

A background image showing two hands pointing at an old, cracked map. The map has various markings, including a red 'X' and a red circle. The hands are positioned on the left side of the frame, with one hand pointing towards the center and the other pointing towards the bottom left. The map is aged and has a yellowish-brown color with visible cracks and some red markings.

Software Capstone design

Application Research
by using Embedding board(Jetson xavier)

Team **Coincidence**
Prof 조성배 | 장계봉
정한솔 | 강범준 | 문찬경

1. Background



Attached Sensors

Excavator in construction sites

Safety Issue

Pose Estimation

Attached sensor

Expensive, Difficult, Time-consuming

2 Subject

Computer Vision

Detect object and **Recognize** object's action

Problem: to find clear characteristics
depending on different angles

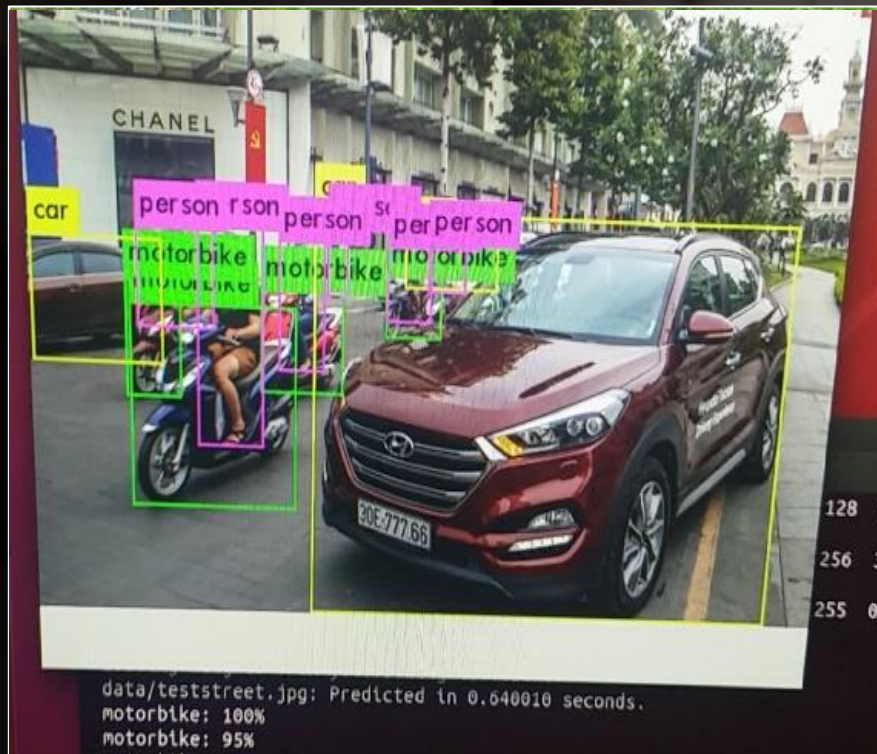


1. Dumping
2. Digging
3. Moving forward
4. Moving backward
5. Turning around
6. Moving side
- ...

3. Method

(a) Object Detection

YOLO algorithm(You Only Look Once)




Object is detected for a second

Training through
photos which have clear differences

3. Method

(a) Object Detection

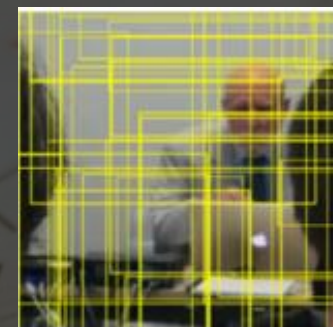
YOLO algorithm(You Only Look Once)



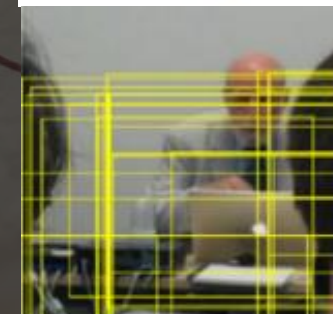
dog, bear

ca	99 conv	128	1 x 1 / 1	76 x 76 x 384	->	76 x 76 x 128	0.568 BFL
Ki	Ops						
nv	100 conv	256	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 256	3.407 BFL
	Ops						
	101 conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379 BFL
	Ops						
	102 conv	256	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 256	3.407 BFL
	Ops						
	103 conv	128	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 128	0.379 BFL
	Ops						
	104 conv	256	3 x 3 / 1	76 x 76 x 128	->	76 x 76 x 256	3.407 BFL
	Ops						
	105 conv	255	1 x 1 / 1	76 x 76 x 256	->	76 x 76 x 255	0.754 BFL
	Ops						
	106 yolo						

Loading weights from yolov3.weights...Done!
data/testdog.jpg: Predicted in 1.278501 seconds.



