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Learning Spatial-temporal Features for Video Copy Detection by the Combination of CNN and RNN

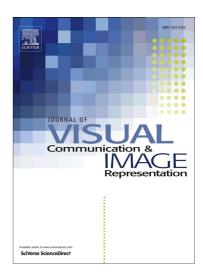
Yaocong Hu, Xiaobo Lu

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### **ACCEPTED MANUSCRIPT**

## Learning Spatial-temporal Features for Video Copy Detection by the Combination of CNN and RNN

Yaocong Hu<sup>1,2</sup>, Xiaobo Lu<sup>1,2,\*</sup>

College of Automation, Southeast University, Nanjing, Jiangsu 210096, China

#### Abstract

Following the rapid developments of network multimedia, video copyright protection online has become a hot topic in recent researches. However, video copy detection is still a challenging task in the domain of video analysis and computer vision, due to the large variations in scale and illumination of the copied contents. In this paper, we propose a novel deep learning based approach, in which we jointly use the Convolution Neural Network (CNN) and Recurrent Neural Network (RNN) to solve the specific problem of detecting copied segments in videos. We first utilize a Residual Convolutional Neural Network(ResNet) to extract content features of frame-levels, and then employ a SiameseLSTM architecture for spatial-temporal fusion and sequence matching. Finally, the copied segments are detected by a graph based temporal network. We evaluate the performance of the proposed CNN-RNN based approach on a public large scale video copy dataset called VCDB, and the experiment results demonstrate the effectiveness and high robustness of our method which achieves the significant performance improvements compared to the state of the art.

Keywords: video copyright, CNN, sequence matching, SiamesLSTM

<sup>\*</sup>Corresponding author.

Email addresses: ychu@seu.edu.cn (Yaocong Hu), xblu@seu.edu.cn (Xiaobo Lu)

<sup>&</sup>lt;sup>1</sup>School of Automation, Southeast University, Nanjing 210096, China.

<sup>&</sup>lt;sup>2</sup>Key Laboratory of Measurement and Control of Complex Systems of Engineering, Ministry of Education, Southeast University, Nanjing 210096, China.

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