

并行尺度裁切的深度卷积神经网络模型

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摘要: 针对并行卷积神经网络(PCNN)的参数过多, 模型训练时间成本高的问题, 本文提出了并行尺度裁切卷积神经网络(PSC-CNN). PSC-CNN 算法是将并行卷积神经网络其中一路(Path A)的输入及该通路的特征提取层的输出通过 Crop 层裁切得到新的尺寸的图像供给另一路(Path B)网络作为输入. 这样, Path A 的输入图像在数据层经过一次随机裁剪, Path B 则经过了两次裁剪操作, 增加了输入数据的多样性, 提升了模型的学习能力. 算法以 AlexNet 为基础网络, 分别设计了对应的 PCNN 及 PSC-CNN 模型, 在数据集 Caltech101、Caltech256 上进行实验. 实验结果表明, 相较原始的 PCNN, 本文提出的改进算法有效的提升了分类准确度同时缩短了训练时间.

关键词: 并行卷积神经网络; 识别; 尺度裁切; 特征提取; AlexNet

Parallel Scale Cropping Deep Convolutional Neural Network Model

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Abstract: As the excessive parameters of parallel convolutional neural network (PCNN) and the high cost of model training time, this paper proposes a parallel scale cropping convolutional neural network (PSC-CNN). The PSC-CNN algorithm is that obtains an input for one path (Path A) of the parallel convolutional neural network and an output of the feature extraction layer of the path, and then to get a new size image as input of the other path (Path B) network through the Crop layer. In this way, the input image of Path A undergoes a random cropping in the data layer, and Path B undergoes two cropping operations, which increases the data diversity and improves the learning ability. The algorithm is based on AlexNet, and the corresponding PCNN, PSC-CNN models are designed respectively. Experiments are carried out on the datasets Caltech101 and Caltech256. Experimental results show that compared with the original PCNN, the improved algorithm proposed in this paper effectively improves the classification accuracy and shortens the training time.

Key words: parallel convolutional neural network; recognition; scale cropping; feature extraction; alexnet

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