Project Plan
Product-based Capstone Project

Team ID : CH2-PS175

Team Member :

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Final Selected Themes:

Health Innovation: Empowering Vulnerable Communities for Health and Well-being

Title of the Project:

[Care Your Skin: Skin Disease Diagnosis]

Executive Summary/Abstract:

The data from Pitewi Community Health Center in the East Arso District of Keerom Regency reveals a troubling upward trend in skin disease cases over the past three years. The number of reported cases has escalated from 93 in 2019 to 116 in 2020, and further to 134 in 2021. This surge has propelled skin diseases into the list of the top ten health concerns plaguing the community, underscoring a critical need for increased public awareness and proactive measures towards skin health maintenance.

By prioritizing preventive measures, such as regular skin screenings and protective practices, healthcare systems can experience a significant decrease in the demand for extensive treatments, leading to lower medical costs. Additionally, heightened awareness and proactive attitudes towards skin care can substantially improve individuals' skin health, which is closely linked to increased comfort and self-esteem, enhancing their overall well-being.

The purpose of skin diagnosis applications represents a significant advancement in dermatological healthcare, offering a user-friendly and efficient approach for individuals to monitor their skin health, thereby supporting early detection and personalized care strategies. This app will also help the user to find nearby hospitals according to their location. For this first phase of development, we limit the hospitals only for hospitals in big cities in Indonesia

How did your team come up with this project?

The advent of skin detection applications marks a significant shift from traditional methods, primarily due to their enhanced efficiency. These applications, powered by advanced machine learning algorithms, offer a more time and cost-effective solution, eliminating the constant need for a doctor's presence. They are designed to provide quick and accurate diagnoses, thereby streamlining the process significantly. This technological advancement not only expedites the diagnostic process but also ensures a high degree of accuracy,

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making it a revolutionary step in the field of dermatology. Thus, the integration of these applications signifies a transformative approach in healthcare, bridging the gap between technology and medicine.

Project Scope & Deliverables:

Project Scope: The objective of this project is to classify the skin disease by user-uploaded image of the skin disease. This app will analyze the image that has been given and classify the disease. Along with the result, this app will provide the description of the disease, suggestion, and nearby hospitals. The features itself depends on the user plan whether it's free/premium plan.		
Week	**Task**	**Deliverables**
1	**Machine Learning**	
	Collecting dataset	Collect image dataset about skin disease found on internet
	Learning and understanding the dataset	Exploring and preparing the datasets before preprocessing, splitting, and analyzing class distributions. The deliverables include a comprehensive report detailing dataset characteristics, class distribution analysis, and recommendations for optimizing dataset quality and model performance.
	Mobile Development	
	Create User Flow	Make user flow for navigation app skin disease
	Create UI Design	Create the user interface of the application
	Cloud Computing	
	Create database	Create and finalize the application database structure

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	API document	Complete the API document agreement between cloud computing and mobile development
2	**Machine Learning**	
	Exploratory Data Analysis and Preprocessing	Analyze, visualize, normalize, resize the data
	Literature study about various powerful deep learning model for skin disease classification	A good model is critical to generate good accuracy.
	Developing the classification model and improve the model through hyperparameter tuning	Generating a good model
	Mobile Development	
	Star Frontend programming	Start making the User Interface of the application
	Start backend programming	Start creating functionality of application features
	Cloud Computing	
	Create Backend	Initiate backend API services
3	**Machine Learning**	
	Modelling data	Make model to classify data with tensorflow
	Measure performance and evaluate	Measure the accuracy of classification and evaluate the result
	Model deployment	Deploy the skin disease classification model to the into application
	Mobile Development	

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	API implementation	Implementing API services provided by Cloud Computing
	Continuing frontend and backend	Continuing the process from the previous week
	Deploy ML model	Applying machine learning models into applications
	Cloud Computing	
	Backend testing and evaluation	Finalizing backend API services
4	**Machine Learning**	
	Final testing and model improvement	Final step of integration
	Mobile Development	
	Additional Pages & Animations	Add supporting pages and other animations to make the application look attractive.
	Testing	Try to do some Unit testing and UI testing to see how it works. Find some bugs and errors before finalizing it
	Evaluation and bug fixing	fix some bugs and errors which has been found from testing
	Final integration	Final integration about the Machine Learning model ,API service,optimizing the application
	Cloud Computing	
	Final backend integration	Final integration about the backend API service, database, and frontend application

a. **Project Scope**

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- Build a neural network model to classify skin diseases.
- Provide knowledge and mitigation about skin diseases.
- The application can detect skin disease from images.

b. Deliverables

- Users know about their skin diseases.
- Users can upload their images.

