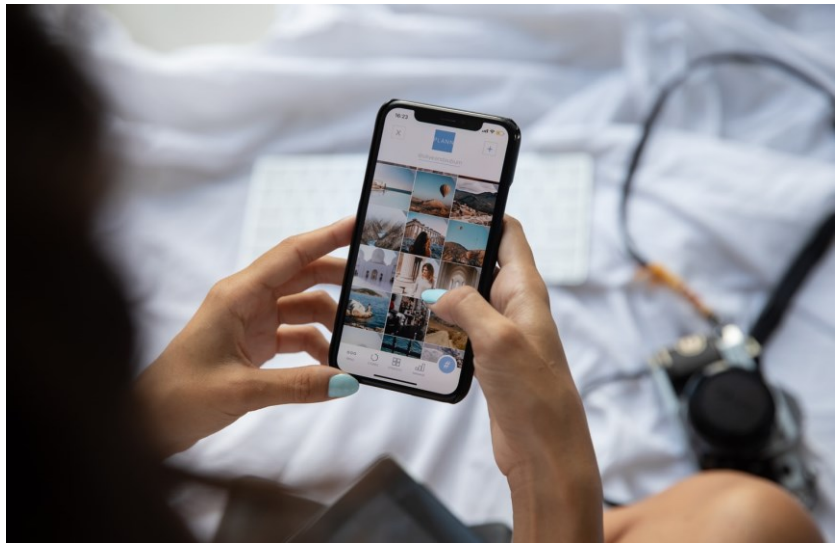
FACE RECOGNITION AND AUTO MOSAICKING MODEL USING CNN

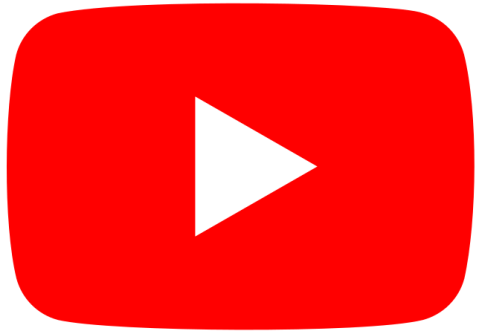
20231139 Seokhun Yeon
20241051 Sooyeon Kim
20195030 Sihyun Kim
20195067 Yohan Park

