Real-Time Pedestrian Detection Method Based on Improved YOLOv3

Authors : Jingting Luo, Yong Wang, Ying Wang

Abstract : Pedestrian detection in image or video data is a very important and challenging task in security surveillance. The difficulty of this task is to locate and detect pedestrians of different scales in complex scenes accurately. To solve these problems, a deep neural network (RT-YOLOv3) is proposed to realize real-time pedestrian detection at different scales in security monitoring. RT-YOLOv3 improves the traditional YOLOv3 algorithm. Firstly, the deep residual network is added to extract vehicle features. Then six convolutional neural networks with different scales are designed and fused with the corresponding scale feature maps in the residual network to form the final feature pyramid to perform pedestrian detection tasks. This method can better characterize pedestrians. In order to further improve the accuracy and generalization ability of the model, a hybrid pedestrian data set training method is used to extract pedestrian data from the VOC data set and train with the INRIA pedestrian data set. Experiments show that the proposed RT-YOLOv3 method achieves 93.57% accuracy of mAP (mean average precision) and 46.52f/s (number of frames per second). In terms of accuracy, RT-YOLOv3 performs better than Fast R-CNN, Faster R-CNN, YOLO, SSD, YOLOv2, and YOLOv3. This method reduces the missed detection rate and false detection rate, improves the positioning accuracy, and meets the requirements of real-time detection of pedestrian objects.

Keywords : pedestrian detection, feature detection, convolutional neural network, real-time detection, YOLOv3