Selective Search
2.24 seconds



EdgeBoxes
0.38 seconds

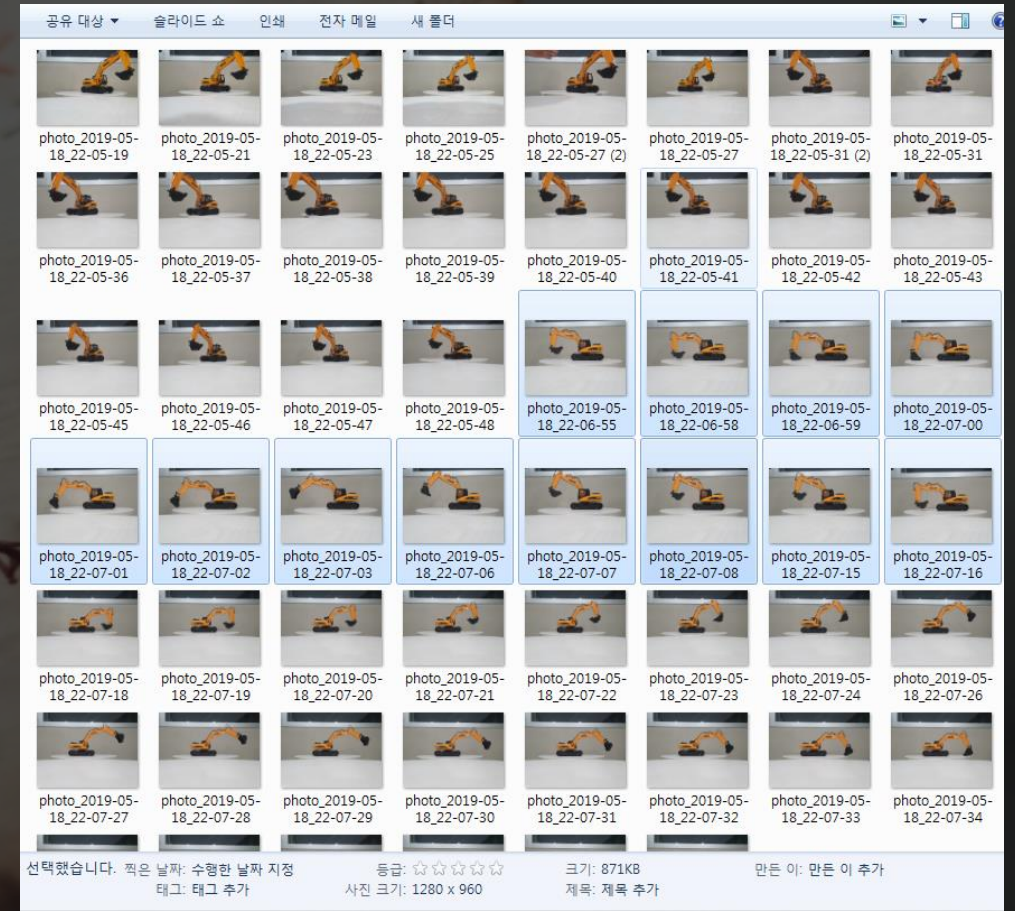
Cheaper Alternative: **grids**



3. Method

(a) Object Detection

YOLO algorithm(You Only Look Once)



3. Method

(b) Action Recognition

Action can be recognized in time-series

RNN-LSTM



Digging



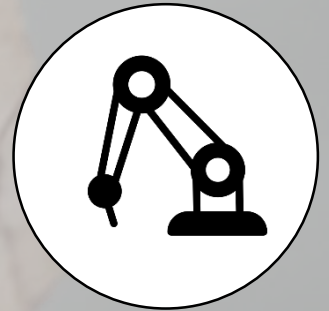
4. Validation

Problems to fix

- a. fixed camera angle
- b. Accuracy in redundant actions(Digging, Dumping)
- c. Rotating

How to solve?

- a. Data with numerous angles
- b. Improve pose-estimation model



4. Validation

a. Digging

b. Dumping

c. Moving

d. Rotating

10 UP



5. VideoClip

Thank you