

# Objects and field detection in Robocup

## Description:

Object detection is one of the most convincing applications of computer vision that has transformed the field. Even though the current methods are providing excellent detection results unimaginable a decade ago, new methods and improvements are constantly being made. One of these is the use of transformer based architecture in deep learning. Compared to convolutional and multi-linear perceptron (mlp) based approaches [1][2], the transformer based detection methods can be more efficient and powerful [3]. The task in this semester thesis involves training a transformer-based supervised model for detection in Robocup with emphasis on small architectures.

## Goal

In the context of ROBOCUP, the humanoid NAO robots need to identify other players, the ball and the field elements in order to achieve a competitive gameplay. The identifications of the aforementioned objects are done purely through vision using object detection/classification methods. The goal of this semester project is to get the detections working while also being efficient in constrained hardware.

[1] Redmon J, Divvala S, Girshick R, Farhadi A. You only look once: Unified, real-time object detection. In Proceedings of the IEEE conference on computer vision and pattern recognition 2016 (pp. 779-788).

[2] He K, Gkioxari G, Dollár P, Girshick R. Mask r-cnn. In Proceedings of the IEEE international conference on computer vision 2017 (pp. 2961-2969).

[3] Carion N, Massa F, Synnaeve G, Usunier N, Kirillov A, Zagoruyko S. End-to-end object detection with transformers. In European Conference on Computer Vision 2020 Aug 23 (pp. 213-229). Springer, Cham.

## Requirements:

Knowledge of deep learning.

Practical experience with deep learning libraries such as PyTorch or TensorFlow.