



SKIN CANCER DETECTION

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INTRODUCTION

- Develop a mobile app that allows users to upload images of suspicious skin lesions
- Users will receive immediate feedback detailing any potential risks
- App serves as an on-demand screening, which aims to encourage users to seek professional medical advice early



MOTIVATION

- Many people may not have regular access to dermatologists
- Medical appointments can be expensive and time-consuming
- We aim to improve awareness and reduce anxiety by allowing users to self-monitor
- Our way of helping to improve overall health
- Early detection of cancer is correlated with improved survival rates



KEY FEATURES

- 1st: Capture and upload images of skin lesions. Users may take photos directly or upload existing images from their photo library
- 2nd: App will guide users through this process with visual indicators. This is to help align the lesion in the frame and ensure quality input
- 3rd: System will analyze the images in real time and provide predictions. A **Convolutional Neural Network** (CNN), trained on the ISIC dataset of skin lesion images, will classify lesions as either benign or malignant risk
- 4th: Predictions will be presented clearly, along with confidence percentages indicating how certain the model is in its assessment
- 5th: Disclaimers, preliminary results, recommendations, links to professional resources



NOVEL FEATURES

- 1st: Predictions are made on-device through TensorFlow Lite, eliminating the need to upload sensitive medical images to cloud servers
- This privacy-first approach protects user data
- 2nd: App is designed for low-latency inference, allowing instant results without needing internet connectivity
- 3rd: App will integrate additional medical resources and educational content, making it a platform to raise awareness and encourage preventive care



ALGORITHMS AND TOOLS

- System will rely on several advanced algorithms and software tools to ensure functionality and access
- We will use a CNN machine learning model, using transfer learning from architectures such as MobileNet, EfficientNet, or ResNet. These models are well-suited for image classification tasks and can be fine-tuned to the ISIC dataset for skin lesion detection
- TensorFlow Lite will be used to deploy the trained model on mobile devices, ensuring an efficient interface with reduced computational overhead
- Flutter is the selected framework, because it supports both Android and IOS for mobile development
- Additional tools like OpenCV and related image preprocessing libraries will handle resizing, cropping, and normalization of images before they are fed into the model



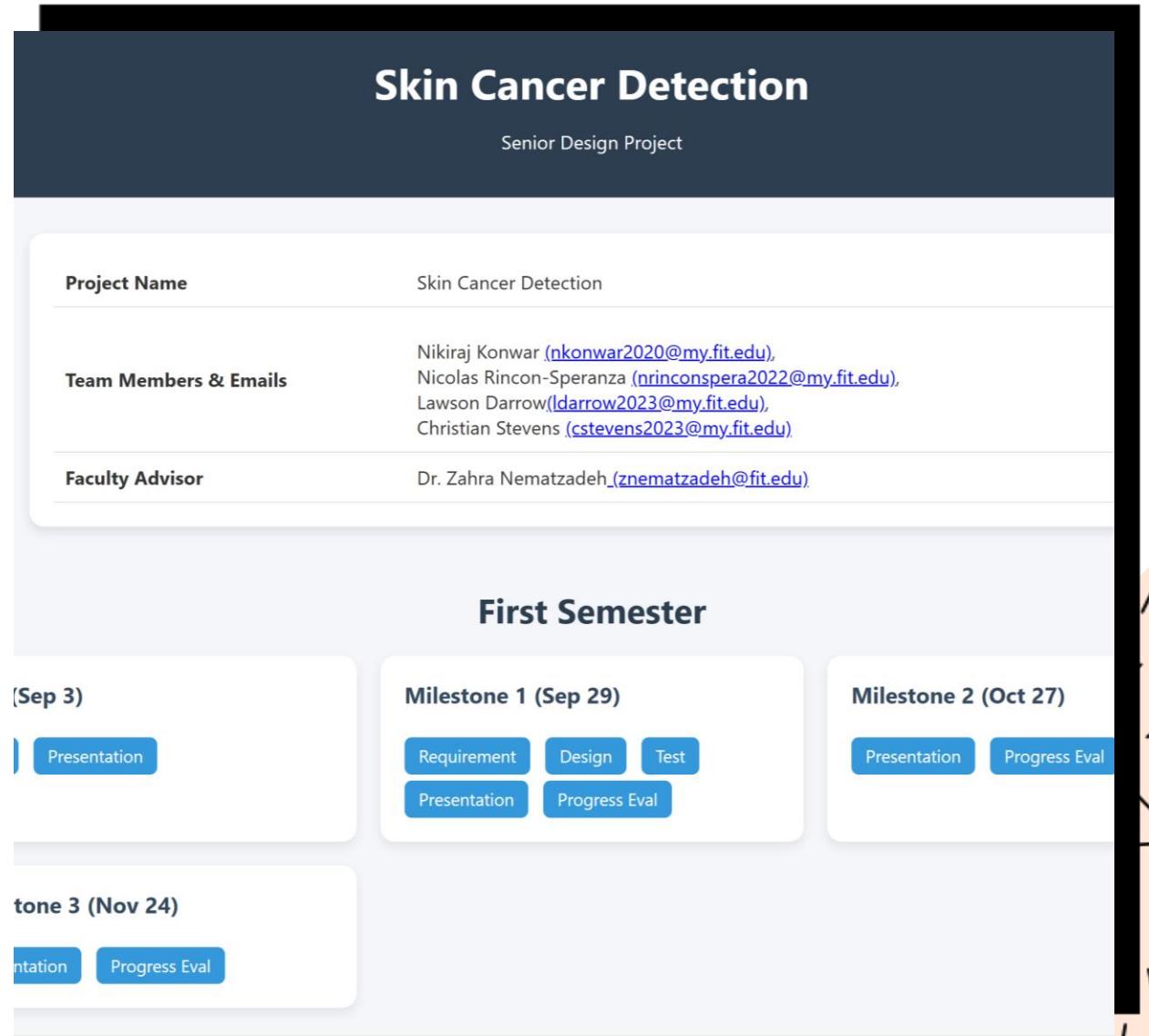
TECHNICAL CHALLENGES

- 1st: Model Accuracy and Dataset Limitations
 - Class imbalance. Malignant cases are less common than benign cases, which can bias the model toward predicting benign outcomes
 - Range of skin tones. We must train the model to identify lesions, independent of skin color, following the Fitzpatrick Skin Classification System
- 2nd: Mobile Performance Optimization
 - Running deep learning models on mobile devices can present challenges like memory usage, processing power, and inference speed
 - Accurate real-time predictions require techniques like quantization, pruning, and model selection
- 3rd: User Trust and Compliance
 - Users must interpret predictions responsibly and consider all medical disclaimers. Language and information must be consistent, and adhere to ethical standards in healthcare technology



WEBSITE

- <https://niki2423.github.io/>



FINAL OUTCOME

- Our development team will deliver a fully functional mobile application that can capture and upload skin lesion images
- Images will be analyzed using an optimized CNN model
- Users will receive real-time predictions directly on their mobile device
- App will demonstrate a practical integration of machine learning into mobile software
- App will empower users to monitor their skin health, encourage professional consultations, and contribute to the broader goal of reducing the impact of skin cancer word wide

