

NGUYỄN QUANG HỦY

PTIT



HUY INIT



2023

initialize
init()
in IT

Two screenshots of the YouTube channel "Huy Init". The top screenshot shows a list of videos under the "DANH SÁCH PHÁT" tab, categorized into sections like "KDLVKP PTIT", "Recommender Systems", "Django for APIs", etc. The bottom screenshot shows another list of videos under the same tab, including "DevReadme", "gPBL2023 - PTIT and SIT", "Huy moment", and "Series kể chuyện ML_DL". Both screenshots show the channel has over 2,000 subscribers.

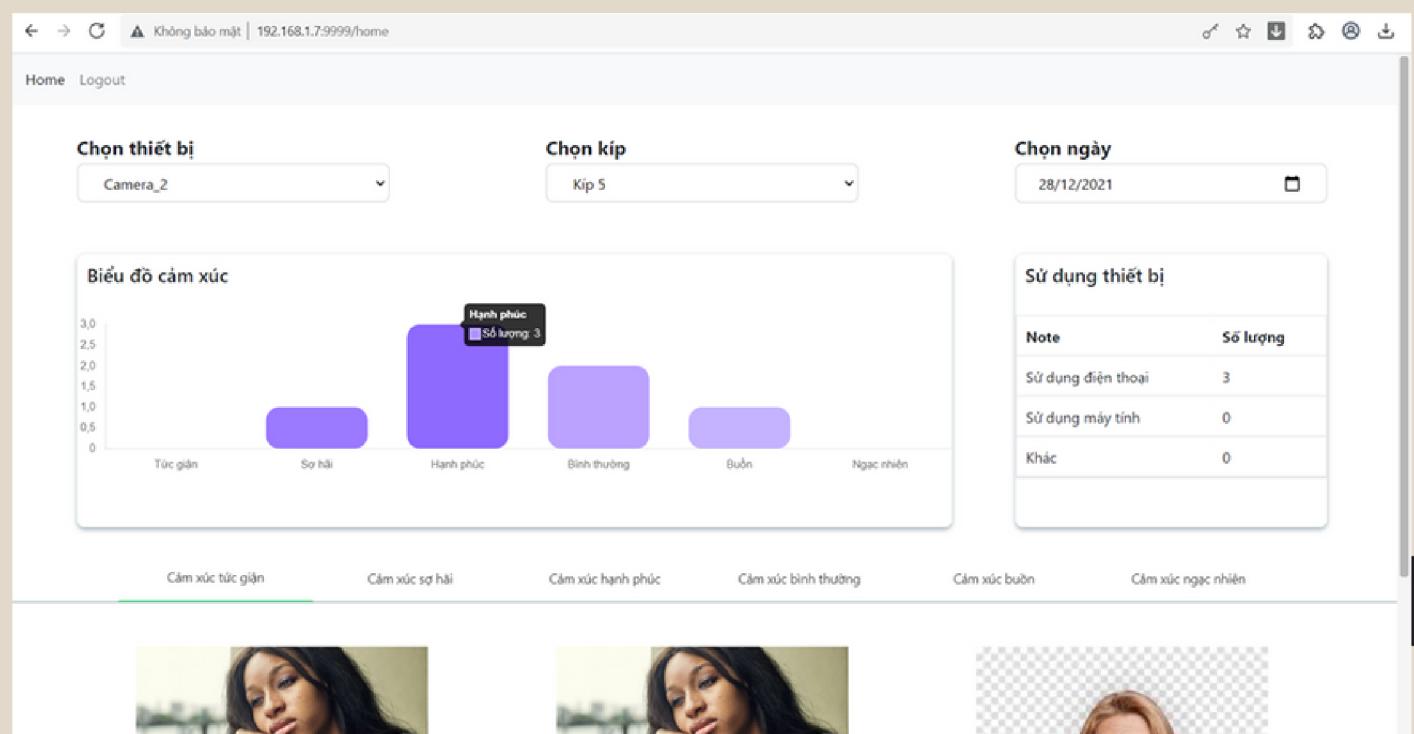
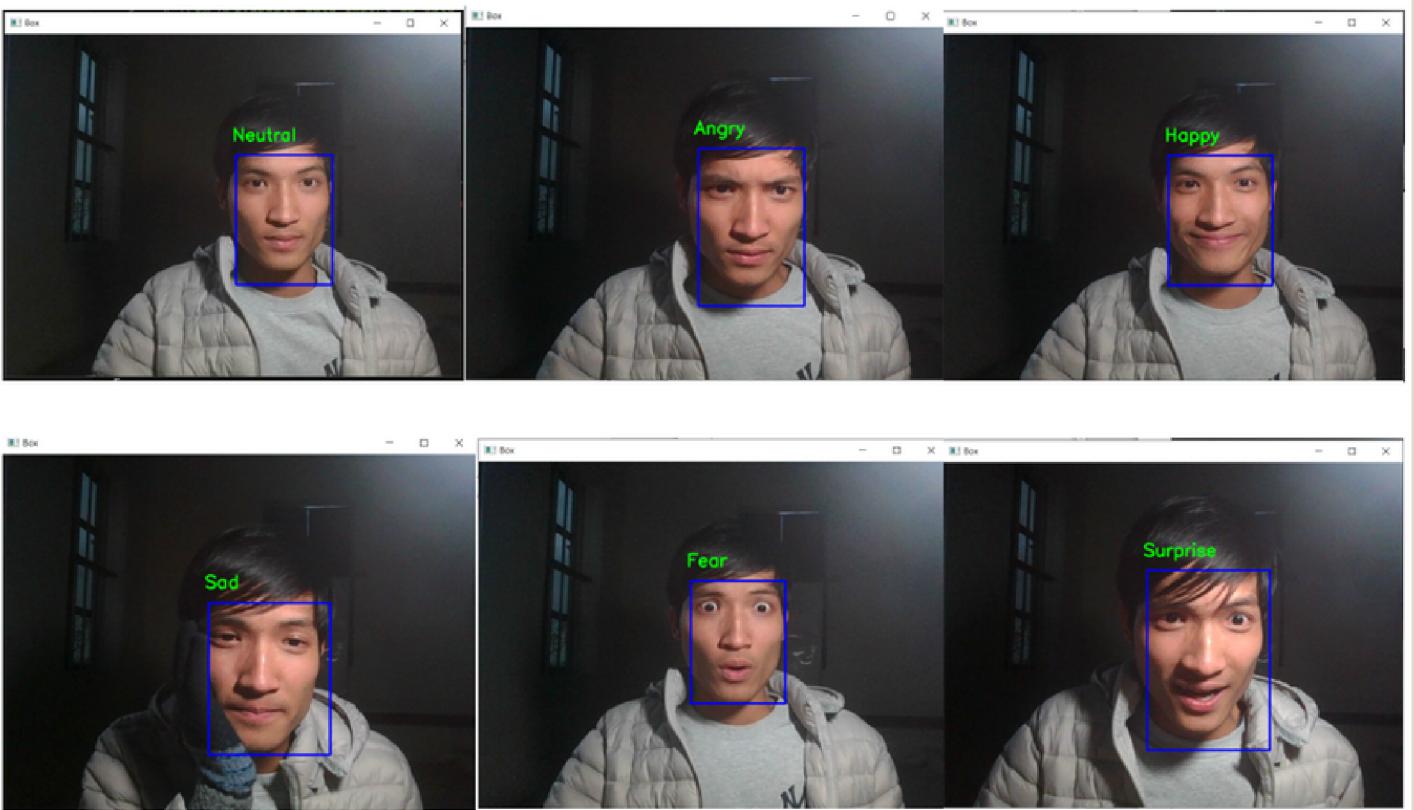
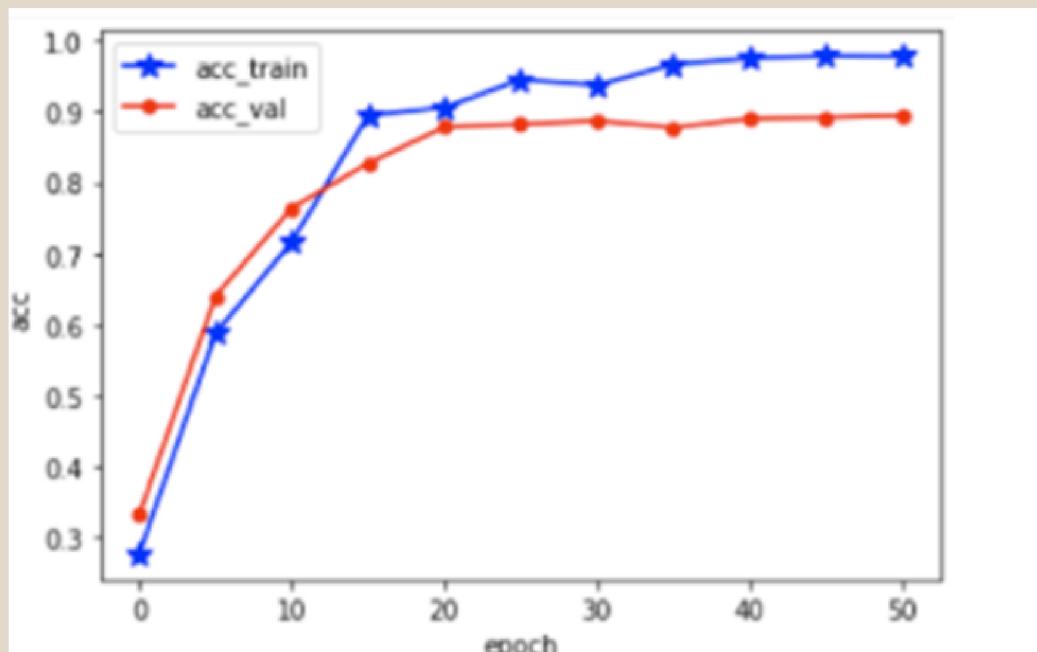


