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# Identification of the Source Camera of Images Based on Convolutional Neural Network

Na Huang <sup>a</sup>, Jingsha He <sup>a</sup>, Nafei Zhu <sup>a,\*</sup>, Xinggang Xuan <sup>a</sup>, Gongzheng Liu <sup>a</sup>, Chengyue Chang <sup>b</sup>

<sup>a</sup> Faculty of Information Technology

Beijing University of Technology, Beijing 100124, China

<sup>b</sup> Machinery Industry Information Center, Beijing 100823, China

[huangna@emails.bjut.edu.cn](mailto:huangna@emails.bjut.edu.cn), [jhe@bjut.edu.cn](mailto:jhe@bjut.edu.cn), [znf@bjut.edu.cn](mailto:znf@bjut.edu.cn)

**Abstract:** Identification of the source of images is an indispensable part of digital forensics that involve images. Although the correlation between images and imaging devices could be characterized using some features and would thus make it possible to identify the sources of images, the efficiency of extracting features as well as estimating and matching of the pattern of the features in current methods are less than satisfactory and could be improved by automatic features extraction. This paper proposes a method for identifying the source camera of digital images based on convolutional neuron network. The method replies on designing a new network that involves an input layer, three convolutional layers with max pooling and normalization, two fully-connected layers and the Softmax classifier to test the task of identifying the source camera following the procedure of digital forensics. The original images are cropped into small-sized patches that the designed network would analyze, lowering the requirement of the network to use a large quantity of sample images from the targeting camera as the training data. A local-to-global strategy is also adopted that would respect the rule of majority voting of the image patches in determining the source camera. Testing results show that the proposed method can achieve accuracy of up to 99.8%, which assures the effectiveness of the majority voting. In addition, we can train an SVM classifier with the deep convolutional features of images that are extracted from the network that could achieve testing performance that is even better than Softmax.

**Keywords:** Forensics, source camera, source identification, convolutional neural network, image classification

## 1 Introduction

The advancement of technologies and the wide applications of the Internet have resulted in more and more digital images to spread very quickly throughout the network via social media and other channels. Users can take, upload and download pictures freely with smart devices, making it difficult to control the production and the propagation of digital images and to use the images as digital evidence. For image-based forensics, identification of the publishers or the sources of images

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