

A High-Efficiency Fully Convolutional Networks for Pixel-Wise Surface Defect Detection

Lingteng Qiu, Xiaojun Wu, Zhiyang Yu

Abstract— In this paper, we propose a highly efficient deep learning-based method for pixel-wise surface defect segmentation algorithm in machine vision. Our method is composed of a segmentation stage (stage 1), a detection stage (stage 2), and a matting stage (stage 3). In the segmentation stage, a lightweight fully convolutional network (FCN) is employed to make a pixel-wise prediction of the defect areas. Those predicted defect areas act as the initialization of stage 2, guiding the process of detection to correct the improper segmentation. In the matting stage, a guided filter is utilized to refine the contour of the defect area to reflect the real abnormal region. Besides that, aiming to achieve the tradeoff between efficiency and accuracy, and simultaneously we use depthwise&pointwise convolution layer, strided depthwise convolution layer, and upsample depthwise convolution layer to replace the standard convolution layer, pooling layer, and deconvolution layer, respectively. We validate our findings by analyzing the performance obtained on the dataset of DAGM 2007.

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