Các nghiên cứu:

- 1. Dự án phân loại cảm xúc (2021)
- 2. Dự án nhận diện hóa đơn thuốc (6-9/2022)
- 3. Dự án phân loại rác thải (4/2023)
- 4. Dự án nhận diện khuôn mặt (12/2022 - nay)
- 5. Tham gia một số dự án khác (2022,2023)

1. Dự án phân loại cảm xúc (12/2021)

- Chuẩn bị, khai phá dataset : Tập dữ liệu huấn luyện 44490 ảnh chia ra các 6 nhãn cảm xúc (happy, fear, happy, neutral, sad, surprise) và tập dữ liệu kiểm tra gồm 6859 ảnh lấy chủ yếu từ bộ dataset Fer2013.
- Train tập dataset với mô hình CNN backbone MobilNetv3 và lặp qua 50 epoch. Độ chính xác trên tập val 91.05%.
- Xây dựng ứng dụng quản lý cảm xúc của lớp học gồm hệ thống quản trị thông qua website và các API kết nối giữa thiết bị nhận diện cảm xúc và phần website quản trị.



A screenshot of a web-based application interface for emotion management. The top navigation bar shows 'Home' and 'Logout'. The main area has three dropdown menus: 'Chọn thiết bị' (Camera_2), 'Chọn kíp' (Kíp 5), and 'Chọn ngày' (28/12/2021). Below these are two charts: 'Biểu đồ cảm xúc' (Emotion chart) showing the count of various emotions (Tức giận, Sợ hãi, Hạnh phúc, Bình thường, Buồn, Ngạc nhiên) with Hạnh phúc having a value of 3, and a smaller chart for 'Cảm xúc tức giận'. To the right is a table 'Sử dụng thiết bị' (Device usage) with rows for Note (Sử dụng điện thoại: 3), Máy tính (Sử dụng máy tính: 0), and Khác (Khác: 0). At the bottom are three small image thumbnails.

2. Dự án nhận diện hoá đơn thuốc (6-9/2022)



Chuẩn bị, định tính, định lượng dữ liệu.



