Project Plan
Product-based Capstone Project

Problem Statement:
Indonesia is a source of world microalgae megabiodiversity but its potential has not yet been optimized, even though there are many potential benefits from microalgae entrepreneurship. Only a few people know how to use microalgae. On the other hand, many microalgae researchers or people who have studied microalgae cultivation techniques are unable to get work in the field of optimizing the potential of microalgae in industry. There is also a lack of industry that can improve environmental conditions, especially in terms of carbon emissions

Research Questions:
1. How to optimize the potential of microalgae biodiversity in Indonesia?
2. How can people who don't know how to cultivate microalgae still contribute to reducing carbon emissions by using microalgae?
3. How to create job opportunities for microalgae researchers?
4. How can we increase the number of industries that can improve the environment, one of which is by reducing carbon emissions?

Team ID : CH2-PS524

Team Member :

1. (ML) M227BSY0018 – Ahmad Nur Rozzaq – Universitas Jember - [Active]
2. (ML) M204BSY1214 – Muhamad Sadam Akbar –Universitas Esa Unggul- [Active]
3. (ML) M008BSY1221 – Sofyan Maulana – Universitas Gadjah Mada - [Active]
4. (CC) C318BSY4051 – Fazri Firdaus – Universitas Sultan Ageng Tirtayasa - [Active]
5. (CC) C172BSY3868 – Muhammad Hadyan Yazid – Universitas Mikroskil - [Active]
6. (MD) A129BSX1931 – Feby Anggraini Firdatullail – Politeknik Negeri Jember - [Active]

Project Plan
Product-based Capstone Project

Final Selected Themes:
Sustainable Living

Title of the Project:
AlgaLife

Executive Summary/Abstract:

Indonesia's vast microalgae biodiversity remains underutilized, despite its potential for significant benefits in entrepreneurship. Limited knowledge on microalgae usage persists, and researchers skilled in cultivation struggle to find opportunities in the industry. The scarcity of eco-friendly industries, particularly those addressing carbon emissions, further compounds environmental challenges. We have some research questions:

1. How to optimize microalgae biodiversity's potential in Indonesia?
2. How can individuals unfamiliar with microalgae cultivation contribute to reducing carbon emissions?
3. How to create job opportunities for microalgae researchers?
4. How to boost the number of industries improving the environment, specifically by reducing carbon emissions?

Indonesia's tropical climate makes it an ideal habitat for various microalgae types. However, widespread ignorance about microalgae cultivation persists. Microalgae, abundant in various water bodies, remains an untapped resource for profit. The minimal awareness of the microalgae industry in Indonesia hinders its potential benefits, including carbon absorption and sustainable land use.

Our team addresses this issue to bridge the gap between environmentally conscious investors and the untapped potential of microalgae. Additionally, we aim to provide job opportunities for microalgae researchers. Tackling Indonesia's high CO2 pollution, land crisis, and inadequate wastewater treatment aligns with our mission to explore the mega biodiversity of microalgae for sustainable solutions.

How did your team come up with this project?
We began with brainstorming and spent about two weeks individually reflecting on proposed ideas. Some of us revised or improved previous suggestions. Following this, we held a discussion to finalize our choice—AlgaLife, an investment app for various microalgae species. Users input capital and specify their desired profit waiting duration. AlgaLife caters to environmentally conscious investors (philanthropists and green warriors), creates job opportunities for microalgae researchers, initiates the green industry in Indonesia, and explores Indonesia's microalgae mega biodiversity potential.

Project Plan
Product-based Capstone Project

Project Scope & Deliverables:

AlgaLife features:

A. Alga Invest : Investment with certain input capital and desired profit waiting duration

B. Alga Pedia : interactive encyclopedia about various microalgae properties and economical value

Team member role and responsibilities table :

Name	Role	Responsibilities
Muhammad Hadyan Yazid	Project Manager	• Planning & scheduling • Prepare resources • Monitor task progress on each member • Defining project scope
Sofyan Maulana	Machine Learning Engineer	• Design ML systems • Collecting data • Formulate Business Model • Doing tests and experiments
Feby Anggraini Firdatullail	Mobile Developer	• Planning and analysis • Design application • Implementation to sources code program • Testing
Fazri Firdaus Muhammad Hadyan Yazid	Cloud Engineer	• Building database • Create application API • Maintaining cloud infrastructure
Muhamad Sadam Akbar	UI/UX Designer	• Doing UX research • Optimize user experience • Design high-fidelity prototype • Illustrate design ideas
Ahmad Nur Rozzaq Muhammad Hadyan Yazid	DevOps Engineer	• Deploy application • Testing

