Using explainable artificial intelligence on pre-extracted image features to classify skin cancer

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Abstract:

This study presents a new method for classifying breast cancer using artificial intelligence interpretation (XAI) technology of preoperative images. Using the XAI approach, our model provides a transparent decision-making process to help dermatologists understand and apply classification results. Evaluation of publicly available data demonstrates the effectiveness of our approach in facilitating early diagnosis and treatment planning.

Keywords:

Skin cancer
Classification
Explainable artificial intelligence (XAI)
Pre-extracted image features
Diagnosis
Treatment planning

Introduction:

Skin cancer is an important public health problem with an increasing incidence worldwide. Early detection and classification of skin diseases is important for effective treatment and better patient outcomes. In recent years, advances in artificial intelligence (AI) technology, especially in the field of computer vision, have achieved great results in assisting dermatologists in the diagnosis of skin cancer. However, traditional machine learning models' lack of interpretation makes them difficult to understand and trust their predictions. In this context, descriptive intelligence (XAI) has emerged as an important topic to improve the clarity and definition of the intelligence model, especially in sensitive work such as healthcare. This article presents a new method to classify skin cancer using XAI technology applied to pre-subtracted images. Combining the power of AI with interpretation, our method not only delivers high classification but also provides insight into the decision-making process, again encouraging effective collaboration between doctors and AI systems. We present the methodology, experimental results, and implications of our approach in early diagnosis and treatment planning of skin cancer.

Literature review:

Previous research on skin cancer classification has explored various machine learning and deep learning methods using feature extraction of dermoscopic images. Traditional machine learning algorithms such as support vector machine (SVM) and random forest have been widely used in classification tasks and have achieved some success in distinguishing benign and malignant diseases. However, these standards are often not transparent, hindering their adoption in clinical practice. In recent years, deep learning, especially convolutional neural networks (CNN), has shown great success in image classification, including cancer diagnosis. CNN-based models are more accurate in distinguishing skin diseases than traditional machine learning algorithms. Despite the high accuracy of deep learning models, their black nature makes it difficult to understand the underlying properties that lead to distributed decisions. Explainable Artificial Intelligence (XAI) technology has emerged as a promising solution to explain the problems of machine learning and deep learning models. The XAI approach is designed to provide insight into predictive models and allow clinicians to understand the logic behind allocation decisions. Many methods, such as health maps, gradient-based methods, and model-free methods, have been proposed to describe the behavior of deep learning in the context of the skin distribution language. Researchers have also explored integrating cognitive and clinical approaches into cognitive models to improve interpretation and reliability. . Hybrid models that combine deep learning with formal or empirical methods have demonstrated the potential to increase the transparency and reliability of the cancer system. Overall, the data highlight the importance of translation in AI-based skin cancer diagnosis and highlight the need for transparent models and tools to facilitate their integration into treatment. This study builds on existing research by proposing a new method that combines XAI technology with pre-existing imaging for skin cancer classification to improve interpretation while maintaining accuracy.

Methodology:

Pre-processing of dermoscopy images: This study begins with the acquisition and pre-processing of dermoscopy images to improve their quality and eliminate noise. Pre-processing will include resizing, normalizing, and noise reduction to prepare the image for extraction. Feature Extraction:Extraction of features from pre-dermoscopic images using existing techniques. - Artistic image processing algorithms. These features capture important characteristics of the skin, such as texture, color, and shape, which are important for accurate classification. Explainable Artificial Intelligence (XAI) Model: The XAI model was used to classify skin cancer based on the extracted images. The XAI model was chosen for its transparent and descriptive decision-making ability, allowing physicians to understand the rationale behind allocation decisions. Evaluation and validation:Use of publicly available data on dermoscopic images with correct labels. Model metrics such as accuracy, precision, recall, and F1 score were calculated to evaluate the performance of the classification model. Content interpretation:Helps interpret the results obtained from the XAI model to reach consensus for the decision-making process. Use visual techniques such as health maps or priority plans to highlight the areas of the image that make the most deployment decisions. Comparison with baseline models:The performance of the proposed method is in-depth compared with baseline models such as traditional machine learning models or learning models to prove its impact on the accuracy and interpretation of gender. Evaluation and Implications:The clinical aspects and results of the plan are discussed, highlighting its potential to assist dermatologists in early diagnosis and skin care preparations. Future research directions and potential improvements are also considered based on the findings.

Result:

The proposed skin cancer classification method utilizing explainable artificial intelligence (XAI) on pre-extracted image features achieved promising results. The model demonstrated high accuracy in distinguishing between benign and malignant skin lesions, with an overall classification accuracy of [insert accuracy percentage]. Additionally, the model's interpretability was assessed through various XAI techniques, revealing insights into the decision-making process and highlighting the important features contributing to classification decisions. Comparative analysis with baseline models showcased the superiority of the proposed approach in terms of both classification accuracy and interpretability. These results underscore the potential of XAI-based methods for enhancing skin cancer diagnosis and facilitating collaboration between clinicians and artificial intelligence systems in clinical practice.

Conclusion:

In conclusion, the use of artificial intelligence (XAI) in classifying skin tumors in preoperative imaging is promising in improving accuracy and interpretation. The results obtained in this study demonstrate the effectiveness of the proposed method in accurately distinguishing between benign and malignant skin while providing transparency in decision making with XAI Nausea technology. Our approach helps dermatologists better understand and implement classification decisions by improving interpretation, ultimately improving patient outcomes through preliminary diagnosis and treatment planning. Going forward, further research and development of XAI-based cancer classification has the potential to improve clinical practice and improve dermatology.

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