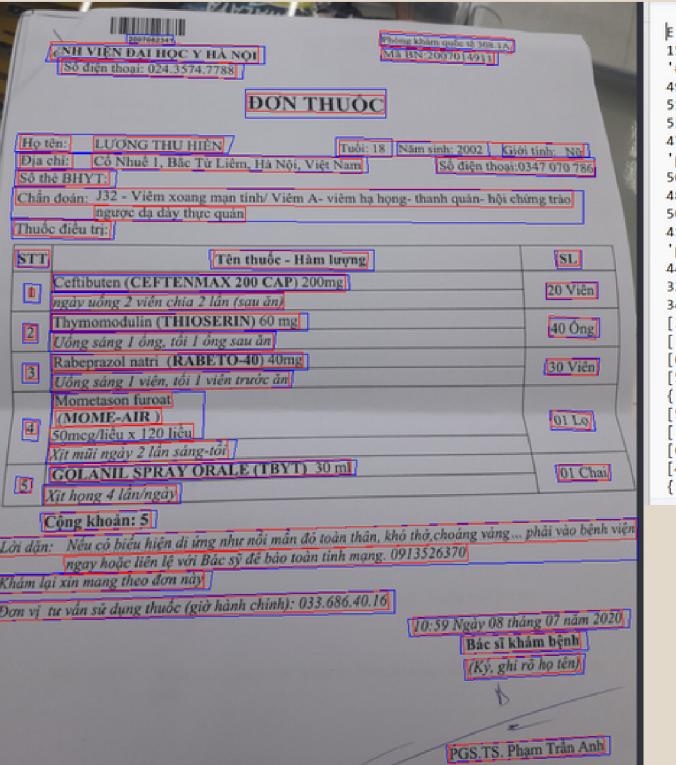
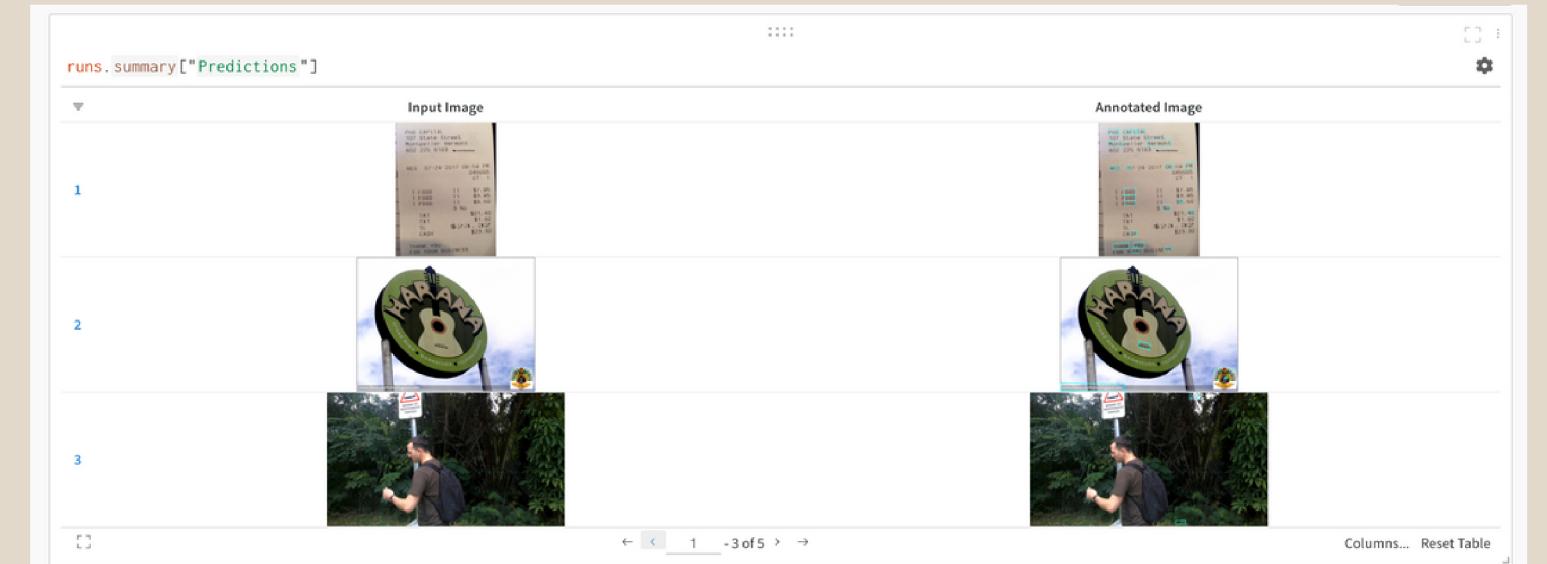
Test dataset với model Craft, Tesseract, EasyOCR, KerasOCR và Benchmark với mô hình PaddleDetection: 57% .



