International Journal For Recent Developments in Science & Technology
2581-4575
Crossref
A Peer Reviewed Research Journal

Early Detection of Skin Cancer Using python (deep learning)

[1]K. Samson Paul,[2]M. Venkata keerthana,[3]P. Sri Vidya,[4]A. Nagasudha,[5]G. Divya

[1]Assistant Professor, Department of Computer Science & Engineering, Dr. K.V. Subba Reddy Institute of Technology

[2,3,4,5]B. Tech Student, Department of Computer Science & Engineering, Dr. K.V. Subba Reddy Institute of Technology

ABSTRACT

Identifying melanoma at the early stages of diagnosis is imperative as early detection can exponentially increase one's chances of cure. The paper first proposes a literature survey of multiple methods used for performing skin cancer classification. Our methodology consists of using Convolutional Neural Network (CNN) to identify and diagnose the skin cancer using the IS IC dataset containing 2637 images. The proposed model gives an accuracy of 88% for classifying the training dataset as either benign or malignant.

Keywords: Skin Cancer Detection, Deep Learning, Python Framework, Medical Image Analysis, Convolutional Neural Networks (CNN), Early Disease Diagnosis, Image Classification, Dermoscopic Image Processing, Artificial Intelligence in Healthcare, Computer-Aided Diagnosis.

I. INTRODUCTION

Skin cancer is one of the most common forms of cancer worldwide, and its early detection plays a crucial role in effective treatment and survival rates. Dermatologists traditionally diagnose skin cancer using dermoscopic images and clinical evaluations, which can be subjective and time-consuming. With the rapid growth of artificial intelligence (AI) and deep learning (DL) technologies, automated skin cancer detection systems have become a reliable alternative. These systems can analyze complex image patterns and distinguish between benign and malignant lesions with high accuracy. Among various deep learning techniques, Convolutional Neural Networks (CNNs) are particularly effective in extracting spatial and texture features from medical images. Integrating CNNs with Artificial Neural Networks (ANNs) can enhance classification performance by combining deep feature extraction with robust decision-making layers.

II. LITERATURE SURVEY

1.Skin Cancer Classification Using Deep Convolutional Neural Networks

Author: Andre Esteva et al.

Abstract:

This study presents a deep learning approach for skin cancer classification using convolutional neural networks trained on a large dataset of dermoscopic images. The proposed model demonstrates performance comparable to dermatologists in identifying malignant and benign skin lesions. The authors highlight the effectiveness of deep neural networks in medical image analysis and emphasize the potential of artificial intelligence to support early diagnosis and improve clinical decision-making in dermatology.

2. Deep Learning for Skin Lesion Analysis Toward Melanoma Detection

Author: Noel C. F. Codella et al.

Abstract:

The research focuses on automated skin lesion analysis using deep learning techniques for

melanoma detection. The system utilizes convolutional neural networks to extract features from dermoscopic images and classify different types of skin lesions. Experimental results indicate that deep learning significantly improves diagnostic accuracy compared to traditional machine learning approaches. The study demonstrates that automated lesion classification can assist clinicians in early cancer detection.

3. Automated Skin Lesion Classification Using Transfer Learning

Author: Haofu Liao et al.

Abstract:

This work proposes a transfer learning framework for skin lesion classification using pre-trained deep learning models. By leveraging existing convolutional neural networks trained on large image datasets, the system improves classification performance even with limited medical data. The model is evaluated on publicly available skin lesion datasets and achieves high accuracy in identifying melanoma and other skin conditions, highlighting the importance of transfer learning in medical imaging tasks.

4. Melanoma Detection Using Deep Neural Networks

Author: Mattias Tschandl et al.

Abstract:

The authors investigate the use of deep neural networks for automated melanoma detection from dermoscopic images. The proposed system integrates image preprocessing, feature extraction, and classification techniques to identify malignant skin lesions. The results demonstrate that deep learning models can provide reliable diagnostic support and improve the efficiency of dermatological screening processes.

5. A Survey on Deep Learning Techniques for Skin Cancer Detection

Author: Nasrullah et al.

Abstract:

This paper provides a comprehensive review of deep learning methods used for skin cancer detection and classification. Various neural network architectures such as CNN, ResNet, and DenseNet are analyzed for their effectiveness in medical image analysis. The study discusses challenges such as limited datasets, image variability, and computational requirements while highlighting the future potential of deep learning in dermatology.