2024-Deep Learning
Term Project
Final Presentation

2024.5.22

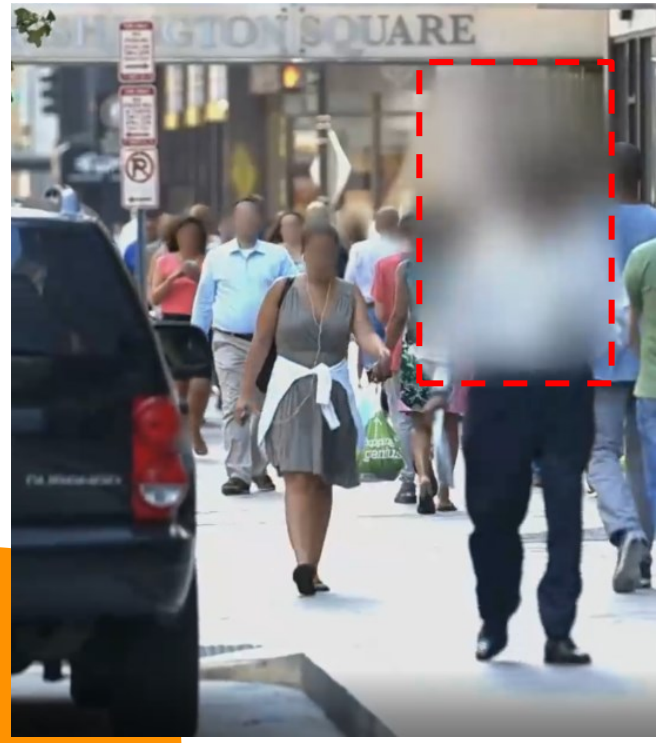
CONTENTS

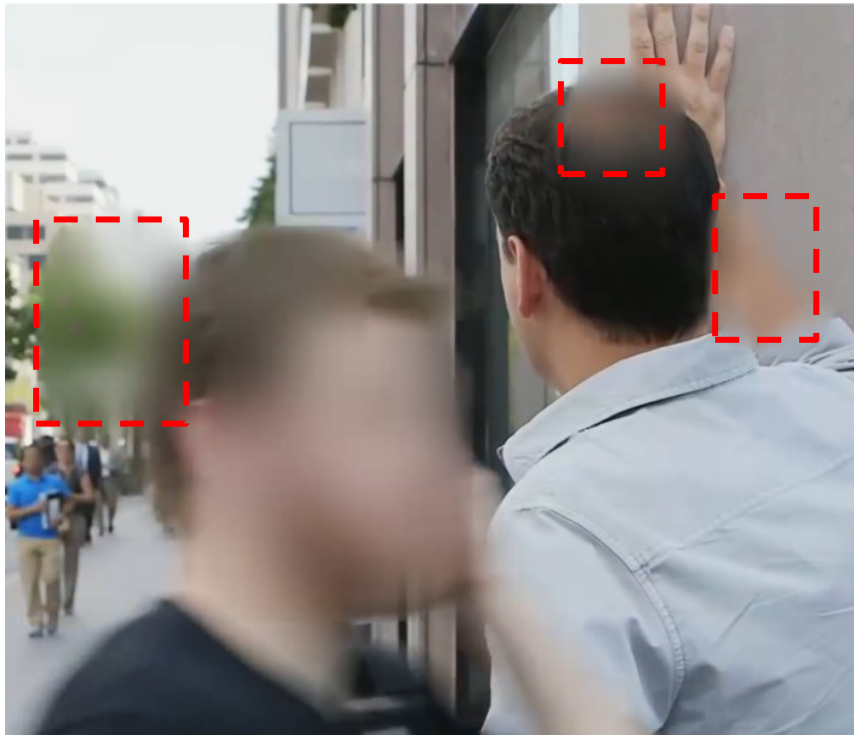




1. BACKGROUND

- Imperfection of the Existing Programs





- Error Cases are Easily Seen
- Low Accuracy

Src: https://blur.me

2. MODEL

1. Use Yolo v8 Architecture
2. Calculate similarity with registered face
3. face_recognition.compare_faces function was used.
4. Label faces: registered vs unregistered

YOLOv8n

↓

Face Recognition

↓

Mosaic

INPUT : image

OUTPUT : face bounding box annotation

2. MODEL

1. Various model types in YOLOv8 exists.
2. For higher calculation speed, YOLOv8 nano and small was used.
3. During the weekend, when the daytime temperature reached 30 degrees, We trained the model in a dorm room with no air conditioning.

Model	size (pixels)	mAP	Speed A100 TensorRT (ms)	params (M)	FLOPs (B)
YOLOv8n	640	37.3	0.99	3.2	8.7
YOLOv8s	640	44.9	1.20	11.2	28.6
YOLOv8m	640	50.2	1.83	25.9	78.9
YOLOv8l	640	52.9	2.39	43.7	165.2
YOLOv8x	640	53.9	3.53	68.2	257.8

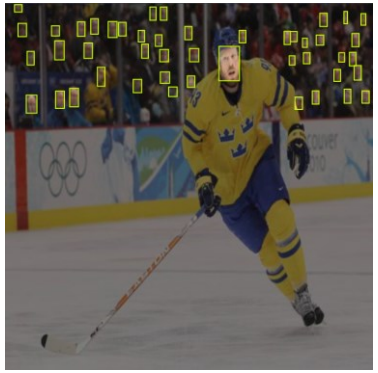
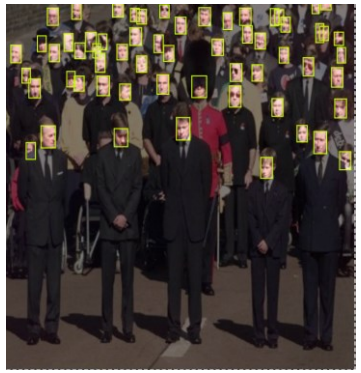
3. DATASET (1)

