Project Plan for Bangkit 2022 Product-based Capstone

Problem Statement

Wayang is a traditional Indonesian performing art that developed on the islands of Java and Bali. However, quoted from the famous puppeteer Ki Manteb Sudarsono, this art has lost its existence over time and has difficulty competing with modern entertainment. This is due to the lack of people's knowledge about wayang, especially about its characters. There are hundreds of wayang characters, so it's quite difficult to memorize them. Therefore, there needs to be a technological solution that makes it easy to access information about wayang characters.

Research Questions

- What are the wayang characters in Indonesia?
- How can mobile apps help recognize Indonesian wayang characters?
- What impacts can be given from this app for the preservation of Indonesian wayang?

Team ID: C22-PC383

Active Team Member:

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Inactive Team Member:

- **(ML) M2405F2972 - Muhammad Syiarul Amrullah - Politeknik Pos Indonesia**
- **(CC) C2277G2380 - Achmad Gifari - Universitas Negeri Jakarta**

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Final Selected Themes
Tourism, Creative, and Digital Economy

Title of the Project:
Wacayang, Indonesian Wayang Kulit Characters Detection App

Executive Summary/Abstract:
Wayang is a traditional performing art that has been designated by UNESCO as a Masterpiece of Oral and Intangible Heritage of Humanity from Indonesia on November 7, 2003. However, the existence of wayang continues to decline because ordinary people do not know the story or background of the character of wayang characters so they are less interested. For example, the number of wayang characters that only exist in the Ramayana story is 300+ different characters, not to mention the types of puppets and their origins. Therefore, it is quite difficult to study the various kinds of wayang characters. With mobile phone users in Indonesia reaching 370 million, our team sees that wayang preservation can be done through a mobile application. Therefore, our team wants to preserve and popularize this culture to the public by creating a wayang character detection application, focusing on wayang kulit, and presenting the information in an attractive way in this Wacayang app.

How did your team come up with this project?
Several members of this team come from Java. In Java, there are Javanese language subjects that discuss Javanese culture including Indonesian wayang. This subject has been studied from elementary school to high school. However, even though they have been studying, students, including members of this team, tend to have forgotten about the wayang culture lesson. This is because apart from being complex, the motifs and patterns of wayang characters tend to be similar to one another. In addition, most of the Javanese language textbooks are still in black and white, making them less interesting and difficult to remember.

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Project Scope & Deliverables:

Project Scope:
Create a mobile application that is able to identify Indonesian wayang kulit characters. We will use images uploaded by the user as input, and the information about the name, description, image, and related video about the identified wayang character will be displayed on the app.

Week	Learning Path	Task	Deliverables
1	Mobile Development	Create use cases and user flow.	User flow, use cases.
		Create design guidelines.	UI/UX design.
		Design mock up and analyze the design.	Mock up that implement design guidelines and satisfy the user flow and use cases.
	Machine Learning	Searching and gathering wayang kulit image	Datasets
		Pre-Processing Data	Clean Datasets
	Cloud Computing	Design required data to be used on the app.	Relation data ERD.
2	Mobile Development	Build an Android app based on mock up and design guidelines.	Android app with expected design and user flow.
		Make a dummy network request using a dummy API and Retrofit.	Android app that is able to communicate with the network.
	Machine Learning	Build image classifier model	Functional Model that can predict input image
		Saving model	Saved model.
		Converting model	Model with different format to make deployment easier

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	Cloud Computing	Set up MongoDB.	Database.
3	Mobile Development	Start testing and connect with real cloud services.	Android app that should be able to post and get data from real cloud service.
		Test the main functionality of the app.	App should be able to post wayang images to the server and gain information about the identified wayang.
	Machine Learning	Build and test improved model.	Model with more than 60% accuracy.
		Saving model.	Saved model.
		Converting model.	Model with different format to make deployment easier
	Cloud Computing	Create a data diagram, authentication, authorization.	API endpoints with token header.
4	Mobile Development	Keep polishing and testing the app with real cloud services.	Android app that should be able to post and get data from real cloud service.
	Machine Learning	Advance dataset pre-processing.	Improved dataset to help model generalize better.
	Cloud Computing	Polish API endpoints.	API documentation.
5	Mobile Development	Finishing the app.	Polished app integration with ML and cloud computing, perform tests, and deploy.
	Machine Learning	Build and test improved model.	Improved image classifier model with more than 80% accuracy.
		Saving the best model.	Saved model.

