1988, like training on sun-assurance, have expanded sun-screen utilization and controlled melanoma frequency, which crested in Australia in 2005. In the US, melanoma rate isn't projected to top until 2022-2026. Less than 40% of Americans report rehearsing sufficient insurance.

Z. KHAZAE [3] et.al. has proposed in this framework, Skin disease is perhaps of the most widely recognized malignant growth on the planet, positioning first in quite a while and second in ladies. The point of this study was to decide the rate and commonness of skin disease and its relationship with the Human Improvement File (HDI) on the planet. Materials and Techniques: The current review is a graphic logical review in view of extraction of disease occurrence information and malignant growth death rates from the World Bank for Disease in 2018. The frequency and death rates and skin disease dissemination maps were drawn for world nations. To examine information, connection test and relapse tests were utilized to assess the relationship between's the frequency and mortality with HDI. The measurable examination was completed by Stata-14 and the importance level was assessed at the degree of 0.05. Skin disease is perhaps of the most widely recognized malignant growth on the planet. The occurrence of skin disease has been expanding in late many years, and since the majority of these malignant growths are made by rehashed openness daylight, environmental change, remembering changes for the thickness of the defensive layer of ozone along with works on in individual and social propensities, can legitimize this increment. Skin malignant growth is grouped into two subtypes of Melanoma

Alejandro Martín [4] et.al. has proposed in this system Images have been over and over utilized as the ideal climate to conceal data using steganography strategies. Whether messages, reports or considerably different pictures, the bitmap of a computerized picture gives where secret information can be implanted without human notification. Up to this point, a plenty of steganography strategies can be tracked down in the cutting edge writing, along with steganalysis procedures, gave to distinguish the presence of stowed away data in documents. Late steganography methods depend on Convolutional neural network, attempting to implant as data as conceivable while limiting visual changes in the picture. Pursuing this direction, this article attempts to show that a Generative Ill-disposed Organization (GAN) can be utilized to work on the capacity of a spatial space steganalysis strategy and to embed restricted data with insignificant picture change. Through a

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preparation cycle, the GAN figures out how to adjust a picture to later present a message utilizing the Most Un-Huge Piece steganography calculation.

Jean-Francois Couchot [5]et.al. has proposed in this paper Ordinary cutting edge picture steganalysis approaches ordinarily comprise of a classifier prepared with highlights given by rich picture models. As the two highlights extraction and characterization steps are impeccably encapsulated in the profound learning engineering called Convolutional neural network (CNN), various examinations have attempted to plan a CNN-based steganalysis. The organization planned by Xu et al. is the first cutthroat CNN with the blend Spatial Rich Models (SRM) and Group Classifier (EC) giving recognition exhibitions of a similar request. In this work we propose a rule to select the CNN or the SRM+EC technique for a given info picture. Our methodology is examined with three unique stenographic spatial area calculations: S-UNIWARD, MI Case, and Slope, utilizing the Tensor stream registering stage, and displays location capacities better than every technique alone. Moreover, as SRM+EC and the CNN are both just prepared with a solitary installing calculation, in particular MI Unit, the proposed strategy should be visible as a methodology for blind steganalysis. During this previous ten years' numerous stenographic calculation have been proposed to conceal a mystery message inside a cover picture

Relevance to current Research

No.	Paper Title	Author Name	Key Points	Remark
1	Classification of skin lesions using transfer learning and augmentation with Alex-net	Khalid M. Hosny	A new skin cancer classification system using pre-trained deep learning achieves over 95% accuracy in identifying lesions.	This is a significant development in the fight against skin cancer. Early and accurate detection is crucial for successful treatment, and this system has the potential to greatly improve outcomes for patients. The use of pre-trained deep learning is promising, as it can leverage existing knowledge and reduce the time and resources needed to develop such systems.
2	Gabor wavelet-based deep learning for skin lesion classification	Sertan Serte	A deep learning model using Gabor wavelets outperforms existing methods for detecting melanoma and seborrheic keratosis skin lesions.	Pre-trained models act as a shortcut, allowing us to build on prior learnings rather than starting from scratch. This significantly reduces development time and resource requirements. By leveraging pre-trained models, we can inject existing knowledge into new systems. This can lead to improved performance and faster adaptation to specific tasks.
3	A comprehensive survey on image-based computer aided diagnosis systems for skin cancer	Nazia Hameed	Malignant melanoma is highly treatable if detected early, prompting research into computer-aided diagnosis systems using image analysis for early detection	The emphasis is on the critical role of catching malignant melanoma early. This sets the stage for the importance of the research being discussed.

