Ahmedabad University

CSE 641 Computer Vision

Weekly Report - Week 5

Project Title: Evaluate Performance of YOLO Family Models in Small Object Detection (HBB)

Section - 1
Group - 02

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Introduction:

After analyzing the performance of various YOLO models on the VisDrone and COCO datasets, we identified that YOLOR had relatively lower mAP values compared to other models. To address this, we explored techniques from YOLOX, a model known for its effectiveness in small object detection. One key feature of YOLOX is the decoupled head, which separates classification and regression tasks, thereby reducing competition between them and improving accuracy. This week, we focused on integrating the decoupled head approach into YOLOR.

Integration of Decoupled Head in YOLOR:

The decoupled head in YOLOX consists of two independent branches: one for classification and the other for regression. Unlike the coupled head used in standard YOLO models, which merges these tasks, the decoupled head enables the model to focus on each task separately, leading to more refined feature learning. Our implementation involved modifying the YOLOR architecture to include separate convolutional layers for classification and regression, similar to YOLOX.

We adapted the loss functions accordingly, ensuring that the regression and classification branches were optimized independently. Additionally, we experimented with different configurations, including the number of layers and feature channels, to balance model complexity and inference speed. After integrating these modifications, we successfully executed the training pipeline without errors.

Conclusion:

This week, we successfully integrated the decoupled head from YOLOX into YOLOR and left the model for training. As training takes approximately 5 to 6 hours, we do not yet have the results or observations. The implementation process was smooth, and our modified YOLOR architecture is now running with the decoupled head. In the next report, we will analyze the training outcomes and evaluate the impact of this integration on YOLOR’s performance.