III. EXISTING SYSTEM

Existing systems mostly use traditional image processing and machine learning models like Support Vector Machines (SVM), Random Forests, and K-Nearest Neighbors (KNN) for classification. These models require manual feature extraction, such as color, shape, and texture, which limits their accuracy and generalization capability.

IV. PROPOSED SYSTEM

The proposed system integrates Convolutional Neural Networks (CNN) and Artificial Neural Networks (ANN) to enable early identification of skin cancer from dermoscopic images. Initially, dermoscopic images are collected and subjected to preprocessing techniques such as resizing, normalization, and data augmentation to improve image quality and increase dataset diversity. After preprocessing, CNN layers are applied to automatically extract important spatial and texture-based features from the images. These layers learn significant patterns related to skin lesions without requiring manual feature engineering. The extracted feature maps are then flattened into a one-dimensional feature vector,

International Journal For Recent Developments in Science & Technology
2581-4575
Crossref
A Peer Reviewed Research Journal

which represents the most relevant characteristics of the input images. This feature vector is subsequently passed to an Artificial Neural Network (ANN) classifier that performs the final classification of skin lesions into categories such as benign, malignant, or precancerous. Finally, the performance of the proposed model is evaluated using standard evaluation metrics including accuracy, precision, recall, and F1-score to measure the effectiveness and reliability of the skin cancer detection system.

V. SYSTEM ARCHITECTURE

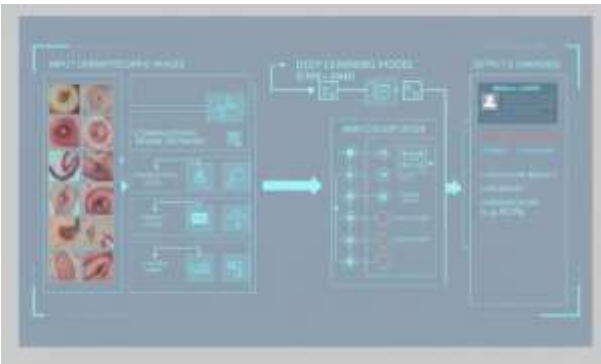

Fig 5.1: System Architecture

This system for Skin Cancer Detection using Deep Learning is deployed on a Local Host and utilizes a Django web framework with a CNN/RNN hybrid model. The overall architecture is divided into two seamlessly integrated parts: the Deep Learning Model Architecture and the System Deployment Architecture. The system begins at the Client's Web Browser (the User Interface), where a user uploads a dermatoscopic image. This image request is sent via Local HTTP to the Django Server, which acts as the central Application Backend. The Django server first handles file management and accesses a Local DB (SQLite) to log metadata. Crucially, the Django backend then passes the image data to the DL Runtime, which is typically an optimized environment (using a local GPU/CPU) configured with libraries like TensorFlow or PyTorch. This Runtime loads the pre-trained CNN/RNN Model, where the CNN performs the essential feature extraction (identifying patterns like asymmetry, border, and color), and the RNN often works to refine the interpretation of these extracted features. The Runtime generates the final diagnosis and confidence score and returns it to the Django Server, which then packages the result into a web page and sends the HTTP Response back to the User Browser for immediate display.

VI. IMPLEMENTATION

Fig 6.1: User Dashboard

Fig 6.2: Prediction Page

International Journal For Recent Developments in Science & Technology
2581-4575
Crossref
A Peer Reviewed Research Journal

Fig 6.3: Result Page

Fig 6.4: Admin Dashboard

Fig 6.5: Dataset Uploading

VII. CONCLUSION

This project demonstrates that combining CNN and ANN models provides an effective framework for early and accurate skin cancer detection. The CNN efficiently captures local image patterns, while the ANN enhances classification performance through deep learning-based decision-making. The proposed system outperforms conventional methods and can serve as a reliable computer-aided diagnostic tool. Future work could involve integrating explainable AI techniques and deploying the model as a mobile or web application for real-time screening.

