Skin Disease Detection from Images

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Abstract

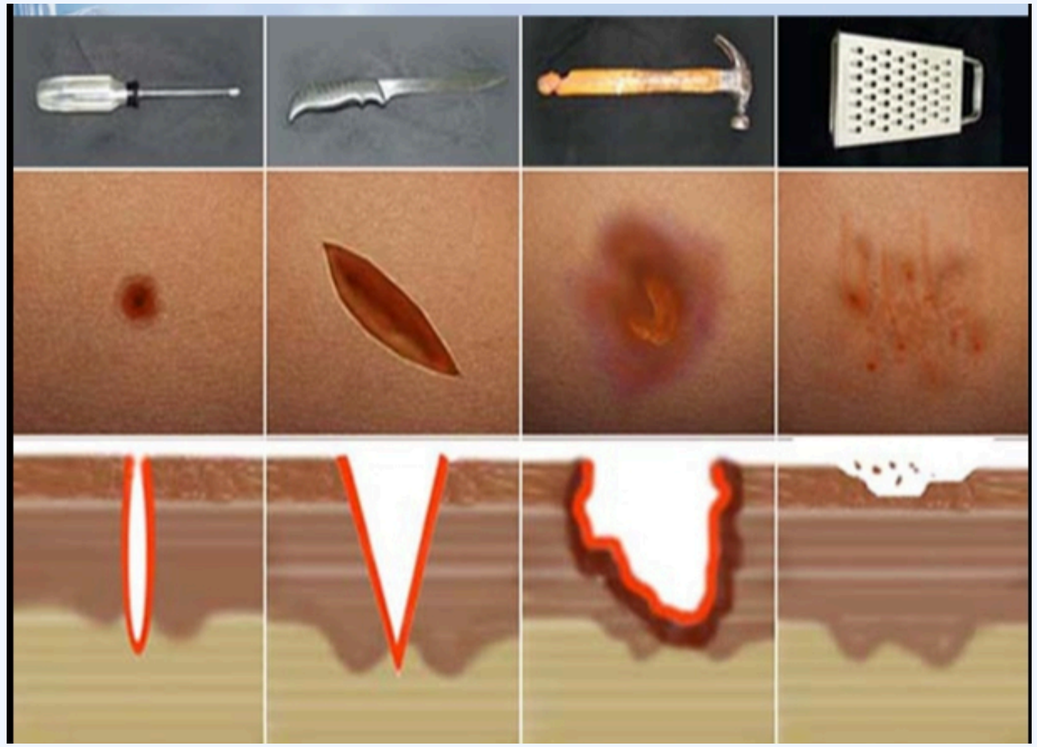
Project Objective

This project aims to develop an AI-based model for detecting skin diseases, including eczema, psoriasis, dermatitis, fungal infections and melanoma, using deep learning techniques.

Methodology and Impact

The model processes and classifies images using Convolutional Neural Networks (CNN), enabling early diagnosis and improving dermatological analysis. The system is designed to assist medical professionals and enhance telemedicine solutions.

Introduction



Skin diseases are prevalent worldwide, affecting millions of individuals. Accurate and timely diagnosis is critical to prevent severe conditions.

Traditional methods rely on manual examination, which can be subjective and inconsistent. AI-driven diagnostic models provide a scalable, automated, and efficient approach to assist dermatologists in identifying skin disorders accurately.

Literature Survey: Traditional vs. AI Methods

Traditional dermatology involves visual examination, dermatoscopy, and biopsy.

Manual diagnosis is prone to errors and depends on expert availability.

AI-based models, especially CNNs, have revolutionized medical image analysis.

Studies show that AI models can achieve accuracy comparable to dermatologists.

Literature Survey

AI in Skin Disease Detection

- Convolutional Neural Networks (CNNs) are widely used for medical imaging.
- AI models extract and analyze patterns in skin images to classify diseases.
- Studies indicate that CNN-based models achieve high precision and recall.
- Research suggests that AI can assist in early detection, reducing misdiagnosis.

Literature Survey

•Challenges in AI-driven diagnosis:

- Limited availability of labeled data.
- Diverse Skin Tones: AI models must be trained on a variety of ethnicities and skin colors.
- Overfitting: AI models sometimes perform well on the dataset but fail in real-world cases.
- Data Imbalance: Some diseases are rare, leading to fewer labeled images.
- Ethical & Privacy Concerns

Literature Survey Comparison of AI Models

Various AI models tested for skin disease detection:

Traditional Machine Learning: Early research used SVM, KNN, and Decision Trees, but these had lower accuracy.

- CNN: Best for feature extraction and classification.
- Transfer Learning (e.g., ResNet, VGG): Pre-trained models improve accuracy.
- Hybrid models: Combining deep learning with traditional image processing.

Proposed Methodology

Model Architecture

- CNN-based model for skin disease classification.
- Preprocessing:

1. Image resizing & normalization.
2. Data augmentation for better model generalization.

- Training Approach:

1. Supervised learning with labeled datasets.
2. Optimization: Dropout, Batch Normalization, Adam optimizer.

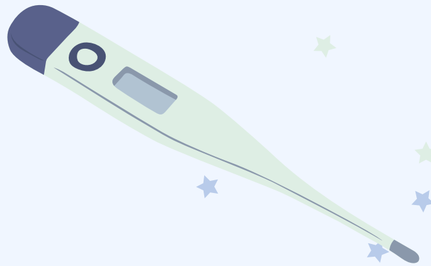
Implementation Plan

- Data Collection: ISIC & HAM10000 datasets.
- Model Training:

1. Train CNN with labeled skin disease images.
2. Use cross-entropy loss for optimization.

- Evaluation Metrics: Accuracy, Precision, Recal F1-score.
- Validate using test dataset & real-world imag

Impact and Applications



Assist dermatologists in diagnosis and treatment.

Enable early detection and self-monitoring.

Contribute to public health research and disease surveillance.

Conclusion

- AI-based models provide an efficient and accurate way to diagnose skin diseases.
- CNN-based models have demonstrated high performance in medical image classification.
- Further research is needed to address remaining limitations.

Future work includes:

- Improving model robustness to diverse skin tones.
- Explore innovative data augmentation techniques.
- Deploying AI systems for real-world dermatological applications.

Thank you for your attention