Object Detection Based Behaviour with YOLO on Thymio

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Abstract— **The ability of classify in booth space and domain objects is encoded in an enormous variety of species on the planet. Recently, deep learning approaches has been develop to make machine able to mimic the same task with interesting results. In this paper we use a small two wheels robots, Thymio, with a frontal camera mounted to act based on the object detected in the surrounding.**

I. YOLO: REAL-TIME OBJECT DETECTION

YOLO is a trained model for real-time object detection. While prior work on object detection repurposes classifiers to perform detection, YOLO handle the object detection as a regression problem to spatially separated bounding boxes and associated class probabilities. YOLO avoids resorting to complex pipelines that are slow and hard to optimize; instead, it uses a single convolutional neural network that simultaneously predicts multiple bounding boxes and class probabilities for those boxes. Using YOLO, You Only Look Once at an image to predict what objects are present and where they are.

YOLO neural network uses features from the entire image to predict each bounding box simultaneously across all classes. The convolutional neural network contains 24 convolutional layers, that extract features from the image, followed by 2 fully connected layers, whose aim is to predict the output probabilities and coordinates. The system divides the input image into an $S \times S$ grid; if the center of an object falls into a grid cell, that grid cell is responsible for detecting that object. Each grid cell predicts B bounding boxes and confidence scores for those boxes. These confidence scores reflect how confident the model is that the box contains an object and also how accurate it thinks the box is that it predicts. There is also a fast version of YOLO, designed with a neural network with fewer convolutional leayers and fewer filters in those layers.

YOLO is extremely fast, it reason globally about the image when making predictions, it learns generalizable representations of objects and it is open source. YOLO still lags behind other detection systems in accuracy; while it can quickly identify object in images, it struggles to precisely localize some objects, especially small ones. However, it is still the state-of-the-art model for object detection in real-time.

For our project, we used the third version of YOLO, or YOLOv3, which has been improved by making it a little bigger than before, but more accurate.

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IV. MATH

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$$\alpha + \beta = \chi \tag{1}$$

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TABLE I
AN EXAMPLE OF A TABLE

One	Two
Three	Four

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Fig. 1. Inductance of oscillation winding on amorphous magnetic core versus DC bias magnetic field

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APPENDIX

Appendixes should appear before the acknowledgment.

ACKNOWLEDGMENT

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References are important to the reader; therefore, each citation must be complete and correct. If at all possible, references should be commonly available publications.

REFERENCES

[1] Y. Redmon, S. Divvala, R. Girshick, and A. Farhadi, You Only Look Once: Unified, Real-Time Object Detection, University of Washington, Allen Institute for AI, Facebook AI Research, May 2016, http://pjreddie.com/yolo/.

[2] Y. Redmon, and A. Farhadi, YOLOv3: An Incremental Improvement, University of Washington, Apr 2018.