A Survey on Lightweight CNN-Based Object Detection Algorithms for Platforms with Limited Computational Resources

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Abstract: Autonomous drones must be able to identify the existence of one or more objects of interest in a complex environment with high accuracy and speed to fly around safely. Most existing object detection techniques, based on traditional machine learning algorithms, can't offer acceptable performance in complicated environments. Deep Convolutional Neural Networks (CNNs) provide us such ability with high performance. Today, deep CNN-based object detection algorithms are more and more used in Artificial Intelligence (AI) applications. However, it still very difficult to deploy large CNNs architectures on small devices with limited hardware resources, because they consist of millions of parameters, which make them computationally very exhausting. Lightweight CNN architectures are proposed as a solution to make the deployment of deep neural networks on small devices feasible. This paper focuses on reviewing recent used lightweight CNN architectures that can be implemented on embedded targets to improve the object detection performance for small devices-based systems, like drones. We need to select fast and lightweight CNN models to use them on drone platforms. The purpose of this reviewing is to choose the most accurate and fastest algorithm to implement it on our drones.

Keywords : Computer vision, Deep Learning, Object Detection, Convolutional Neural Network, lightweight CNN