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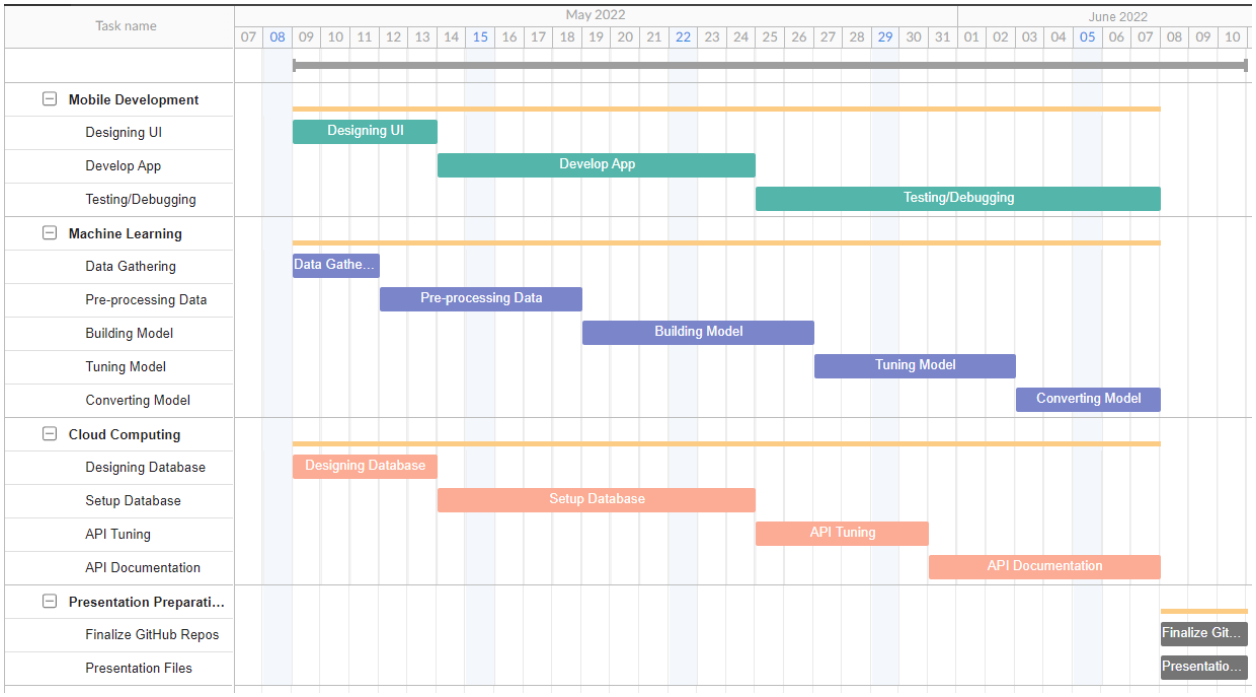
		Converting model.	Model with different format to make deployment easier.
	Cloud Computing	Documentation with postman.	API documentation to make it easier for developers to understand.

Project Schedule:

Week 1 : 9-14 May 2022
Week 2 : 16-21 May 2022
Week 3 : 23-28 May 2022
Week 4 : 30 May-4 June 2022
Week 5 : 6-10 June 2022
Working Days : Monday-Saturday (29 Days)



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

Task	Resource	Description
Documentation	Google Docs	Create documents required for project progression.
	Google Drive	Storage for important files.
	Github	Version control platform.
Meeting	Google Meet	Create room for daily meetings.
	Google Calendar	Make schedules for daily meetings.
	Discord	Text communication channel.
Build Machine Learning Model	TensorFlow	End-to-end deep learning framework.
	Keras	High level neural network API.
	Matplotlib	Library to help visualize model accuracy and loss per epoch.
	Jupyter	Notebook platform to execute machine learning model.
Build App Design and The Actual Android App	Figma	Web app to create wireframe, mock up, and high-fi prototype.
	Android Studio	IDE to create XML layout and Android app functionality.
	Retrofit	Library to connect and make network requests.
	Flaticon, Material.io, Google Fonts	Resource for icons and fonts for Android app.
Cloud Computing	Postman	Simplify documentation and test

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		REST API.
	MongoDB	Database platform.
	draw.io	Create diagrams based on data needs.
	Sublime Text	Text editor used in writing code.
	Google Cloud	Deploy API in Google Cloud platform.
	Library node and express	To fasten cloud service development.
	CMDer	Terminal.

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

Supporting Item	**Description**
Mentor	Mentors who can help and teach how to integrate output from machine learning, cloud computing, and with mobile applications. Especially, specialized in cloud back-end to create APIs that connect machine learning and mobile applications.
Wayang Dataset	https://www.kaggle.com/datasets/bayuokta/wayang-bagong-cepot-gareng-petruk-semar
Development References	CNN to determine the character of wayang kulit. https://pubs2.ascee.org/index.php/viperarts/article/view/373

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Based on your knowledge and explorations, tell us the Machine Learning Part of your capstone?

The machine learning part is to create a machine learning model using TensorFlow to help identify wayang kulit characters. The model will use Convolutional Neural Network to extract features from the input image. These extracted features will help the neural network learn about the image.

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

The mobile development part is to create an end-user Android application using Android Studio, that meets the criteria for this project plan. These criteria include implementing the Retrofit network request properly, uploading images for wayang identification using Camera X or the gallery, and design an XML UI/UX layout.

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

The cloud computing part is on the back-end in API development using Node.js with MongoDB storage database, this API is used to communicate data that will be used in applications.

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

Risk	Likelihood	Impact	Risk response
Model prediction accuracy too low.	Medium	The model can't classify wayang kulit image.	Build a more complex model/try using transfer learning.
App network requests failed or were slow.	Low	The app needs to wait for incoming data from the network service.	Make sure the data for wayang classification submitted to the network request is not null. Display loading or error status on the app if necessary.
Network bad request.	Low	API service not found.	Return error JSON object.

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

Due to the fact that there are two inactive team members (M2405F2972, C2277G2380), there may be some limitations in working on this project. However, the active members of our team will try our best to work on this project with the best results.