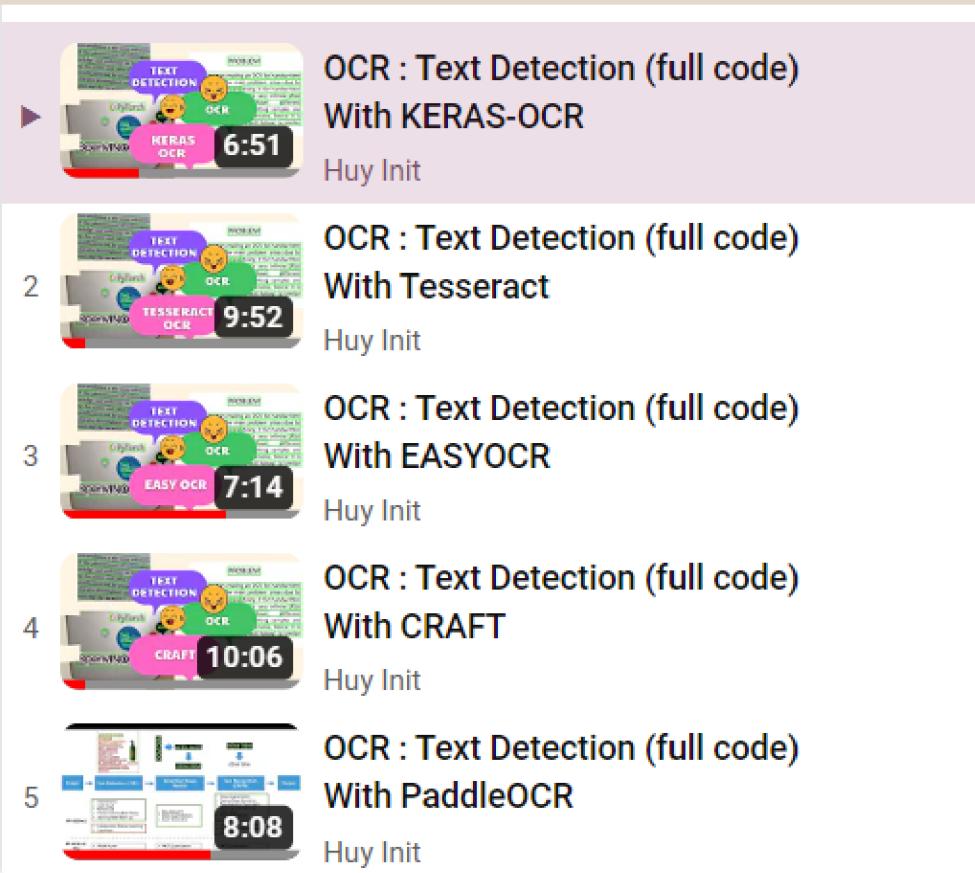
Sử dụng công cụ CVAT để gắn nhãn dữ liệu, chuẩn bị và định dạng tập dữ liệu thuốc tương thích với mô hình Paddle OCR.



Triển khai Text Detection với mô hình Paddle Detection trên tập dữ liệu ICDAR2015 và tập dữ liệu tùy chỉnh (Tập dữ liệu thuốc 1000 ảnh)



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3. Dự án phân loại rác thải (2023)



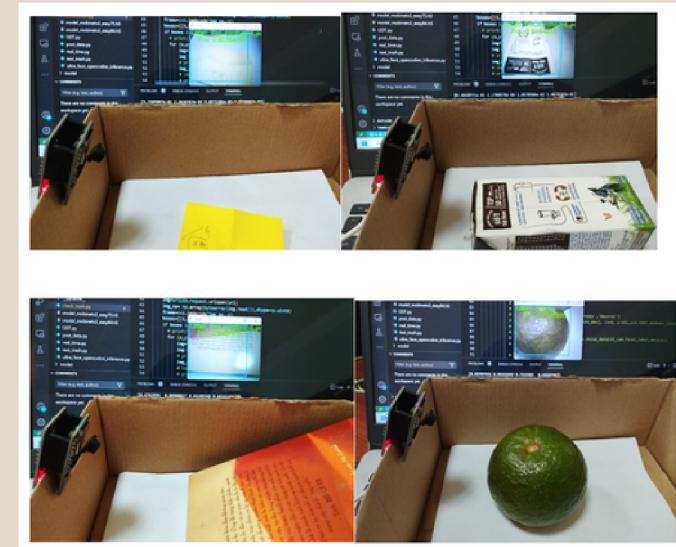
Chuẩn bị, định tính, định lượng dữ liệu (Dataset 4 nhãn)



Triển khai model AI (Thực hiện với tập model CNN backbone MobinetV2)
=> Accuracy 93% và 75% trên tập train và test)