Project Schedule:

Week 1 (20-26 May)	Collecting dataset	**Machine Learning**
	Learning and understanding the dataset	**Machine Learning**
	Create User Flow	**Mobile Development**
	Create UI Design	**Mobile Development**
	Create database	**Cloud Computing**
	API document	**Cloud Computing**
Week 2 (27 May-2 June)	Exploratory Data Analysis and Preprocessing	**Machine Learning**
	Literature study about various powerful deep learning model for skin disease classification	**Machine Learning**
	Developing the classification model and improve the model through hyperparameter tuning	**Machine Learning**
	Star Frontend programming	**Mobile Development**
	Start Backend programming	**Mobile Development**
	Create backend	**Cloud Computing**
Week 3 (3-9 June)	Modelling data	**Machine Learning**

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	Measure performance and evaluate	**Machine Learning**
	Model deployment	**Machine Learning**
	API implementation	**Mobile Development**
	Continuing frontend and backend	**Mobile Development**
	Deploy ML model	**Mobile Development**
	Backend testing and evaluation	**Cloud Computing**
Week 4 (10-20 June)	Final testing and model improvement	**Machine Learning**
	Additional Pages & Animations	**Mobile Development**
	Testing	**Mobile Development**
	Evaluation and bug fixing	**Mobile Development**
	Final integration	**Mobile Development**
	Final backend integration	**Cloud Computing**

Based on your team's knowledge, what tools/IDE/Library and resources that your team will use to solve the problem?

- Tensorflow Keras:
  - Conv2D
  - Sequential
  - Dense
  - ImageNet
  - VGG-16
- Google Colab
- Python:
  - numpy
  - pandas

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    - os
    - shutil
    - matplotlib
- Git/Github
- Android Studio
- Figma
- Retrofit library
- Tensorflow Lite For Android

Based on your knowledge and explorations, what will your team need support for?

- **Machine Learning**
    - Image datasets of skin disease
    - Mentor who understands preprocessing and modelling data
- **Mobile Development**
    -
- **Cloud Computing**
    - Require more credit for Google Cloud Platform expenses if they exceed the provided limit
    - Mentor who understands API development and Cloud Infrastructure integration

Based on your knowledge and explorations, tell us the Machine Learning Part of your Capstone!

In our project, we employ a training process that utilizes transfer learning and fine-tuning to train our model. This approach allows us to leverage pre-existing models and adapt them to our specific needs, enhancing efficiency and performance. Our model requires a substantial dataset, which includes both skin disease cases and healthy skin examples. This diverse dataset enables our model to learn and differentiate effectively between various skin conditions and healthy skin. When it comes to deployment, we opt for either TensorFlow Lite (TFLite) or TensorFlow.js

Based on your knowledge and explorations, tell us the Mobile Development Part of your capstone?

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The Mobile Development implementation within our team starts with creating a UI design on Figma, aiming to facilitate the slicing process later on Android. Subsequently, during the implementation phase, we utilize Android Studio with Kotlin language. We will integrate machine learning and camera features to detect skin diseases, following which the application will provide information regarding the disease, treatment, and nearby hospitals that can assist the patient. Firebase will be employed to acquire up-to-date information on skin diseases.

User Interface and Prototype of the application :
https://bit.ly/UI_and_Protoype_SkinHealth

User Flow of the application :
https://bit.ly/UserFlowSkinHealth

Based on your knowledge and explorations, tell us the Cloud/Web/Frontend/Backend Part of your capstone?

The cloud implementation in our project is primarily accommodating backend services, possibly using a regular compute engine to suit the environment used by the machine learning division. We in the cloud computing division will create a HAPI-based API in nodejs environment for authentication and authorization to serve as a login, register and user authentication function in this application. The other API that we will create is the machine learning model API so that the frontend application interacts with the machine learning model backend service regarding skin diseases diagnosis function. We also prepare a database to store user accounts and user chat data with doctors in premium features.

Based on your team's planning, is there any identifiable potential Risk or Issue related to your project?

Potential risks during the implementation of this capstone project include misidentification of skin diseases, leading to patient distrust. Key issues include:

- Project Deadline: Unforeseen challenges, scope creep, or resource constraints could delay completion. To mitigate this, we prioritize essential tasks to ensure timely completion.

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- Technical Issues: Problems such as force closure, freezing, lagging, and user anxiety due to insufficient knowledge can occur. These are often due to code bugs, memory leaks, or OS compatibility issues. Our approach is to break down problems into smaller parts and solve them methodically.

- Limited Datasets: With an estimated total of around 10,000 images for training, validation, and testing, there's a risk of model overfitting. We plan to augment this number by combining datasets from different sources, performing image augmentation, and considering transfer learning techniques.

- Integration and Compatibility: This requires effective teamwork and understanding of each other's tasks. Unforeseen issues may arise during the integration process. To avoid this, we allocate time every week for maintaining good communication among team members.

By addressing these potential risks and issues proactively, we aim to ensure the successful implementation of our project.

Any other notes/remarks we should consider on your team's application

Our decision to focus on skin disease detection aligns with our team's collective spirit to leverage technology in healthcare. We recognize the social impact of addressing health issues and are dedicated to ensuring the success of the project through careful planning, collaboration, and a proactive approach to overcoming potential challenges. Our team is very enthusiastic about the opportunity to contribute meaningfully to the field of healthcare services.