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Skin cancer detection: A review using AI techniques

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Abstract---Pollution, an unhealthy lifestyle, UV radiation, and other factors can contribute to skin cancer. A variety of machine learning techniques have been developed in the past to detect such malignancies before they worsen. The goal of this article is to utilize a convolutional neural network to segment skin lesion images. The purpose of this study is to see how deep learning may be utilized to segment skin lesion photos. People may discover what skin diseases they may have, how to protect themselves from it, and what measures they can take early on to successfully treat the disease using Artificial Intelligence. Machine learning may be used to diagnose the problem and help us predict the result. The most widely used classification technology is the support vector machine. The discoveries might help doctors treat sickness early on and avoid further deterioration.

Keywords---image segmentation, convolutional neural network, skin cancer.

Introduction

Skin cancer is a rare and serious disease that should be detected as soon as possible. It can be present with a variety of symptoms and forms. It can be

present in anyone of any age group and, if not treated promptly, could be fatal. Skin cancer affects one out of every six persons. It is a disease that affects the body in a variety of ways and causes some body cells to grow fast and uncontrollably, spreading to other parts of the body. Cancer can arise from any of the billions of cells that make up the human body. Overexposure to sunshine has been linked to an increase in sickness, according to medical authorities. Artificial intelligence refers to a robot whose ability to accomplish tasks is controlled by a computer commonly associated with intelligent intelligence and judgement. Artificial Intelligence (AI) for skin cancer detection is a cost-effective and technologically advanced method that can save lives. This paper's work focuses on a review of skin cancer detection that aids in our understanding of the disease and its detection using Machine Intelligence. Python and AI are important parts of the study because they assist us understand how it works and other strategies. The task is divided into three tiers, each of which aids us in comprehending the technique in a clear and accurate manner.

Artificial Intelligence in detection of Skin Cancer

Deep learning neural networks are widely used in the detection of skin cancer. It is comprised of a series of inter connected nodes. Its shape and structure is comparable to that of a normal human brain in comparison terms of neuronal connections. Its nodes collaborate to tackle specific issues. Machine learning neural networks are computer programmers that are programmed to do certain tasks. They function as pro in the areas for what they were programmed. In current research, neural networks were taught and trained and coached to categorise images and differentiate of the different skin related cancer cells. International Skin has a variety of skin lesions. For skin cancer detection, we looked into various learning approaches such as ANN, CNN, and KNN.

