

Proposal - Bangkit 2023 Company-based Capstone

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Replace the highlighted part of this proposal with your team's answers.

Please see the limits of each answer below. You may exceed one page if necessary.

Company : Wowrack Indonesia

Problem Code : C23 - IT

Team Member:

- (ML) M017DSX0074 - Antonius
- (ML) M181DSX0351 - Carles Octavianus
- (ML) M181DSX2305 - Agustinus Bravy Tetuko Ompusunggu
- (CC) C181DSX0802 - Charles Pramudana

Why is this problem/project interesting for your team?

We think this problem will challenge us to think innovatively, creatively, and IoT is within our field of expertise.

What's your group's initial idea to work on this project?

Our initial idea for this project is to build an Arduino-based IoT system using Arduino Uno/Nano and ESP32 Cam Module. We chose Arduino due to its reliability and affordability. We initially think that CNN architecture will suit this type of project. For encryption, we have selected Advanced Encryption Standard (AES), but we can switch to RSA encryption if the company requires more security.

To accomplish our objectives, we will create separate proposed models for object detection and person detection. For further details, please refer to the remarks section below.

Does your team have unique solutions to be proposed?

To achieve greater accuracy and efficiency, we will employ convolution-neural-network-base-model on the object detector. Convolutional Neural Networks (CNNs) are suitable for modeling static images. To improve accuracy, it is recommended to use only one angle for the image, although this may be limited by the resolution of the ESP32 Cam.

For the person detector, we will use a Face Recognition model based on deep face recognition or siamese network. The choice of models will be based on the amount of training data

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provided. Siamese networks will work better on small data sets and vice versa for deep face recognition.

Based on your knowledge, what tools/IDE/Library will your team use to solve the problem?

Below is a list of the tools, IDEs, and libraries that we will be using (although this list is not exhaustive):

ESP32 Cam, Arduino IDE, OpenCV or other Deep learning libraries, Face recognition libraries, Docker, webhook, Hugging Face, esp_camera.h, WiFi.h or other Arduino libraries.

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

- Image data of Trash can, Storage Tray for each class, Sample information about Person Faces
- Mentors with expertise in Image Recognition / Deep learning.
- Access to MQTT Broker, Backend Database for Person detector, used S3 Storage.
- Arduino Kits etc.

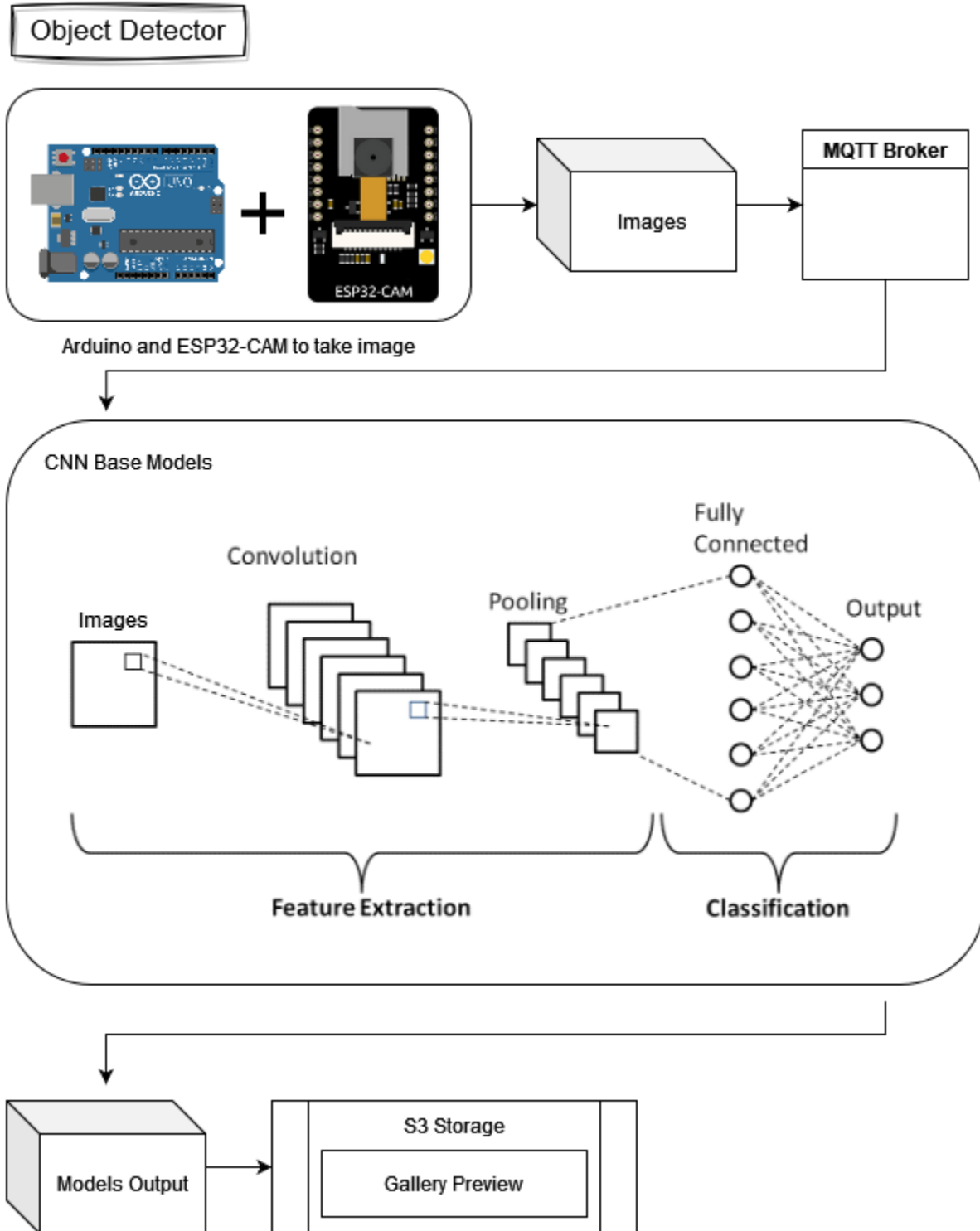
This list is not exhaustive we may or may not need another support for this project

