Project Plan for Bangkit 2023 Product-based Capstone

Team ID : C23-PS090

Team Member :

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Final Selected Themes:

Education

Title of the Project:

ZooMates: App-based Real-Time Animal Recognition Technology for Early Childhood Interactive Learning

Excecutive Summary/Abstract:

Early childhood is a crucial stage for learning due to the high ability to capture information. Education at this time is very important, especially about developing an understanding of the animal world. However, conventional learning such as picture books and videos do not provide maximum interaction and are less attractive to children. Therefore, our team wanted to create an animal detector application that can help children to learn and interact with the animal world in a fun way.

This application will be equipped with an animal detection feature via a camera, so that children can learn about the animals they find around them interactively. The application will also provide complete information about the animal, such as its habitat, food, behavior and other characteristics. The aim of this project is to increase children's interest and knowledge about the animal world and help them develop empathy for living things.

Some of the research questions we want to answer are how to optimize the performance of animal detectors in this application, how to provide information that is easy for children to understand, and how to build interesting interactions between children and applications. With this project, we hope to provide educational solutions that are innovative and beneficial for young children.

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How did your team come up with this project?

Our team noticed the lack of engaging and interactive educational tools for young children to learn about animals. Traditional methods of teaching, such as books and lectures, may not be effective for children with short attention spans. Therefore, we came up with the idea of creating an animal detector application that would make learning fun and engaging for children. The application would allow children to identify animals by taking pictures of them, and provide information on the animals' characteristics and habitats. Our team believes that this approach to education will make learning about animals more enjoyable and memorable for children.

Project Scope & Deliverables:

Phase 1 : Planning and Research (Week 1)

- Conduct research on early childhood education and animal learning
- Defining the target audience and their learning needs
- Develop application concepts and features
- Create a project plan and time schedule

Phase 2 : Design and Development (Weeks 2-3)

- Create wireframe and application design
- Develop front-end and back-end applications
- Integrate animal detection technologies using image recognition or machine learning
- Add interactive features such as audio, animation, and quizzes
- Testing and debugging applications

Phase 3 : User Trials and Feedback (Week 4)

- Conduct user testing sessions with young children and their guardians
- Gather feedback and evaluate the usability and effectiveness of the app
- Made necessary changes and improvements based on user feedback

Phase 4 : Deployment and Maintenance (Week 4)

- Final Release after updates and feedbacks
- Deploy the application
- Updates will continue to be carried out according to the input received (if go public)

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Project Schedule:

PATH	ACTIVITIES	TIMELINE																										
		WEEK 1 (MAY 2023)							WEEK 2 (MAY 2023)							WEEK 3 (MAY - JUNE 2023)							WEEK 4 (JUNE 2023						
		13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9
ML	Problem Analysis																											
	Dataset Collection																											
	Data pre-Processing																											
	Build Model																											
	Train Model																											
	Optimizing Model																											
	Deployment pre-Paration																											
MD	Research UI/UX																											
	User Flow																											
	Wireframe																											
	UI Design																											
	Develope Mobile App																											
CC	Requirement Analysis																											
	Desain Databases																											
	Develop API Aplication																											
	Deploy																											
	Testing																											

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

- IDE : Android Studio, Jupyter Notebook, Google Colab, Visual Studio code
- Library : TensorFlow, openCV, Keras, Scikit-image
- Platform : Google Cloud Platform, Figma, Maze, Postman
- API : REST API
- Resources : Kaggle

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

- Mentors : mentor data and supporting resources of mobile development, machine learning and cloud computing

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

Our team will train our own model using Tensorflow. We will use transfer learning to create a convolutional neural network (CNN) that can recognize different animal images. We will preprocess the image dataset to ensure that it is suitable for the model training process. Once the model is trained, we will deploy it using Tensorflow.js.

Project Plan for Bangkit 2023 Product-based Capstone

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

- In this capstone project, the system will be developed using native Kotlin-based android applications. The system will run optimally on Android Level API 26 and above. The most commonly used library is retrofit, the point of which is to connect with APIs on systems whose machine learning data is processed by Cloud Computing members working with Machine Learning members. Since this system uses a camera to capture images from the device to send via APIs, it will use the CameraX library to do so. The ui aspect will use material design components.

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

- In the cloud computing section, the things we have done are developing applications with app engines and cloud runs with databases and using several supporting APIs in using the application. for programming languages that we understand javascript and php. Use Google Cloud Storage to store data in the form of images, videos, etc. along with processing the data. Google Compute Engine can be used to process complex data such as processing large amounts of images and videos. This service provides high computing capacity and easily scales according to application needs. Google Cloud AI can be used to build and train Machine Learning models for animal detection. This service provides various Machine Learning algorithms and tools to easily train and evaluate models.

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

- Compatibility issues with devices - the application may run well on one device, but not on others with different configurations or operating systems.
- Accuracy of image recognition - when the application is unable to recognize animal images with adequate accuracy, the application will fail to meet the intended educational purpose.
- Application performance - a slow or frequently error-prone application can diminish the user experience and make users switch to other applications.
- Availability of animal image data - if the animal image resources used are inadequate, the application may not be able to provide a sufficient learning experience.

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

This project uses Machine Learning and Computer Vision technology to study the physical and behavioral traits of animals and identify their species based on pre-trained data and information. It can also distinguish between similar species and estimate the age and size of the detected animal.

With AI-based animal species detection, it is hoped that it can help improve human understanding of the diversity of animal species in nature and facilitate the process of animal research and observation more efficiently and accurately. In addition, this project can also help identify endangered animal species and support animal conservation efforts around the world.