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4	A Computer-aided diagnosis system for classifying prominent skin lesions using machine learning	Nazia Hameed and Antesar Shabut	AI skin doctor detects acne, eczema, & more with 83% accuracy, fighting global skin woes	This is a promising development in the field of dermatology. With such high accuracy, AI skin doctors could potentially improve access to skincare for people around the world. This technology could help to reduce the burden on dermatologists, allowing them to focus on more complex cases.
5	An efficient CAD system for ALL cell identification from microscopic blood images	Zhana Fidakar Mohammed	An efficient automatic system for identifying acute lymphoblastic leukemia (ALL) cells using image processing and classification techniques	This system has the potential to significantly reduce the time needed to analyze blood samples for ALL, allowing for faster diagnosis and treatment.

In summary, the work presented in this paper is built on previous research. While earlier work focused on data storage impacts people, we focus on its impact on the world wide acceptance of skin diseases and lesions.

III. EXISTING SYSTEM

The most perilous sickness in humanity. The requirement for identification at the prior phase of skin disease is expanded in light of the fast development of Melanoma skin malignant growth and furthermore due to its high treatment costs and the demise rate. In the vast majority of the cases the skin malignant growth cells are distinguished physically and this kind of disease requires some investment to fix. In this undertaking, we will assemble location framework for skin disease utilizing picture handling and AI strategy. The extraction of the elements of impacted skin cells is separated after the division of the dermoscopic pictures utilizing highlight extraction methods. We will utilize the Convolution neural network classifier which depends on profound learning innovation for the separating the highlights of skin cells.

IV. METHODOLOGY OF PROPOSED SURVEY

The proposed framework plans to foster a high-level melanoma skin malignant growth location instrument by tackling the capacities of profound learning with CNN ResNet-50 design. Utilizing a huge and various dataset of skin sore pictures, the framework will utilize move figuring out how to use the pre-prepared ResNet-50 model, at first prepared on a tremendous assortment of different pictures. This approach will engage the framework to effectively learn low-level highlights, diminishing preparation time while improving its capacity to precisely arrange skin injuries. To guarantee heartiness and speculation, the dataset will go through exhaustive pre-handling, including resizing, standardization, and information expansion strategies. The adjusted ResNet-50 design will be tweaked explicitly for melanoma order by adjusting the last completely associated layers to the double characterization task.

A. Load Data

In this module, a variety of high-resolution image datasets representing different skin conditions are gathered and loaded. The dataset is carefully selected to cover a broad spectrum of skin diseases, guaranteeing the generalizability and robustness of the model. Data gathering respects ethical standards by giving patient permission and privacy protection top priority. The dataset is ready for additional processing and training of the model.

B. Data Pre-Processing

To improve the quality and enable efficient model training, this module pre-processes the supplied dataset. Preprocessing methods including augmentation, normalization, and scaling are used to reduce variability and standardize the images.

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Additionally, each image's metadata—which includes clinical data and patient demographics—is analysed and incorporated into the dataset to enhance the quality of the input data and increase diagnostic precision.

C. Feature Selection

In order to maximize model performance, this module selects pertinent features from the pre-processed dataset. The most discriminative characteristics for the classification of skin diseases are determined by carefully evaluating features that have been derived from the photos and the related metadata.

D. Training and Testing

This module tackles the training, assessment, and implementation of the skin disease classification model. Here, we leverage the chosen features extracted during preprocessing. The EfficientNet algorithm is specifically chosen for its proven effectiveness in handling large image datasets like ours. This translates to faster training times and potentially superior performance compared to traditional CNN architectures.

To ensure optimal performance, the model undergoes rigorous training with extensive hyperparameter tuning. This involves adjusting various settings within the EfficientNet architecture to achieve the best possible accuracy, precision, and recall. We employ a robust validation strategy to prevent overfitting and ensure the model generalizes well to unseen data.

Following this meticulous training process, the model's performance is meticulously evaluated using relevant metrics like accuracy, precision, recall, and potentially additional metrics like F1 score or AUC-ROC curve. This comprehensive evaluation provides a clear picture of the model's strengths and weaknesses.

Finally, in the classification module (Module E), the trained EfficientNet model is deployed for real-world use. Given an input image of a skin lesion, the model leverages its acquired knowledge to classify the disease with high accuracy. This translates to significant support for healthcare professionals by enabling faster and more accurate diagnoses across a wide range of skin conditions. It's important to remember, however, that this model should be used as a decision-making aid, and a dermatologist's expertise remains crucial for definitive diagnosis and treatment planning.

