



Application Research **By using Embedding board** **[Jetson Xavier]**

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Background



Safety is important issue in construction sites. To address safety issues, many proactive methods and research have been introduced. But these approaches are based on the locations of the attached sensors to heavy equipment(ex. Excavator). Using attached sensors costs a lot. Expensive, Time-consuming, Difficult. So alternative ways are required to cost less

Subject

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

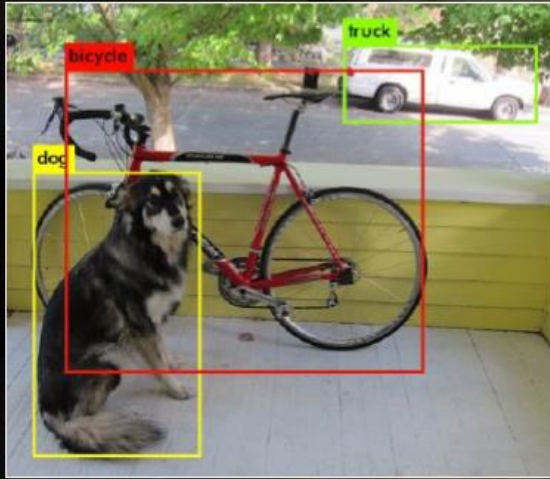
By using computer vision algorithm

problem: to find clear characteristics depending on different angles

Methods

STEP 1 Object Detection

YOLO Algorithm(You Only Look Once)



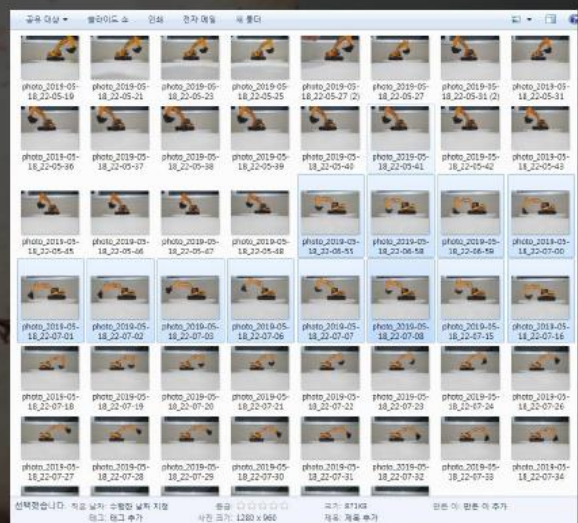
Object is detected for a second

Training through
photos which have clear differences

Training the model

YOLO is a algorithm to detect the objects. To detect them properly, numerous numbers of training data are required. Pictures were taken in various angles

YOLO algorithm(You Only Look Once)



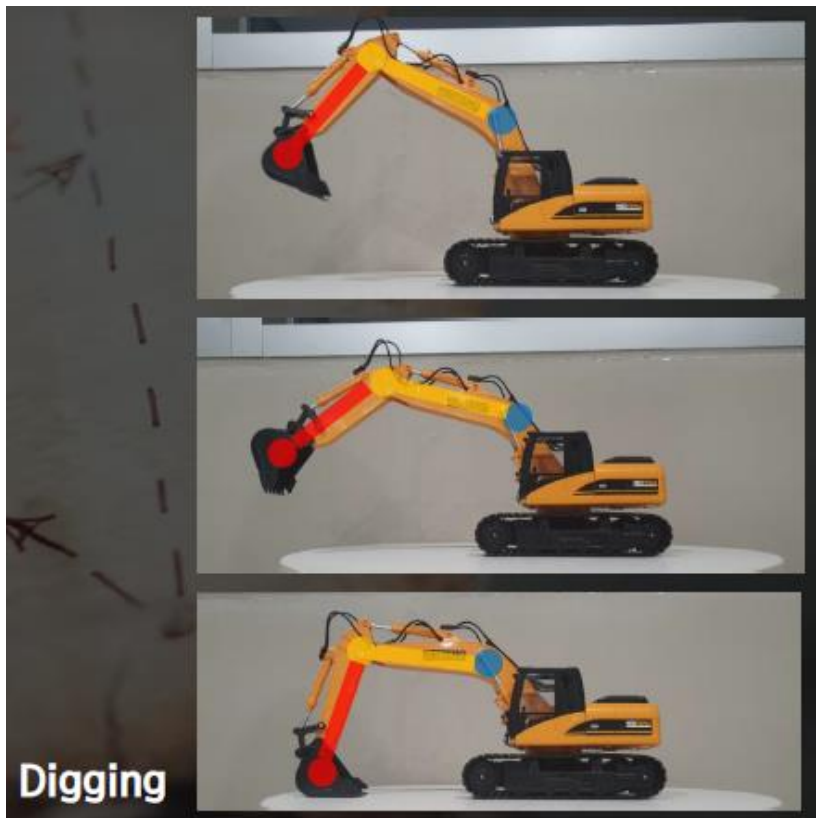
STEP 2 Action recognition

RNN-LSTM(pose estimation)

We recognize excavator's actions in time-series data by using pose-estimation

*picture below is digging example

Digging can be recognized In three sequential action



Results

We validated our model with different dataset whose angle is 10 degrees higher than training dataset to avoid overfitting problem

And performance was more or less same as training one(86%). To Improve performance, Data with numerous angles are needed