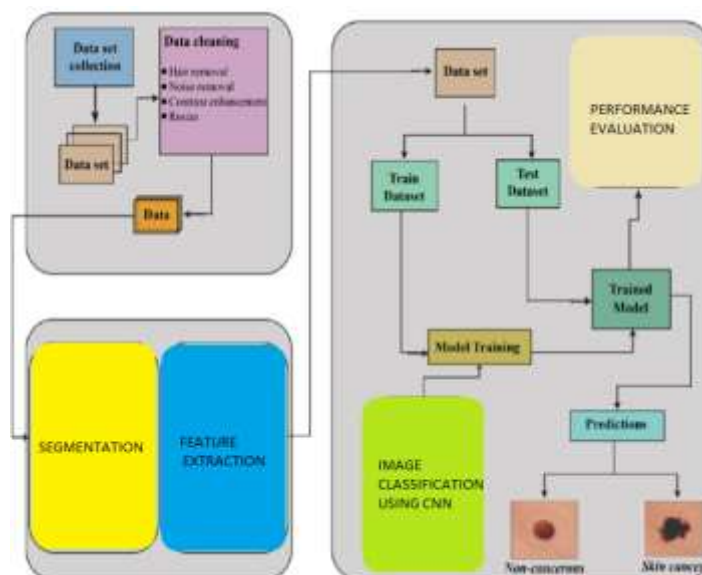


Fig. Skin Cancer Detection Process

Discussions

1. Artificial Intelligence-Based Image Classification for Diagnosis of Skin Cancer: Challenges and Opportunities (By: Manu Goyal¹, Thomas Knackstedt², Shaofeng Yan³, and Saeed Hassanpour⁴) They discuss advances in computerized image-based AI problem solving for skin cancer detection, as well as possible hurdles with future possibilities to develop these AI based systems to aid dermatologists in skin cancer diagnosis. They came to the conclusion that in the physical world, ethnic identity, epidermis, tresses, and eye colour, profession, disorder, medications, already present sun damage, the amount of nevi, and lifestyle habits (such as sunlight exposure, smoking, and intake of alcohol), clinical history, respond effectively to diagnoses, and other knowledge from the affected person's chart must all be considered. But at the other hand, today's deep learning algorithms rely on clinical imaging data. When such algorithms are used to skin lesions or diseases which are not included in the training dataset, they typically lead to a misdiagnosis. The study also looks into the possibilities of creating effective algorithms to help physicians diagnose skin cancer. Computer vision and dermatological associations must collaborate to enhance current AI solutions and increase the diagnostic dependency and correctness of techniques used for skin cancer diagnosis. AI has the ability to revolutionize skin cancer diagnostics, resulting in a more cost-effective, remote-accessible, and more efficient healthcare facilities.
2. Skin Cancer Detection: Using Deep Learning Techniques (By: Mehwish Dildar ¹, Shumaila Akram ², Muhammad Irfan ³, Hikmat Ullah Khan ⁴, Muhammad Ramzan ^{2,5}, Abdur Rehman Mahmood ⁶, Soliman Ayed Alsaari ⁷, Abdul Hakeem M Saeed ⁸, Mohammed Olaythah Alraddadi and Mater Hussen Mahnashi) The research presents a thorough examination of machine learning algorithms for early skin cancer diagnosis. The study looked at research articles on skin cancer diagnosis that were published in respectable journals. The discoveries of this research are put together in the form of tools, graphs, tables, methods, and frameworks to help comprehension. The review provides an overview on ANNs, CNNs, KNNs, and RBFNs for lesion image discrimination. The majority of computer - aided diagnostic research keeps focus on identifying if a certain lesion picture is cancerous. When a diseased asks about a specific skin cancer symptom that has appeared on any region of the body, studies aren't always able to offer a clear response. So far, the study has concentrated on the small subject of signal picture categorization.
3. Deep Learning Solutions for Skin Cancer Detection and Diagnosis (By: Hardik Nahata and Satya P. Singh) The study's objective was to find a skin cancer detection CNN model that can differentiate between different forms of skin cancer and be helpful in finding the cancer in the early stage. The CNN classification model will be developed with Keras and Tensorflow in Python on the backend. Convolutional layers, Drop - outs layers, Pooling layers, and Thick layers, amongst many others, are used to update the parameters, and the model is built and assessed using multiple network topologies. The model will use Transfer Learning techniques to achieve standard developed. The model will be assessed and trained using data from the ISIC competition archives. It also looked into using data augmentation as a

preprocessing step to improve the CNN model's differentiation resilience. InceptionResnet, the best model, with an average accuracy of 91 percent.

