YOLOv7 Optimization Model Based on Attention Mechanism Applied in Dense Scenes

Jiabao Wang¹, Jun Wu¹, Junwei Wu¹, Jiangpeng Wang¹, and Ji Wang¹

¹Hubei University of Technology

May 30, 2023

Abstract

With the development of computer vision and target detection technology, real-time detection of dense scenes has become an important application requirement in various industries, which is of great significance for improving production efficiency and ensuring public safety. However, the current mainstream target detection algorithms have problems such as insufficient accuracy or inability to achieve real-time detection when detecting dense scenes, and to address this problem this paper improves the YOLOv7 model using attention mechanisms that can enhance critical information. After comparing the optimization results of three different attention mechanisms: CBAM, CA, and SimAM, the YOLOv7B-CBAM model is proposed, which effectively improves the accuracy of object detection in dense scenes. The results on VOC data sets show that the YOLOv7B-CBAM model has the highest accuracy, reaching 87.8%, 1.5% higher than that of the original model, and outperforms the original model as well as other models with improved attention mechanisms in the subsequent results of two other different dense scene practical application scenarios. The experiments show that the CBAM attention mechanism enables the model to have a higher detection rate and realize real-time monitoring, which improves the robustness of the model and ensures better accuracy than the current mainstream models.

Hosted file

YOLOv7 Optimization Model Based on Attention Mechanism Applied in Dense Scenes.docx available at https://authorea.com/users/623544/articles/646244-yolov7-optimization-model-based-on-attention-mechanism-applied-in-dense-scenes