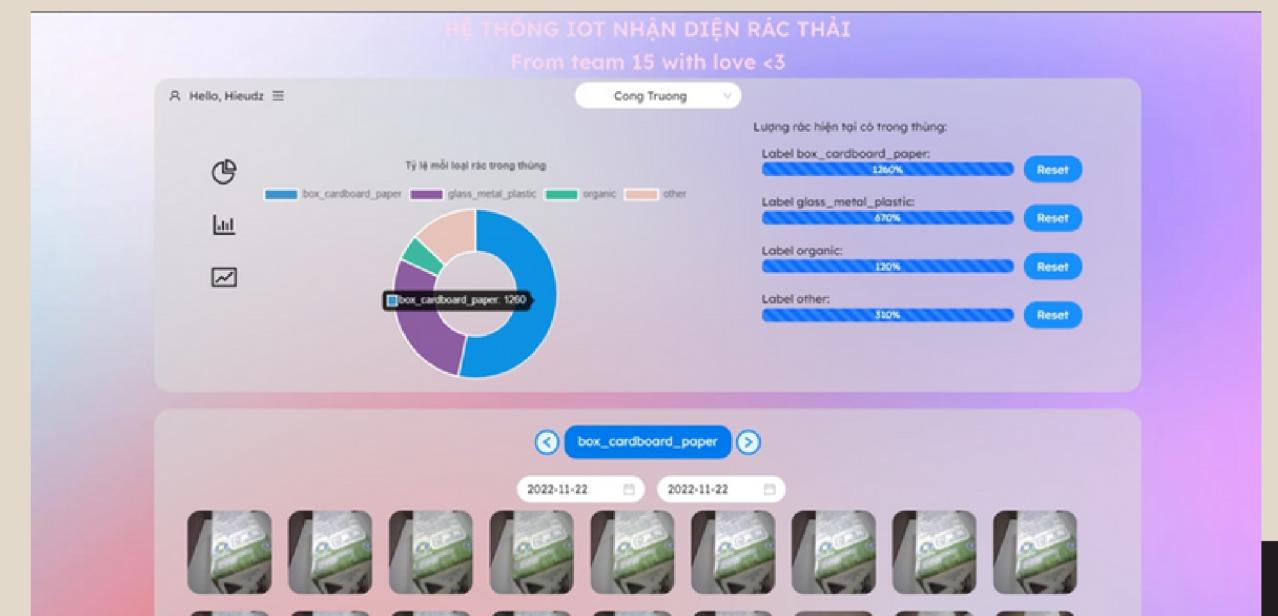
Kết nối ESP32CAM và test modul AI. Xây dựng ứng dụng lưu trữ dữ liệu thu được và xử lý dữ liệu. Hiển thị dữ liệu và các kết quả phân tích trên Web



```
Epoch 13/20  
196/196 [=====] - 52s 265ms/step - loss: 0.2176 - accuracy: 0.9312  
Epoch 14/20  
196/196 [=====] - 51s 261ms/step - loss: 0.2449 - accuracy: 0.9165  
Epoch 15/20  
196/196 [=====] - 51s 262ms/step - loss: 0.2552 - accuracy: 0.9133  
Epoch 16/20  
196/196 [=====] - 52s 265ms/step - loss: 0.2053 - accuracy: 0.9315  
Epoch 17/20  
196/196 [=====] - 54s 274ms/step - loss: 0.1901 - accuracy: 0.9389  
Epoch 18/20  
196/196 [=====] - 53s 272ms/step - loss: 0.2115 - accuracy: 0.9261  
Epoch 19/20  
196/196 [=====] - 52s 263ms/step - loss: 0.1746 - accuracy: 0.9385  
Epoch 20/20  
196/196 [=====] - 52s 264ms/step - loss: 0.1930 - accuracy: 0.9382
```

scores = myModel.evaluate(test_generator)
print(scores)
print(scores[0])