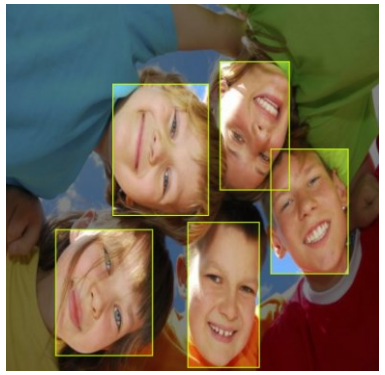
- WIDER FACE: A Face Detection Benchmark
- 32,203 images and 393,703 labeled faces in 61 event classes.

http://shuoyang1213.me/WIDERFACE/

3. DATASET (2)

- FDDB : Face Detection Dataset and Benchmark
- 5171 face annotations
- Including difficult pose angles, out-of-focus faces , low resolution
- Grey scale & color images




https://universe.roboflow.com/fddb/face-detection-40nq0/dataset/1

4. YOLO MODEL TRAIN

- Hyperparameter
  - Learning rate: cosine annealing schedule
  - Optimizer: SGD
  - Max Epoch: 1000
  - Dropout: 0 and 0.5
- Early stopping was conducted when loss stopped to converge.

4. YOLO MODEL TRAIN

https://www.seoul.co.kr/news/sport/2012/09/27/20120927028009

5. IMPLEMENT


Face Detection and Mosaic App
Load Image
Este espacio cuenta con cámaras de seguridad para la prevención del delito.
Deselect All
Select All
Bounding Box
Mosaic
Mosaic Intensity
1
Export