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

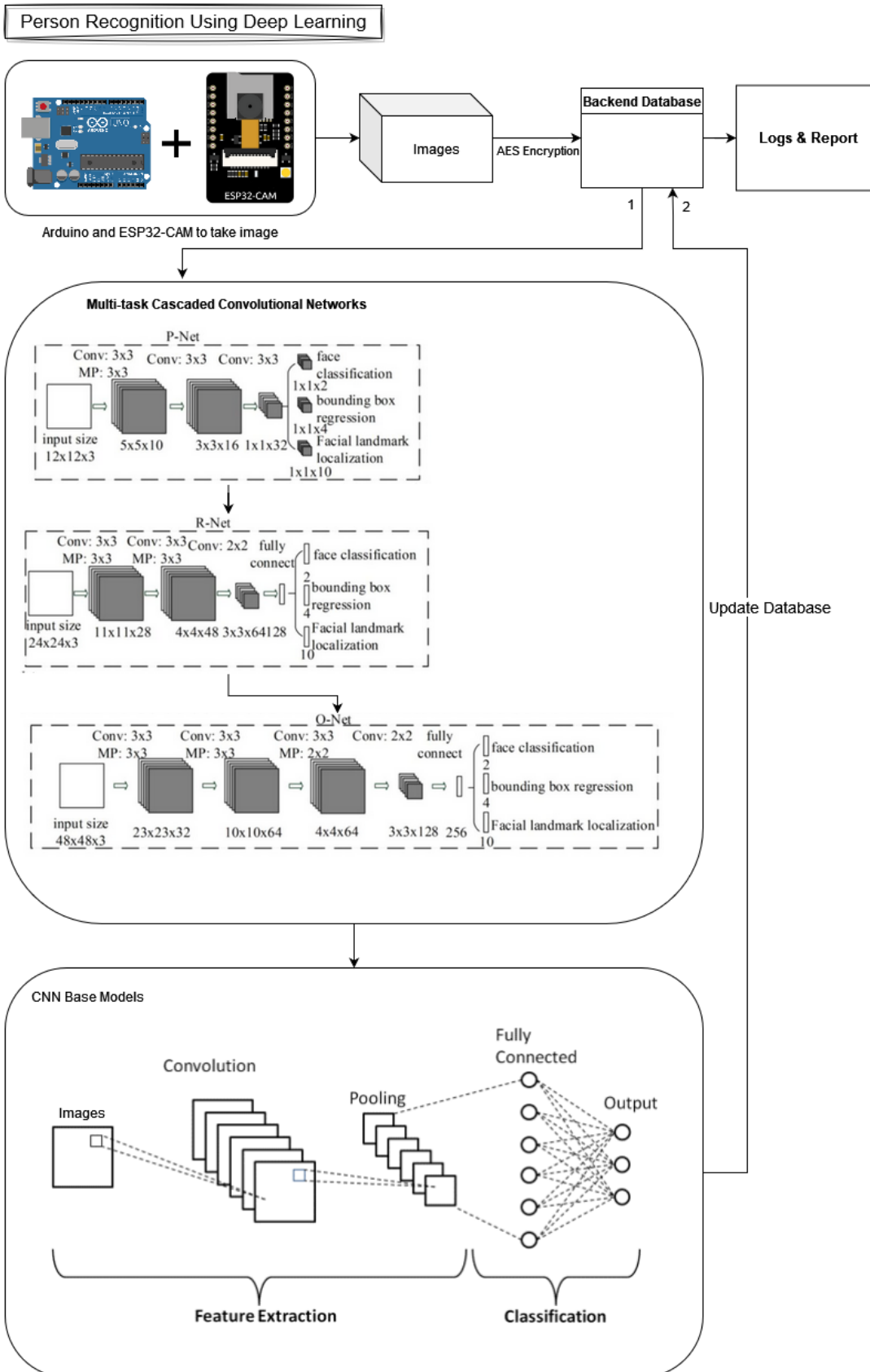
For cases of people with changing facial features, facial recognition models may be inappropriate. We can use gait recognition to solve this problem but for the duration of 1 month it is not feasible to make such a model.

Flowchart for our proposed solution can be seen below. The flowchart for object detector is the usual CNNs Model trained with data provided. While the person detector for deep learning is trained using MTCNN for detecting the location of the person's face then predicting it using CNNs Model. While the siamese one is comparing the image similarity using anchor image.

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Person Recognition Using Siamese Network