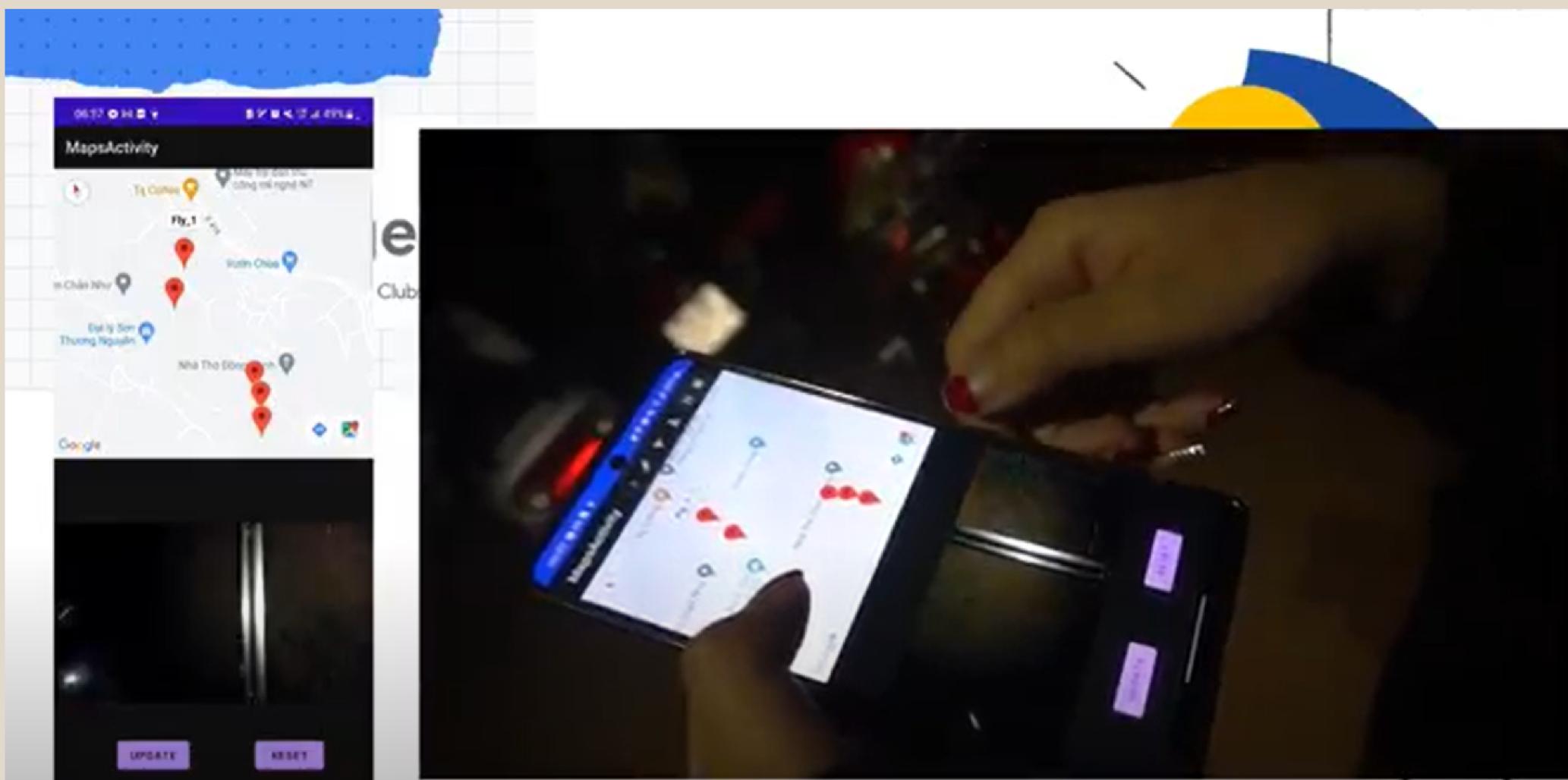
44/44 [=====] - 3s 74ms/step - loss: 0.8427 - accuracy: 0.7525



4. Dự án nhận diện khuôn mặt (10/2022 - nay)

- Nghiên cứu, chuẩn bị, kiểm soát chất lượng và khai thác tập dữ liệu.
- Hoàn thành quy trình dự án từ Nhận diện khuôn mặt, Trích xuất khuôn mặt, Nhận dạng khuôn mặt (Tìm kiếm khuôn mặt) bằng Webcam và Camera_ip.
- Train model Face Detection trên tập LFW và Widerface với model RetinaFace.
Sử dụng Face Extraction với model CNN dùng Arcface loss và InsightFace .
Sử dụng FaceSearch với HNSWLIB và FAISS
- Triển khai mô hình trên web cho phép các chức năng: Đăng ký khuôn mặt, nhận diện khuôn mặt, log Timesheet.
- Tích hợp hệ thống với 2 mô hình Pretrained: Face-Mask-Classification và Face-Anti-Spoofing.

5.Tham gia một số dự án khác (2022,2023)



6. Kế hoạch nghiên cứu tại JAIST

Task	Time (Week)
Face Detection	14
Research Plan: Face Detection Using the RetinaFace Model	
1. Write Specification Document: Theoretical study of the RetinaFace model. Study of three training datasets: LFW, WiderFace, and a combined dataset (MixDataset).	1
2. Data Collection: LFW (Labeled Faces in the Wild): Dataset containing facial images of individuals in real-world environments.	0,2
WiderFace: Dataset with diverse images in various environments and levels of difficulty for face detection.	0,2
MixDataset: Composite dataset from both LFW and WiderFace, along with real-world company data to ensure diversity and dataset challenges.	0,6
3. Data Preparation: Data preprocessing: Formatting data appropriately for the RetinaFace model (e.g., converting to image format and bounding boxes).	1
Dataset splitting: Divide data into training, validation, and testing sets.	1
4. Building the RetinaFace Model: Downloading and configuring the RetinaFace model: Utilize open-source code to download and configure the model.	0,5
Training process: Initially train on the WiderFace dataset, then continue training on the LFW dataset, and finally on the MixDataset to increase difficulty.	2
5. Evaluation and Model Refinement: Using the validation set to fine-tune model hyperparameters, such as learning rate and iteration count.	2
Using the test set to evaluate the model's performance on individual datasets (LFW, WiderFace) and on the combined dataset (MixDataset).	1
Evaluate accuracy, recall, and average precision on each dataset.	1
6. Comparison and Result Analysis: Compare achieved results on different datasets to determine model performance on each set.	1
Analyze the impact of difficulty and unique characteristics of each dataset on detection outcomes.	1
7. Conclusion	
Identify necessary resources such as computing power, open-source libraries, datasets, and time.	0,5
Summarize research findings and emphasize key points.	0,5
Propose future directions, including incorporating the latest knowledge and testing on additional datasets.	0,5
	14