4. Skin Cancer Detection using Machine Learning Techniques (By: Vidya M. and Dr. Maya V Karki) Hybrid feature extraction was utilised in this work to identify skin lesions as benign or melanoma. Machine learning techniques are used to detect skin lesions automatically using the ABCD rule, GLCM, and HOG for feature separation and differentiation. For skin lesion segmentation, the GAC approach was suggested. The segmentation resulted in a JA of 0.9 and a DI of 0.82. Color, uniformity, and dimension of skin lesions, skin lesions textures GLCM, and shape, edge of skin lesions HOG were all produced using the ABCD rule. Multiple machine learning and deep learning methods, such as SVM, KNN, and Nave Bayes, were introduced to deal with classification. The proposed approach was tested on ISIC datasets' skin lesion images. When compared to other classification algorithms, SVM surpasses them with an AC of 97.8% and an AUC of 0.94. Utilizing KNN, the overall sensitivity were 86.2 percent and 85 percent, respectively.
5. Machine Learning in Dermatology: Current Applications, Opportunities, and Limitations (By: Stephanie Chan. Vidhatha Reddy . Bridget Myers . Quinn Thibodeaux . Nicholas Brownstone . Wilson Liao) The goal of this work was to give a handbook for dermatologists to guide or elucidate the foundations of machine learning and its vast variety of usage so that they could better assess its possible benefits and drawbacks. In dermatology, machine learning has a lot of possibilities, from diagnostics to forecasting more effective and safer therapies. Dermatologists would need to learn how to use this innovation as it develops. How ML works, as well as how and where it can and must be applied in a clinical situation. While machine learning approaches are effective, they are nonetheless similar to earlier clinical tools in that physician evaluation is required for in practice usage. We must also be aware of how hidden biases may impede with the algorithms' black - box testing character. It's also critical to make these technologies accessible to people with different skin tones. Further ML research should be inclusive, with algorithms and datasets made publicly available for validation and testing. Prior to bringing a product to market, it should undergo thorough peer-reviewed randomized clinical trials. Overall, more dermatologists need to be involved in the progression, advancement and testing of ML if the technology is to be helpful and physiologically important.
6. Human-computer collaboration for skin cancer recognition. (By: Philipp Tschandl, Christoph Rinner, Zoe Apalla, Giuseppe Argenziano, Noel Codella, Allan Halpern, Monika Janda, Aimilios Lallas, Caterina Longo, Josep Malvehy, John Paoli, Susana Puig, Cliff Rosendahl, H. Peter Soyer, Iris Zalaudek and Harald Kittler) The writers and discoverers of this study expand on previous advancements in image-based AI for skin cancer finding accuracy to look at the implications of numerous interpretations of AI-based assistance over a variety of clinical skill levels and health processes. They observed that strong AI-based clinical judgement call support improves diagnostic accuracy more than AI or physicians alone, and that AI-based aid is most beneficial to clinicians with the least experience. They also observed that AI-based more than one class chances over performed CBIR representations of AI in the setting of mobile technology, and that AI-based assistance was beneficial in simulations of second views and telemedicine

triage. They also found that AI may deceive a wide range of doctors, including experts, highlighting the potential benefits of high-quality AI through fraudster clinicians.

Conclusion and Future Work

Numerous AI or machine learning strategies for skin cancer identification and bifurcation were discussed in this systematic review research. These methods are all non-invasive. In the diagnosis of skin cancer, preparation and image fragmentation are preceded by careful extraction and categorization. This review concentrates on ANNs, CNNs, KNNs, and RBFNs for lesion image categorization. The most important factor in achieving the best results is choosing the right classification technique. When it comes to identifying picture data, however, CNN outperforms other types of neural networks since it has a stronger connection to computer vision than the others. The majority of skin cancer identification and detection research focuses on identifying if a certain lesion picture is cancerous or not. Existing research, on the other hand, is unable to offer a response when a affected person inquires about a specific skin cancer symptom that is visible on any part of their body.

The study has so far been limited to the subject of signal picture classification. To find an answer to the topic that frequently occurs, future research could use full-body photography. The image acquisition phase will be automated and sped up with autonomous full-body photography. Auto-organization is a concept that has been created just in the field of deep learning technology. Auto-organization is an unsupervised learning approach for detecting features and discovering relationships or patterns in picture samples in a dataset. Convolutional machine learning, which include auto-organization techniques, improve the degree of features representation provided by pro systems. Auto-organization is a paradigm that is still under investigation and succession. But in any case its discoveries may one day aid in improving the accuracy of image processing systems, particularly in the realm of medical imaging, in which the finest details of characteristics are very crucial for correct sickness detection.

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