Project Plan for Bangkit 2023 Product-based Capstone

Team ID : C23-PS209
Team Member :

Path	Bangkit ID	Name	University	Status
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CC	C227DSX0761	Glenn Steven Santoso	Universitas Kristen Petra	Active
CC	C038DSX0839	Okyan Awang Ramadhana	Institut Teknologi Sepuluh Nopember	Active

Final Selected Themes:
Education, Learning, and Personal Development

Title of the Project:
Baksara

Executive Summary/Abstract:
Aksara Jawa, the traditional script of the Javanese language, holds immense cultural and historical significance in Indonesia. Its use in letters, manuscripts, and charters dates back to the 1500s and has played a pivotal role in shaping the Javanese culture. Despite over 60 million Javanese speakers in Indonesia, only a small fraction of them can read and write Aksara Jawa fluently, leading to concerns about the script's preservation.

Our team aims to address this problem by developing an Aksara Jawa learning app that leverages digital technology to make learning the script more accessible and engaging for millennials. The lack of effective learning resources has hindered the spread of Aksara Jawa, and we believe that our app can help reverse this trend. By utilizing interactive features and gamification, our app will provide a fun and effective way to learn the script, thereby increasing its usage and preserving its cultural significance.

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How did your team come up with this project?

We came with a shared concern about the decreasing use and understanding of Aksara Jawa among younger generations. We felt that there was a need to create an innovative solution to help preserve and raise awareness about Aksara Jawa. We discovered that there were very few resources available for learning Aksara Jawa that used digital technology. Most of the available apps only provided transliteration, and learning was still mostly done through the conventional Pepak Aksara Jawa. We saw this as an opportunity to develop an Aksara Jawa Learning Application that could help make learning the script more accessible and engaging.

Project Scope & Deliverables:

<table>
<tr><th>Day</th><th>ML</th><th>MD</th><th>CC</th><th>Deliverable</th></tr>
<tr><td colspan="5">Week 1</td></tr>
<tr><td>1</td><td colspan="3">Define Application Requirements and Features</td><td>Application Requirements Document</td></tr>
<tr><td>2</td><td rowspan="2">Define Machine Learning Requirements</td><td>Create Case Study</td><td rowspan="2">Create database design, Authentication and Authorization API, including google auth with firebase</td><td>Case Study</td></tr>
<tr><td>3</td><td>Create Design System</td><td>ML Requirements Document, Fixed Data Flow Design</td></tr>
<tr><td>4</td><td rowspan="2">Collect Aksara Jawa Dataset</td><td rowspan="3">Create High-Fidelity Prototype</td><td>Create basic CRUD API for User Progress</td><td>User Progress API</td></tr>
<tr><td>5</td><td rowspan="2">Integrate with Cloud SQL and GraphQL interface</td><td>Raw Aksara Dataset</td></tr>
<tr><td>6</td><td>Preprocess Dataset</td><td>High-Fidelity Prototype, Database Integration</td></tr>
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Week 2				
8	Preprocess Dataset	Create Basic Framework for The Application (Login/Register, Learning Module, Dictionary, User Profile)	Deploy application to App Engine	Aksara Dataset Ready To Use
9	Build Machine Learning Model			Basic API ready to use (testing)
10			Website Preparation	
11				
12	Train Machine Learning model		Create Website and Create a backup in Cloud Storage	Data Ready to be Backed Up According to the Interval
13	Evaluate Machine Learning model		Create Website and Integrate with Cloud Run	
Week 3				
15	Optimize Machine Learning Model		Create Website, Buy Domain and Build CI/CD Pipeline with Cloud Build	Android Application's Main Framework
16		Create Additional Features (Canvas, Aksara Article, Aksara Scanner)		Development and deployment with CI/CD,

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				Domain Ready To Use
17				ML Model Ready To Use, Android Application with Additional Features
18	Deploy Machine Learning Model	Implement Gamification (Experience, Achievement)	Deploy Website, Maintaining API and routine daily-checkup for Database	Observing and maintaining data needs for the upcoming event
19				Android Application with Gamification Features
20	Integrate Machine Learning Model into Website and Application	Implement Machine Learning Model to Canvas & Scanner		Updating and monitoring API, Website Ready To Use
Week 4				
22	Integrate Machine Learning Model into Application	Implement Machine Learning Model to Canvas & Scanner	Monitoring API and routine daily-checkup for Database	Machine Learning Integration, Android Application with Completed Features
23	Test machine Learning Integration and Fix Bugs	Application Enhancement, Application Testing		Stable API version, label it to alpha testing

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24				
25				ML Model Bug Fixed
26	Finalize Application Development and Testing			API labeled to v1.0.0
27				Application Tested and Bug Fixed
Week 5				
29	Presentation Preparation			
30				
31				Presentation Ready

Project Schedule:

Milestone	Week 1	Week 2	Week 3	Week 4	Week 5	PIC
Application Concept						All
Mobile App Design						Rony, Arifin
Dataset Collection						Arifin, Rudi
Mobile App Basic Framework						Hans
Database Design, Local						Okyan, Glenn, Rudi

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initiation (Express.js, GraphQL)						
Machine Learning Model						Rudi, Arifin
API Deployment for development environment						Okyan
Create logging and monitoring at GCP						Glenn
Mobile Main Framework						Rony
Gamified Implementation (Mobile)						Hans
Deployment stabilized using CI/CD pipeline						Okyan, Glenn
Website Development						Glenn, Okyan, Arifin
UI / UX Enhancement						Rony
Model Deployment						Rudi, Arifin
API monitoring and maintenance						Glenn, Okyan
Website Testing						Glenn, Rony, Rudi
Mobile Testing						Okyan, Hans, Arifin
Presentation Preparation						All
Stable API						Glenn, Okyan