Task	Time (Week)
Face Extraction	8
Research Plan: Face Feature Extraction Using the InsightFace Model (Backbone ResNet100) in ONNX Format	
1. Introduction (Write Specification Document): Study of the InsightFace library with ResNet100 as the backbone. The objective is to understand the model's functioning and extract high-quality facial features.	1
2. Preparation and Setup: Download the InsightFace model with ResNet100 backbone in ONNX format.	0,5
Set up the necessary libraries and environment to load and use the ONNX model.	0,5
3. Feature Extraction Process: Develop source code to load the ONNX model and provide facial images as input.	1
Preprocess image data: normalize and resize appropriately.	0,3
Conduct feature extraction process using the InsightFace model.	0,3
Record and document the output of the extraction process.	0,4
4. Evaluation and Result Analysis: Evaluate the accuracy of feature extraction through comparison with results from similar models or through quantitative metrics.	1
Analyze the feature extraction results, examining the correlation with expected outcomes and gaining an understanding of InsightFace model operation.	1
5. Performance Enhancement: If the feature extraction results fall short of the desired performance, proceed with optimization or parameter adjustment of the InsightFace model.	1
6. Report Writing	
Write a research report including sections such as introduction, methodology, results, analysis, and conclusion regarding face feature extraction using the InsightFace model.	1
	8

6. Kế hoạch nghiên cứu tại JAIST

Task	Time (Week)
Hnswlib Integration	8
Research Plan: Integrating Face Search and Registration System Using the Hnswlib Library	
1. Overview Research: Study existing search libraries and, consequently, gain a comprehensive understanding of the functionalities of the Hnswlib library. Test several basic use cases.	1
2. Data Preparation: Gather and preprocess facial data for registration and search purposes.	0,5
Prepare input data for the Hnswlib library.	0,5
3. Face Registration: Develop source code to register facial data into the database.	0,5
Utilize the Hnswlib library in conjunction with feature extraction models to create indexes and store facial data.	0,5
4. Face Search: Build source code to perform facial search within the database.	0,5
Japan Advanced Institute of Science and Technology	
Utilize the Hnswlib library for search and retrieval of similar results.	0,5
5. System Integration: Construct a user interface to input facial data and perform searches.	0,5
Integrate registration and search source code into the user interface.	0,5
6. System Evaluation: Fine-tune parameters and configurations of the Hnswlib library to ensure optimal search performance.	1
Ensure the system can effectively handle a large volume of facial data.	0,5
Conduct tests and evaluate the quality of the face registration and search system.	0,5
7. Report Writing: Compile a research report encompassing sections such as introduction, methodology, results, analysis, and conclusion regarding the integration of the Face Search and Registration System using the Hnswlib library.	1
8	

Task	Time (Week)
IoT System	10
Research Plan: Integrating a System with Raspberry Pi and Processing of Thermal and Digital Cameras	
1. Hardware and Camera Research: Focus on identifying suitable Raspberry Pi and thermal and digital cameras for evaluation and integration into the system.	1
2. Equipment Preparation: Gather necessary components such as Raspberry Pi, thermal camera, digital camera, and other peripherals.	0,5
Install the operating system and development environment on the Raspberry Pi.	1
3. Integration of Digital Camera: Develop source code to connect and utilize the digital camera with the Raspberry Pi.	0,5
Capture and process images from the digital camera to extract facial features.	1
4. Integration of Thermal Camera: Develop source code to connect and utilize the thermal camera with the Raspberry Pi.	0,5
Capture and process thermal images to extract temperature information from facial regions.	1
5. Integration of Face Recognition System: Utilize a facial recognition model (such as InsightFace mentioned earlier) to process data from both the digital and thermal cameras.	2
Combine recognition results from both types of cameras for face and facial temperature recognition.	1
6. User Interface: Build a user interface on the Raspberry Pi to display recognition and facial temperature information.	1
Enable user interaction and data management.	1
7. Performance Optimization: Fine-tune source code and parameters to ensure efficient system operation on the Raspberry Pi.	1,5
Ensure the system can process data and perform recognition swiftly.	1
8. Report Writing: Compile a research report including sections like introduction, methodology, results, analysis, and conclusion about the integration of the system using Raspberry Pi, thermal, and digital cameras.	1



Thank you

THANK YOU.

Brigitte
SchWartz