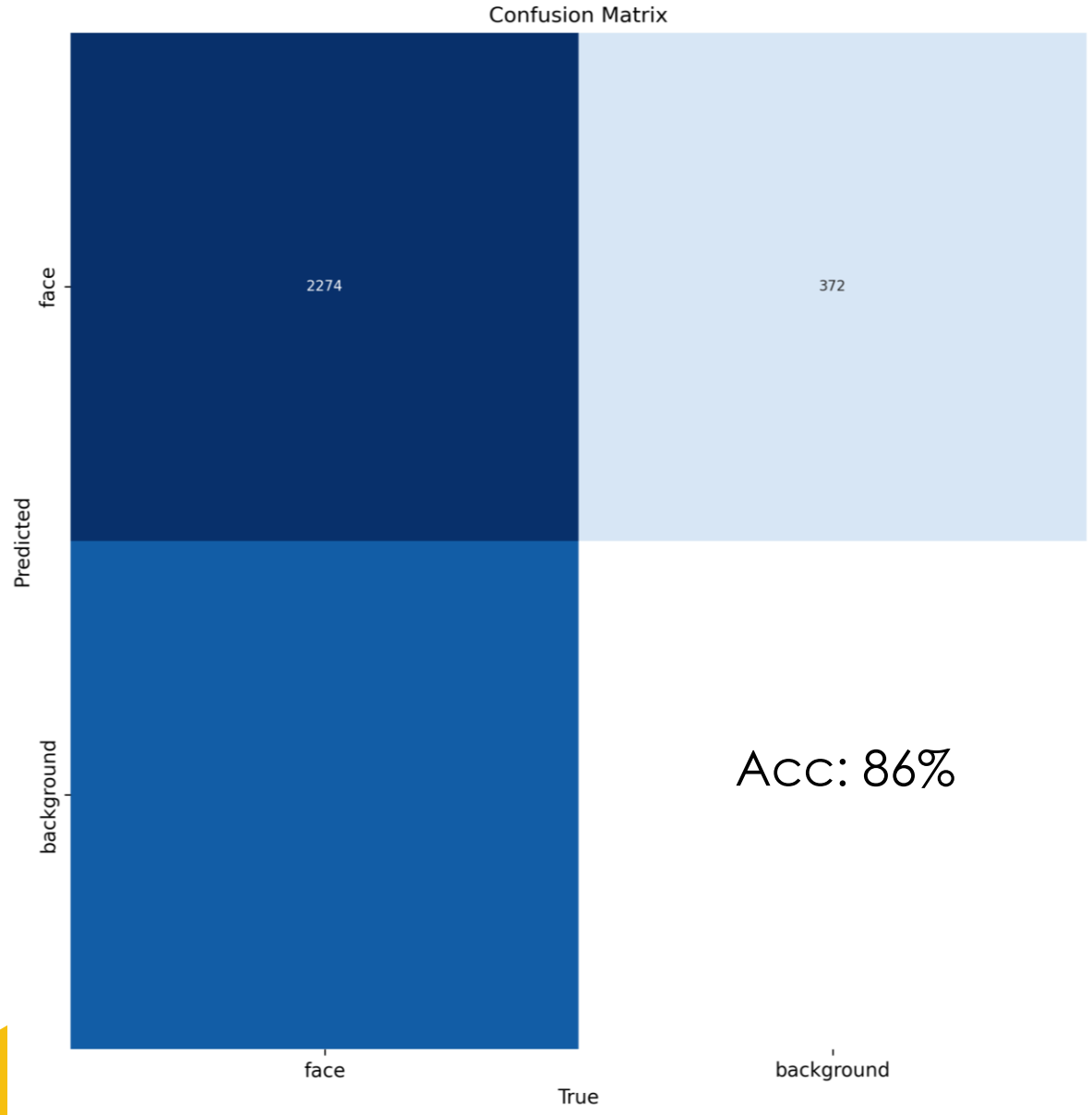
5. IMPLEMENT


Face Detection and Mosaic App
Load Image
Este espacio cuenta con cámaras de seguridad para la prevención del delito.
Deselect All
Select All
Bounding Box
Mosaic
Mosaic Intensity
1
Export

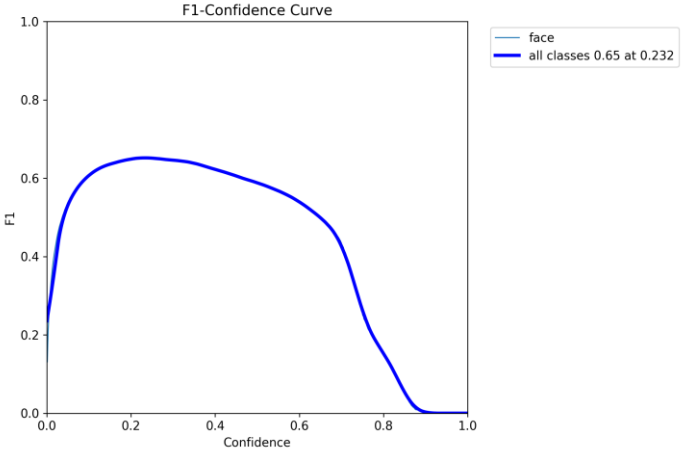
5. IMPLEMENT

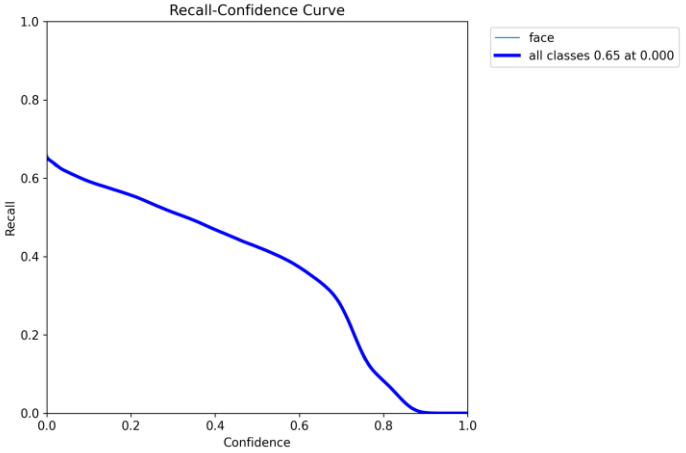

Face Detection and Mosaic App
Load Image
Deselect All
Select All
Detect Faces
Bounding Box
Mosaic
Mosaic Intensity
8
Export