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version						

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

Name	Type	Category	Used For
Visual Studio Code	IDE	General	Writing Code
Github	Tools	General	Code Repository and Maintaining Version for our code
Notion	Tools	General	Write Documentation, Links, and other resources.
Google Colab	IDE	ML	Workspace for Machine Learning Team
Tensorflow	Library	ML	Main Library for developing Machine Learning Model
Numpy	Library	ML	Accelerating the process time when working with array
Pandas	Library	ML	Read data on various format and Do manipulation on the data
Matplotlib	Library	ML	Creating Visualization for Machine Learning Model Evaluation
OpenCV	Library	ML	Processing Image into array that will be used as an input in prediction
Tensorflow Lite	Library	ML	Model deployment on mobile application
Tensorflow JS	Library	ML	Model deployment on website
Aksara Jawa Dataset	Resources	ML	Training, Validation, and Testing Data on Machine Learning Model
Android Studio	IDE	MD	Workspace for Mobile Development Team

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Figma	Tools	MD	Create Digital Wireframe and High Fidelity Prototype
Material 3	Resources	MD	Create Standard Design System for UI Components, Fonts, and Color Palettes
LottieFiles	Resources	MD	Animation, Image, Logo/Icon Resource for UI / UX
Glide	Library	MD	Converting Image from URI References to ImageView
Retrofit	Library	MD	Manages the Process of Receiving, Sending, and Creating HTTP Requests and Responses from Android Interface
CircleImageView	Library	MD	Create Circle Image view for Circular Images
Drawing Canvas Library Arsenal	Library	MD	Create Canvas for Drawing Aksara
Mockito	Library	MD	Framework for Unit Testing
Espresso	Library	MD	Framework for UI Testing
Room, Datastore	Library	MD	Acting as database for the Android App
Express.js	Library	CC	Developing back-end system as the main framework
GraphQL	Library	CC	Database interface system
Google Cloud Platform	Tools	CC	Deploying application and managing resources
App Engine	Resources	CC	Deploying application to Google Cloud Platform
Cloud Run	Resources	CC	Deploying application and or website to Google Cloud Platform with CI/CD pipeline

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Bucket	Resources	CC	Deploying SPA website
Firebase	Resources	CC	Database for authentication
Cloud SQL	Resources	CC	Main database for application
Cloud Terminal / Terminal	Tools	CC	Accessing and running command at Cloud Terminal

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

- Obtaining an Aksara Jawa Dataset
- Gathering stories about Aksara Jawa from local people
- Understanding the rules of Aksara Jawa transliteration

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

The Capstone project aims to develop a machine learning model using Tensorflow to recognize and transliterate Aksara Jawa characters for a mobile application and website. The model will check the level of similarity between the user's input and the actual character for the mobile app, and for the website, it will be used to recognize characters written on a canvas. The model will be a CNN-LSTM and deployed on mobile devices using Tensorflow Lite and on the website using Tensorflow JS.

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

The application will include e-learning materials for Aksara Jawa, articles about Aksara Jawa, a dictionary to help users look up words in Aksara Jawa, Wayang stories written in Aksara Jawa, and gamification. The app will be developed using Android Studio with MVVM architecture, Retrofit, Room, Canvas, and Camera enabling users to learn about and interact with Aksara Jawa on a user-friendly platform.

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

Google Cloud Platform (GCP) services such as App Engine and Cloud Run will be used to deploy and manage the Aksara Jawa learning app, while React JS will be used for the frontend web and Express JS and GraphQL for the backend web and API. The app will be developed in a fully managed serverless environment using Google Cloud Run and Google Cloud SQL, with a continuous integration and delivery (CI/CD) pipeline set up using Google Cloud Build.

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

Potential Risk	Likelihood Probability	Impact Category	Contingency Plan
Missing Team Member	Unlikely	Moderate	Call missing team member's parent
Unequal distribution of workload among team	Unlikely	Moderate	Regularly review team member workload to ensure that tasks are evenly distributed.
Data loss or corruption	Unlikely	Major	Implement data backup and recovery procedures.
Technical difficulties with project technology	Likely	Minor	Conduct thorough research on the chosen technology, allow time for learning and experiment, also prepare a backup plan in case of technical issues.
Compatibility issues with different devices	Likely	Minor	Test the app on various devices and release updates to fix compatibility issues.
Inadequate app performance	Likely	Minor	Conduct thorough testing to identify and fix performance issues, optimize the app's code and resources.
Disagreements among team members about project	Likely	Moderate	Encourage open and honest communication among team members, establish clear project goals and objectives.
Communication breakdown between team members	Likely	Moderate	Schedule regular team meetings, use collaboration tools such as Notion to keep everyone updated.

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Inaccurate model output	Likely	Moderate	Retrain the model and adjust model parameters. Consider reviewing the model architecture.
Unexpected costs or budget overruns	Likely	Major	Monitor usage and costs regularly, use cost management tools provided by the cloud infrastructure provider and prepare extra budget cap (budget runoff).
Inadequate user interface design	Very Likely	Moderate	Conduct user testing to gather feedback and get feedback from mentor
Insufficient training data	Very Likely	Moderate	Conduct thorough research to identify available sources of data training. Consider using data augmentation.
Back-end code unexpected error	Very Likely	Moderate	Making sure the testing stage is already done correctly and anticipating all the potential risks ahead and trying to minimize the potential errors.
Inadequate time management	Very Likely	Major	Create a project timeline with clear deadlines for each task, regularly review progress and adjust the timeline as necessary.

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