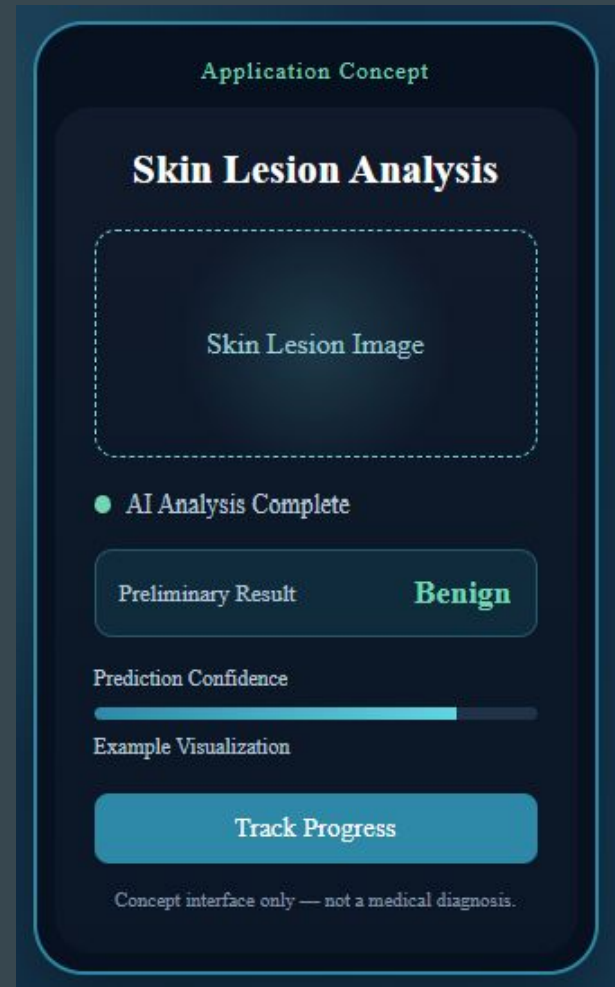


Skin Cancer Detection Mobile Application



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Motivation

- Skin Cancer is the most common cancer worldwide, early detection is crucial
- Getting timely dermatological care is not always easy or accessible
- Want to provide users with a simple, accessible approach for a preliminary assessment of skin lesions using a mobile application



Our System

- Want to create a mobile application that uses machine learning to evaluate photos of skin lesions and make real-time predictions regarding whether a lesion is benign or malignant
- Enables users to easily upload real-time images to receive preliminary prediction on their mobile devices
- Allows users to track their skin health over time by displaying progress of skin lesions over several sessions
- Wants it to be an accessible tool for skin health awareness and monitoring, not replace a medical diagnoses
- Application aims to help people become more aware and cautious about their skin and skin protection

Overall Plan and Approach

Data Preprocessing

- Image acquisition and data collection
- Data preprocessing
- Data augmentation
- Data splitting
- Cross-validation

Model Evaluation

- Evaluation Metrics
- Final Model Assessment

Deep Learning Models

- Convolutional neural network
- Transfer learning

App Development

- Image upload and capture
- Image processing
- Model prediction
- Results and visualization
- History and tracking



Key Features

Image Upload and Processing

- Upload desired image from files or capture
- System will process image
- Higher margin for acceptable photos

Model Prediction & Visualization

- Finalized result of scan
- Model Prediction based on image
- Visual provided indicating confidence level

Disclaimers and Next Steps

- Helpful information regarding next steps
- Disclaimer not a diagnosis
- Suggestions for professional opinion

Novel Features

Predicting Skin Lesions and Visualizing Confidence

- Receive prediction regarding skin lesion
- Visual indicator showing confidence level
- Additional information regarding prediction
- Aids with understanding skin lesions
- Encouragement for medical advice

Tracking the Progress of Skin Lesions

- Save and monitor previous skin lesion results
- Compare changes in predictions over time
- See data regarding skin health over many sessions
- Tracks progress and changes



Algorithms & Tools

Data Preprocessing

Python • OpenCV • Keras
ISIC • HAM10000



Deep Learning

CNN • Transfer Learning TensorFlow • Keras
ResNet50 • EfficientNetB0 • MobileNetV2

Model Evaluation

Scikit-Learn F1 Score • Confusion Matrix
Accuracy • Precision • Sensitivity • Recall

App Development

Flutter • Tensorflow • SQLite • Dart
(Programming Language)

Technical Challenges

Machine Learning Model Selection and Integration

- Determining which model will give the best accuracy

Image Preprocessing and Processing

- Implementing resizing, normalization, data augmentation and many other techniques.

Model Training and Optimization

- Defining training parameters for the machine, like minimizing false negatives.

App Development and Deployment

- Making the model run successfully on a mobile app

Milestones

Milestone 1
September 28
Research & Initial Development

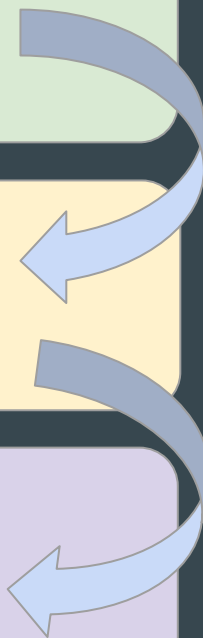
- Compare and select tools.
- Create “Hello World” demos.
- Resolve technical challenges
- Create project documents.

Milestone 2
October 26
Model Development & Evaluation

- Preprocess and augment dataset.
- Train selected models.
- Evaluate and compare performance.
- Select preliminary model.

Milestone 3
November 23
Application & Integration

- Develop mobile application.
- Integrate selected model.
- Implement prediction visualization.
- Implement progress tracking.



Expected Outcome

Functional Mobile Prototype

- Upload or capture skin lesion images.
- Process images for model input.
- Generate preliminary predictions.



Prediction & User Feedback

- Display benign/malignant prediction.
- Show model confidence level.
- Provide disclaimer and suggested next steps.



Skin Health Tracking

- Save previous prediction results.
- Compare results from different dates.
- Help users monitor changes over time.



Closing/Next steps

- Add additional features throughout development
- Optimize machine learning model and application performance
- Conduct usability testing on multiple users to evaluate app effectiveness
- Finalize the project for complete presentation and demonstration