Project Plan
Product-based Capstone Project

Team task & deliverables:

Week	Role	Responsibilities
0	All Teams Member	• Creating the project plan document
1	Project Manager	• Prepare resources • Monitor task progress on each member
	Machine Learning Engineer	• Determining and Planning ML Strategies
	Mobile Developer	• Planning • Analysis
	Cloud Engineer	• Database planning • Cloud Infrastructure Planning • Database build
	UI/UX Designer	• Doing UX research
	DevOps Engineer	• Cloud Infrastructure planning
2	Project Manager	• Monitor task progress on each member
	Machine Learning Engineer	• Formulating Profit Calculation • Collecting data
	Mobile Developer	• Design Application
	Cloud Engineer	• API Research • API Development • Creating Cloud Infrastructure
	UI/UX Designer	• Doing UX research • User Interface Design (UI Design)
	DevOps Engineer	• Creating cloud infrastructure

Project Plan
Product-based Capstone Project

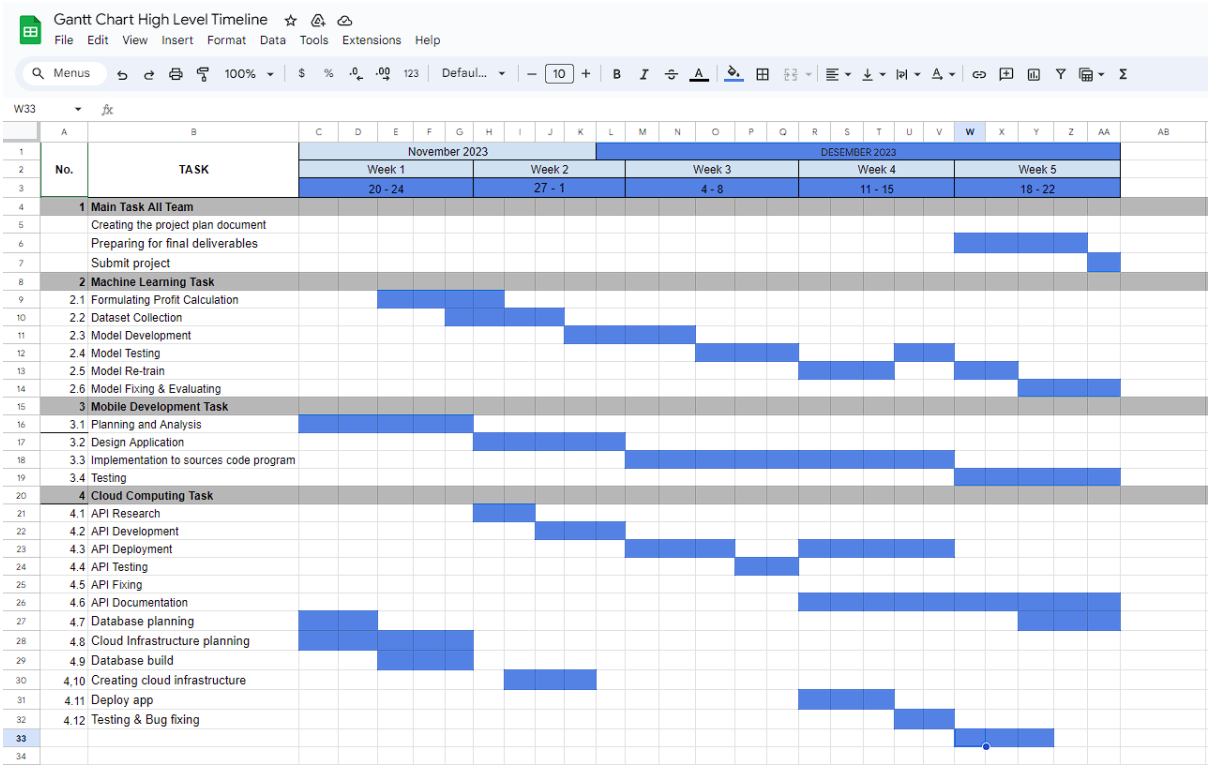
3	Project Manager	• Monitor task progress on each member
	Machine Learning Engineer	• Define machine input & output to cloud engineer • Model testing • Model evaluation
	Mobile Developer	• Implementation to sources code program
	Cloud Engineer	• API Deployment • API Testing
	UI/UX Designer	• User Interface Design (UI Design) • Optimize user experience
4	Project Manager	• Monitor task progress on each member
	Machine Learning Engineer	• Model retrain • Model fixing, debugging, and evaluating
	Mobile Developer	• Implementation to source code program
	Cloud Engineer	• API Deployment • API Documentation • Deploy App • Testing & Bug Fixing
	UI/UX Designer	• Continuous designer updates
	DevOps Engineer	• Deploy app • Testing & Bug fixing
5	All Teams Member	• Preparing for final deliverables • Submit project
	Machine Learning Engineer	• Model retrain • Model fixing, debugging, and evaluating
	Mobile Developer	• Testing App