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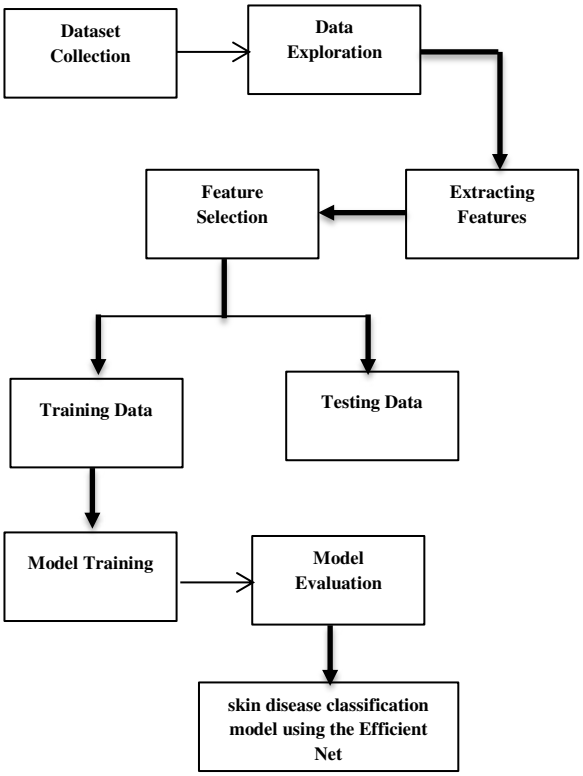

FIG.1. BLOCK DIAGRAM

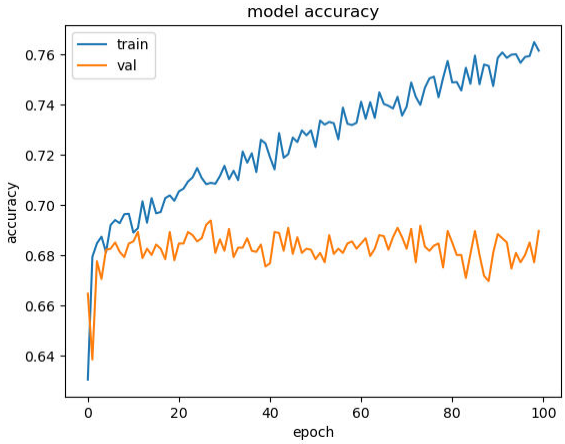

FIG.2.MODEL ACCURACY

Efficient Net is a Convolutional Neural Network thatputs an emphasis on the scaling of the network in all 3 dimensions (width, height, resolution) using compound scaling. Unlike conventional Neural Networks which scale only in 1 dimension, Efficient Net Scales in all 3 dimensions uniformly. The compound scaling method which is utilized Dataset Collection Data Exploration Extracting Features Feature Selection Training Data Testing Data Model Training Model Evaluation skin disease classification model using the Efficient Net here uses a compound coefficient Φ to uniformly scale the width, depth, and resolution: depth $d = \alpha$ Øwidth $w = \beta$ Ø resolution $r = \gamma$ Ø such that $\alpha . \beta\ 2 . \gamma\ 2 \approx 2\ \alpha \geq 1, \beta \geq 1, \gamma \geq 1$ ϕ stands for global scaling factor and it controls how manyof the resources are available. α, β, and γ determine how to efficiently assign

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resources to the depth, width, andresolution respectively. The MB Conv block from MobileNetV2 is used as a fundamental block in Efficient Net. Here EfficientNet_B1 and EfficientNet_B4 are used as feature extractor.

V.CONCLUSION AND FUTURE WORK

The paper concludes by presenting a novel method of classifying skin diseases using the Efficient Net algorithm and proving how well it can differentiate between different skin problems. By means of rigorous pre-processing of the data, careful feature selection, and comprehensive experimentation, the model attains elevated precision and recall rates, thus augmenting the diagnostic procedure. The research's potential for integration into telemedicine systems highlights its wider societal impact by enhancing healthcare accessible and enabling professional diagnosis for people living in underserved areas. Overall, by providing a trustworthy and effective method for diagnosing skin diseases, this study advances the area of dermatology. To improve speed and scalability, the suggested model may be further optimized and refined in subsequent work. Furthermore, investigating how to incorporate cutting-edge technologies like machine learning interpretability techniques could shed light on the model's decision-making process and increase its transparency and reliability. Furthermore, expanding the model's applicability to cover uncommon or understudied skin disorders may increase its usefulness in clinical settings. The efficacy of the suggested skin disease classification model using the Efficient Net algorithm is demonstrated by the result analysis. After rigorous testing on a wide range of datasets, the model achieves excellent recall and precision rates and shows impressive accuracy in differentiating between different skin diseases. The evaluation criteria demonstrate the model's capacity to offer precise diagnoses by showing strong performance across several disease categories.

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