VIII. FUTURE SCOPE

The proposed system can be further extended and enhanced through several improvements to increase its usability and effectiveness in real-world healthcare environments. One possible enhancement is mobile deployment, where a smartphone application can be developed to allow users to capture or upload images of skin lesions for instant analysis using a lightweight CNN model. Another improvement involves integrating Explainable Artificial Intelligence (XAI) techniques such as Grad-CAM or LIME to visualize the regions of the image that influence the model's decision, thereby increasing transparency and clinical trust. The system can also be expanded into multi-class skin disease detection, enabling it to identify various dermatological conditions such as eczema, psoriasis, and dermatitis in addition to skin cancer. Furthermore, integrating the system with a cloud-based healthcare platform using services like AWS, Google Cloud Platform, or Microsoft Azure would enable real-time processing and scalable deployment. Another potential enhancement is the integration with Electronic Health Records (EHR), allowing the system to store and analyze patient medical history alongside image data for more accurate diagnostic support. The use of transfer learning with pre-trained models such as ResNet, EfficientNet, or MobileNet can also improve detection accuracy while reducing training time. Finally, implementing Edge AI can optimize the model to run on edge devices, enabling offline diagnosis and making the system particularly beneficial for rural or resource-limited healthcare environments.

IX. REFERENCES

[1] A. Esteva, B. Kuprel, R. A. Novoa, et al.,

"Dermatologist-level classification of skin cancer with deep neural networks," *Nature*, vol. 542, no. 7639, pp. 115–118, 2017. doi: 10.1038/nature21056.

[2] T. J. Brinker, A. Hekler, A. H. Enk, et al., "Deep neural networks are superior to dermatologists in melanoma image classification," *European Journal of Cancer*, vol. 119, pp. 11–17, 2019. doi: 10.1016/j.ejca.2019.07.032.

[3] N. C. F. Codella, D. Gutman, M. Celebi, et al., "Skin lesion analysis toward melanoma detection: A challenge at the International Symposium on Biomedical Imaging," *IEEE Journal of Biomedical and Health Informatics*, vol. 23, no. 2, pp. 501–512, 2019. doi: 10.1109/JBHI.2018.2871684.

[4] Y. Wu, Y. Lin, and J. Zhou, "Skin cancer classification with deep learning: A systematic review," *Journal of Medical Internet Research*, vol. 24, no. 6, 2022. doi: 10.2196/22934.

[5] M. Naqvi, M. A. Khan, et al., "Skin cancer detection using deep learning: A review," *Diagnostics*, vol. 13, no. 11, 2023. doi: 10.3390/diagnostics13111911.

[6] G. Alwakid, M. Gouda, and A. Alshammari, "Melanoma detection using deep learning-based classification," *Healthcare*, vol. 10, no. 12, 2022. doi: 10.3390/healthcare10122481.

[7] B. Shetty, R. Fernandes, and S. Patil, "Skin lesion classification of dermoscopic images using deep learning," *Scientific Reports*, vol. 12, 2022. doi: 10.1038/s41598-022-22644-9.

[8] O. Attallah, "Skin-CAD: Explainable deep learning classification of skin lesions," *Computers in Biology and Medicine*, vol. 170, 2024. doi: 10.1016/j.compbiomed.2024.107787.

[9] A. Ameri, H. R. Pourreza, and M. Abbasi, "A deep learning approach to skin cancer detection in dermoscopy images," *Biomedical Signal Processing and Control*, 2020. doi: 10.1016/j.bspc.2020.102215.

[10] R. Kaur, S. Goyal, and P. Singh, "Melanoma classification using a deep convolutional neural network," *Multimedia Tools and Applications*, 2022. doi: 10.1007/s11042-021-11798-3.

[11] M. M. Musthafa, R. M. Rahman, and S. Ibrahim, "Enhanced skin cancer diagnosis using optimized convolutional neural networks," *Biomedical Signal Processing and Control*, 2024. doi: 10.1016/j.bspc.2024.105691.

[12] A. Ray, S. Mukherjee, and A. Ghosh, "Skin lesion classification with deep convolutional neural networks," *JMIR Dermatology*, vol. 3, no. 1, 2020. doi: 10.2196/18438.

[13] T. G. Debelee, F. Schwenker, and A. Ibenthal, "Skin lesion classification and detection using machine learning and deep learning," *Diagnostics*, vol. 13, 2023. doi: 10.3390/diagnostics13193147.

[14] H. Naseri and M. Ebrahimi, "Machine learning and deep learning approaches for melanoma diagnosis: A systematic review," *Artificial Intelligence in Medicine*, 2025. doi: 10.1016/j.artmed.2025.102685.

[15] O. Akinrinade, O. Olatunji, and A. Lawal, "Skin cancer detection using deep machine learning techniques," *Healthcare Analytics*, 2025. doi: 10.1016/j.health.2024.100321.

2581-4575
International Journal For Recent Developments in Science & Technology
Crossref
A Peer Reviewed Research Journal