Vivekanand Education Society's Institute of Technology

Department of Computer Engineering

Project Synopsis (2024-25) - Sem VII

WellnessInsight

Advanced System for Tailored Health Recommendations
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Abstract

Skin disorders impact a significant portion of the global population, making early and precise diagnosis critical. Traditional methods relying on physical exams and lab tests are not always accessible in remote areas. To address this, a multimodal AI system is proposed, integrating machine learning and deep learning techniques for efficient diagnosis. Users can input symptoms via text, voice, live camera, or uploaded images. The system uses a Random Forest classifier for text/voice inputs, CNNs for image classification, and U-Net for image segmentation to determine infection severity. This inclusive system boosts diagnostic accuracy and accessibility, particularly benefiting underserved populations.

Introduction

Millions suffer from skin diseases such as acne, psoriasis, eczema, and melanoma. Early diagnosis is essential to manage symptoms and avoid complications. However, in rural areas, diagnostic facilities are limited. To bridge this gap, the proposed WellnessInsight system uses machine learning and deep learning techniques to classify skin diseases. It supports text, voice, live images, and uploaded images for input. By combining Random Forest, CNNs, and U-Net models, the system provides an efficient and accessible alternative for skin disease diagnosis, specifically targeting eczema, melanoma, and psoriasis.

Problem Statement

Access to dermatological diagnosis remains limited in rural and underserved areas due to the lack of skilled professionals and infrastructure. Traditional methods are often slow, costly, and inaccessible. Existing AI models usually rely on single modalities like image uploads and lack infection severity estimation. There is a pressing need for a comprehensive, multimodal, AI-powered system that can process diverse inputs and offer reliable skin disease classification and infection severity analysis.

Proposed Solution

The proposed system, WellnessInsight, integrates:

- Random Forest Classifier for text and voice-based diagnosis.
- CNNs (with VGG16) for image classification.
- U-Net for lesion segmentation and infection percentage estimation. It allows input via live camera, uploaded images, text, and voice, ensuring maximum usability. Infection severity (mild, moderate, severe) is calculated based on the proportion of infected pixels. The system combines NLP, deep learning, and speech recognition to create an accessible and inclusive skin disease diagnostic platform.

Block Diagram
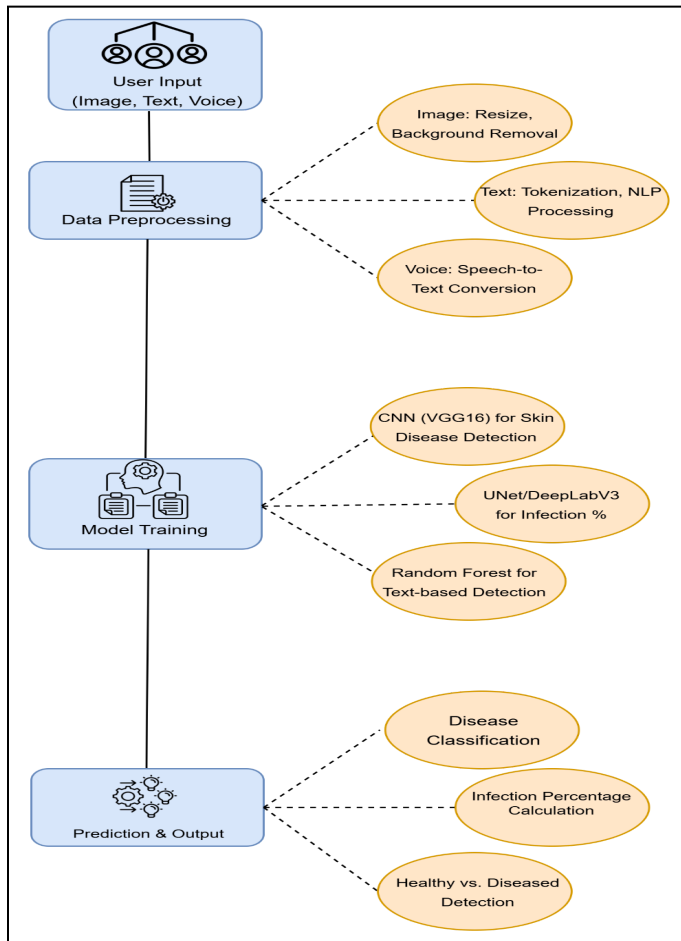
Hardware, Software Requirements, and Tools

Hardware

- GPU-enabled system (for deep learning model training)
- Standard computing devices for system deployment

Software and Tools

- Programming Language: Python
- Libraries: TensorFlow, Keras, OpenCV, Scikit-learn
- Text Processing: Natural Language Processing (NLP) libraries like NLTK or SpaCy
- Voice Input Processing: Speech Recognition APIs
- Image Datasets: DermNet, ISIC 2016, Kaggle Skin Type Dataset
- Development Platform: Google Colab, Jupyter Notebook
- Version Control: GitHub

Proposed Evaluation Measures

- Accuracy of classification models (CNN for images, Random Forest for text/voice)
- Dice Coefficient for segmentation performance (infection area detection)
- Confusion Matrix for model performance evaluation
- Precision, Recall, F1-Score for assessing text, image, and voice input models
- Training and Validation Loss Trends to monitor overfitting or underfitting
- User Accessibility Testing to verify input modality effectiveness

Conclusion

WellnessInsight presents a novel approach to diagnosing skin diseases by integrating multimodal inputs — text, voice, live camera, and uploaded images. It employs machine learning and deep learning models to not only classify diseases but also estimate infection severity. The platform bridges the gap between healthcare availability and accessibility, especially in rural and underserved regions. This comprehensive, AI-driven solution paves the way for more inclusive healthcare by providing remote diagnostic services and aiding early disease management.

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