Project Plan
Product-based Capstone Project

	Cloud Engineer	• API Documentation • Testing & Bug Fixing
	UI/UX Designer	• Design high-fidelity prototype • Presentation of design ideas
	DevOps Engineer	• Testing & Bug fixing • Maintaining Cloud infrastructure

Project Schedule:

Gantt Chart Timeline: Gantt Chart High Level Timeline



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

1. Machine Learning

Project Plan
Product-based Capstone Project

- TensorFlow: Utilized for creating a Neural Network for content-based filtering, incorporating two networks (user content and item content) combined by a dot product.
- Keras: Employed for designing and implementing the Neural Network for content-based filtering within TensorFlow.
- Regression: Multiple regression (2 main features: capital, and desired duration to get profit) using vectorization.
- Scikit-learn, including feature scaling as a means of improving convergence train_test_split to split, shuffle the data, and evaluate the results.
- Python Notebook: Used for coding and experimentation in a collaborative environment.
- TFLite for applying TensorFlow Model in Android
- Transfer Learning: Explored for potential enhancements in model performance.

2. Mobile Development
   - Android Studio: The primary IDE for building the Android application
   - Live Data: Utilized for observing changes in data and ensuring a responsive user interface.
   - SQLite Database: Employed for local data storage within the mobile application
3. Cloud Computing
   - Google Cloud Platform (GCP): Chosen for cloud services, deployment, and overall project infrastructure.
   - Cloud SQL: Utilized for storing datasets securely and efficiently.
   - API Development: Conducted using appropriate tools and frameworks for seamless communication between different components of the project.

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

General:

1. Establishing partnerships with multiple microalgae cultivation farm
2. Collaboration with companies that use microalgae biomass as an ingredient in their product
3. Engaging with local communities as cooperative associates

Mentor:

1. Seeking mentorship for application development, encompassing both technical expertise and broader guidance.

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

Project Plan
Product-based Capstone Project

Recommender System using TensorFlow in the form of Content-Based Filtering.
ML part also will implement machine learning for profit calculation so we can optimize and predict how much received profit based on users input capital, their desired profit waiting duration, availability and amount of cultivator, buyers of microalgae biomass, and investors.

Based on your knowledge and explorations, tell us the Mobile Development Part of your capstone?
Part of the Mobile development build up application with Kotlin to be created in the Android Studio app. Looking for references for the appearance of the application design that will be made to be user friendly. Implementation into a programming language so that you can move activity to other activity.

Based on your knowledge and explorations, tell us the Cloud/Web/Frontend/Backend Part of your capstone?
The Cloud Computing team will initially conduct research on the implementation of the machine learning model. After compiling the required steps, we will move forward with the essential API development procedures. To guarantee the stability and reliability of our application, we will employ a range of Google Cloud services for deployment and we will utilize Cloud SQL to store the datasets.

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

- Many people are still not familiar with microalgae
- Microalgae cultivation farms in Indonesia are still quite rare.

Any other notes/remarks we should consider on your team's application
AlgaLife, with its commitment to fostering a green industry in Indonesia, seeks to create employment opportunities for microalgae researchers, thereby contributing to the growth of the green sector in the country. Our collective goal is to not only serve the interests of our environmentally conscious investors but also to initiate a positive change in Indonesia's green landscape. Our dedicated team is enthusiastic about developing this project and bringing innovative ideas to the forefront, ensuring the continuous improvement of AlgaLife in the future.