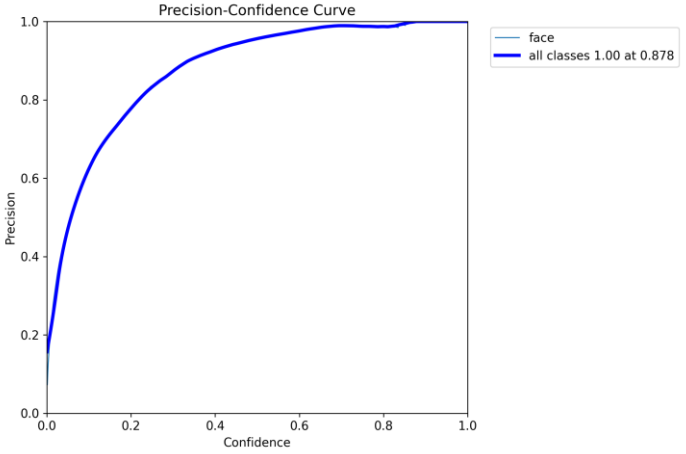
6. RESULTS YOLOv8Nano



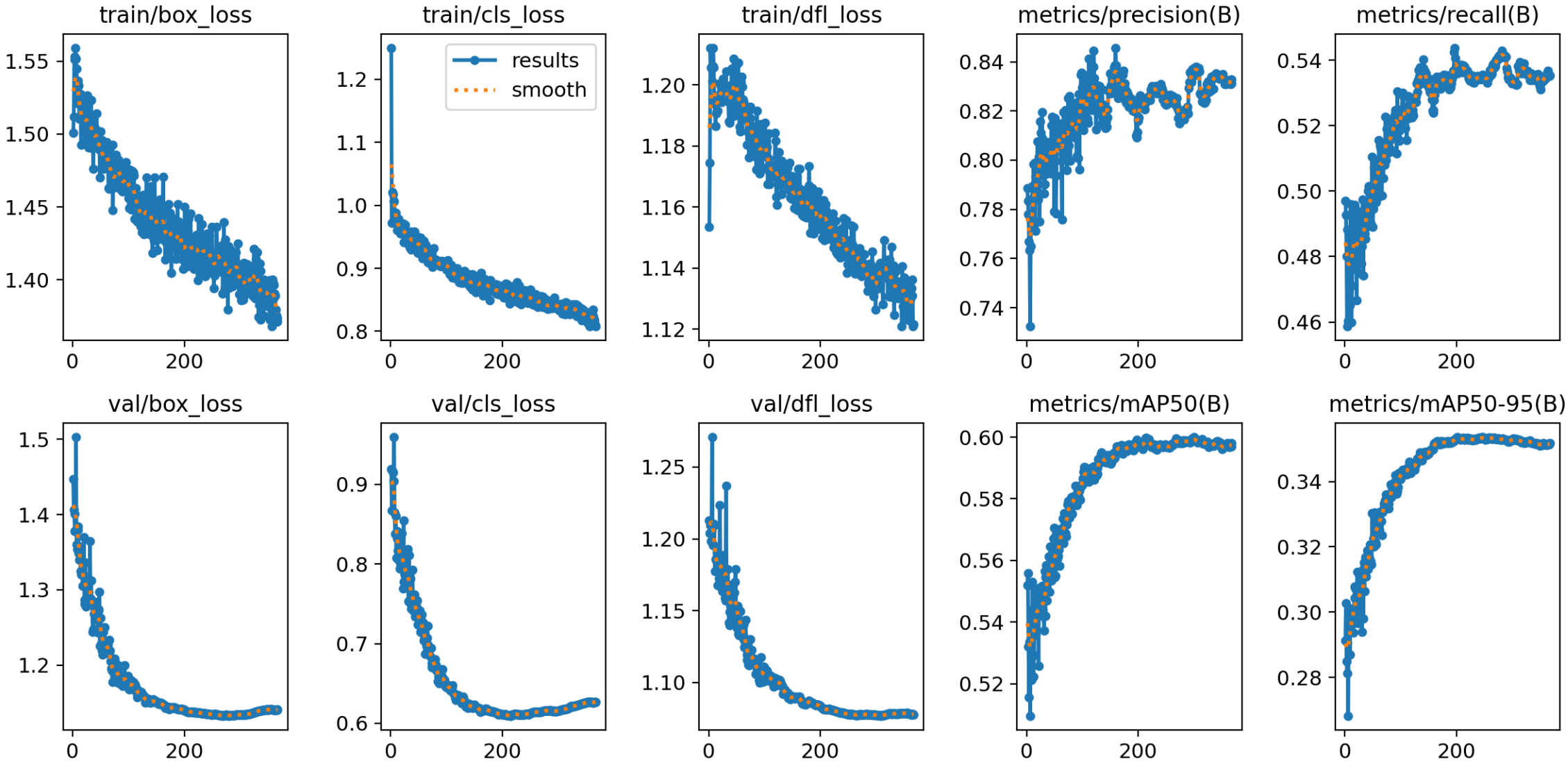
Acc: 86%







6. RESULTS YOLOv8Nano



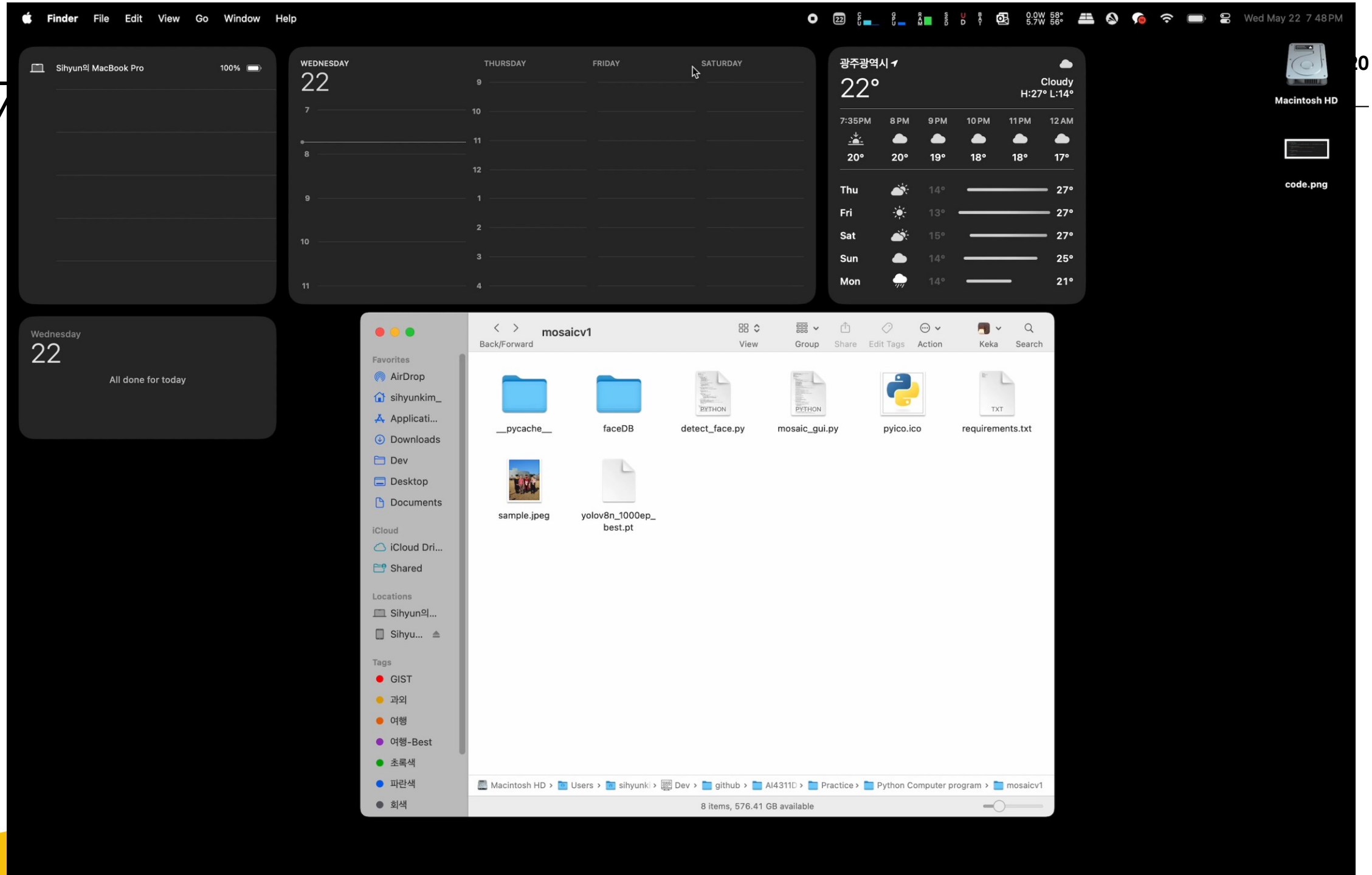
7. DEMONSTRATION

7. DEMONSTRATION

7. DEMONSTRATION

7. DEMONSTRATION

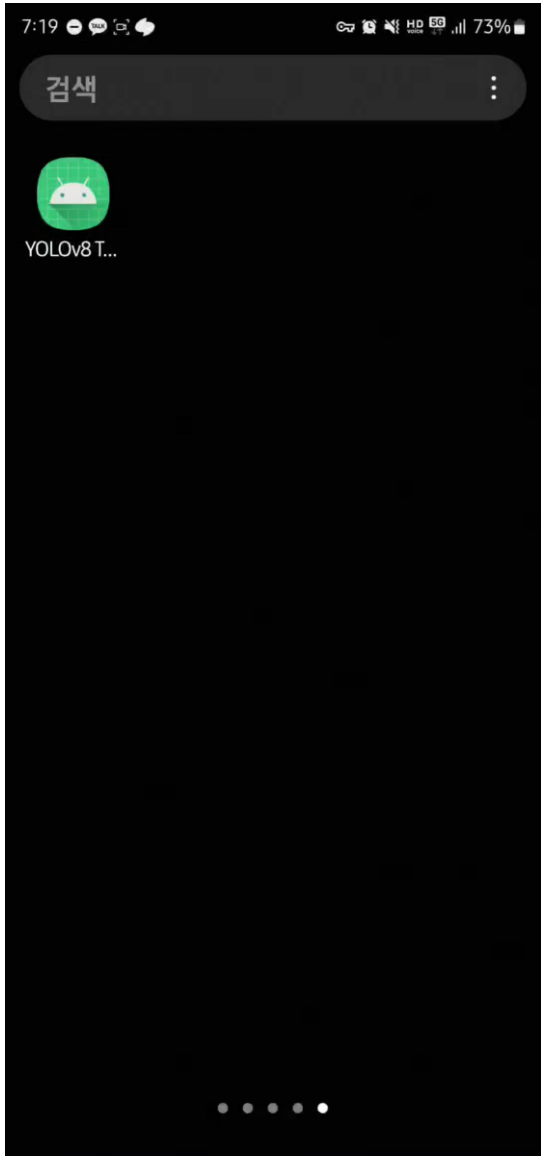
7. DEMONSTRATION


Finder File Edit View Go Window Help
Wed May 22 7 48 PM
Sihyun의 MacBook Pro 100%
WEDNESDAY 22
THURSDAY
FRIDAY
SATURDAY
광주광역시
22°
Cloudy
H:27° L:14°
7:35PM 8 PM 9 PM 10 PM 11 PM 12 AM
20° 20° 19° 18° 18° 17°
Thu 14° 27°
Fri 13° 27°
Sat 15° 27°
