REPORT

Human skin type classification using image processing and deep learning

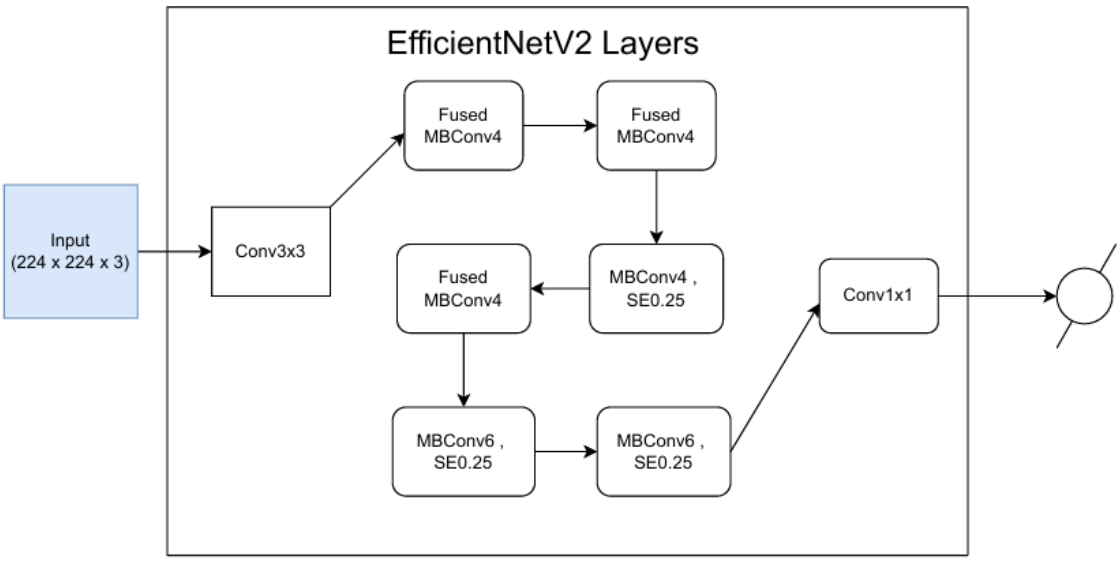
INTRODUCTION:

Skin care is said to be an important part of everyone's life everywhere. Traditionally, beauty and skin care products are used by the elderly, but in the last decade, the average age of people using these products has increased; young people and office workers are also following suit. Cosmetics make the skin look younger and give a person self-confidence. Many companies have taken the opportunity to launch many products, but it is important to note that skin concerns should also be considered before purchasing. Skin experts believe that people should know their skin type before applying anything to their skin. Some skin types can be seen with the naked eye, while others cannot. It has also been found that some people have both oily and dry skin, but in different parts of the body, and this is normal. The latest technologies such as artificial intelligence and machine learning in medicine, medicine, agriculture, business, beauty, and cosmetics. Deep learning is a type of machine learning that involves training computers to learn, and it is rapidly evolving as technology and tools continue to improve it. It is now being hailed as a technological tool that can solve real-world problems with skin cancer classification [1-6]. Dermatologists were supported by significant data on deep learning, especially CNNs, and their use cases for classifying skin diseases in their latest work in 2020 [2]. The article discusses the applicability of CNN-based methods in automatic diagnosis of male VI and MCI, as well as the need for further research and investigation into CNN image processing and standards for this problem. The focus is on two main areas: medical image analysis (including only dermoscopic and pathological images) and digital image classification. The main goal is to help dermatologists to know the CNN-based computerized classification method of diseases in medical images and color images, and also discuss the disadvantages of these techniques. The article also discusses the lack of applications to diagnose other skin diseases besides skin and the directions for developing these applications.

TABLE:

Advantage	Disadvantage	Matrix	Accuracy
• **High Precision**: Achieved an accuracy rate of 94.57% through hyperparameter optimization. • **Streamlined Data Preparation**: Improved using CLAHE and augmentation techniques, eliminating unnecessary noise reduction. • **Model Enhancement**: EfficientNet-V2 surpassed the performance of ResNet-V1 and MobileNet-V2. • **Practical Application**: Serves as a valuable resource for dermatologists, minimizing the need for in-person evaluations. • **Broad Applicability**: Suitable for various medical image classification tasks.	• **Imbalanced Data**: A limited number of dry skin samples introduced bias. • **Complex Preparation**: The use of CLAHE and data augmentation heightened processing requirements. • **Oily Skin Difficulty**: Distinguishing between oily skin and normal skin proved challenging. • **High Expense**: Deep learning models necessitated substantial computational resources. • **Risk of Overfitting**: A small dataset and fine-tuning could increase the likelihood of overfitting.	EfficientNet-V2 achieved: • **Precision**: 91.24% • **Recall**: 91.09% • **F1-Score**: 91.15% • **Loss**: 22.74%	The accuracy of the final model, following hyperparameter tuning, reached **94.57%**. When evaluated on unseen data, the model obtained an accuracy of **89.70%**.

FLOWDIAGRAM:



CONCLUSION:

Therefore, this study adds to the existing body of knowledge by introducing deep learning communication neural networks (CNN), which serve as an effective method for skin classification and disease identification. Furthermore, this research showcases the potential for utilizing artificial intelligence and machine learning to enhance the dermatology field through advanced diagnostic tools. A global image classification system can offer an effective approach for categorizing human skin, which benefits dermatologists and patients alike in terms of convenience, time efficiency, and cost savings.

Skin classification **has demonstrated** that **CNN-based models can** achieve notable accuracy, **which** can be **further enhanced** through techniques like image **enhancement** and **transfer** learning. This **underscores** the need to integrate **AI intelligence** into diagnostics **to** minimize the **number** of **doctors required.** Additionally, there is a **shortage** of desktop **applications,** particularly for other dermatological **conditions,** suggesting a potential area for future **application** development. **Medical** research indicates that further **innovations** are necessary to fully **leverage** the capabilities of **intelligence** in healthcare. By merging industry **expertise** with advanced technology, **we** are establishing a **framework** that promotes improved **diagnoses,** healthier skin, and enhanced **skin treatment.**

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