Data Augmentation with Artistic Style

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Deep Convolutional Neural Networks (CNNs) has gained a great success in computer vision tasks, and the success of training deep CNNs heavily depends on a significant amount of labelled data. The recent research has found that neural style transfer algorithm can apply the artistic style of an image to another image without changing its high-level semantic content, so we think it is possible to employ the neural style transfer algorithm as a data augmentation strategy. The contribution of this dissertation is a thorough evaluation of the effectiveness of the neural style transfer as a data augmentation method in the image classification task. We explore the state-of-the-art neural style transfer algorithms and apply them as a data augmentation method on the Caltech101 and Caltech256 image dataset and VGG deep neural networks, where we found a 2% improvement from 83% to 85% of the image classification accuracy, compared with traditional data augmentation strategies. We also combine this new method with the conventional data augmentation approaches to further improve the performance of image classification. This work shows the potential of neural style transfer in computer vision field, such as helping us to reduce the difficulty of collecting sufficient labelled data and improve the performance of generic image-based deep learning algorithms.