Sun 14° 25°
Mon 14° 21°
Macintosh HD
code.png
Wednesday
22
All done for today
mosaicv1
Back/Forward
View
Group
Share
Edit Tags
Action
Keka
Search
Favorites
AirDrop
sihyunkim_
Applicati...
Downloads
Dev
Desktop
Documents
iCloud
iCloud Dri...
Shared
Locations
Sihyun의...
Sihyu...
Tags
GIST
과외
여행
여행-Best
초록색
파란색
회색
__pycache__
faceDB
detect_face.py
mosaic_gui.py
pyico.ico
requirements.txt
sample.jpeg
yolov8n_1000ep_best.pt
Macintosh HD › Users › sihyunki › Dev › github › AI4311D › Practice › Python Computer program › mosaicv1
8 items, 576.41 GB available

7. DEMONSTRATION

1. For the mobile application, only face detection and creating bounding box
   are implemented.
2. YOLOv8n is used.
3. Around 100~200ms delay.

YOLO_demonstration.mp4



8. CRITICS

1. Pro
    a. Highly accurate face detection was possible.
    b. Using the nano version, our model does not require high computational power. (only one 3090 gpu was used for training)
2. Limitations
    a. Poor accuracy for occlusion cases.
    b. The face recognition part still needs to be improved.
    c. Implementation on mobile device was partially done.

THANK YOU

Q&A