

The Layout Analysis of Handwriting Characters and the Fusion of Multi-style Ancient Books' Background

Authors : Yaolin Tian, Shanxiong Chen, Fujia Zhao, Xiaoyu Lin, Hailing Xiong

Abstract : Ancient books are significant culture inheritors and their background textures convey the potential history information. However, multi-style texture recovery of ancient books has received little attention. Restricted by insufficient ancient textures and complex handling process, the generation of ancient textures confronts with new challenges. For instance, training without sufficient data usually brings about overfitting or mode collapse, so some of the outputs are prone to be fake. Recently, image generation and style transfer based on deep learning are widely applied in computer vision. Breakthroughs within the field make it possible to conduct research upon multi-style texture recovery of ancient books. Under the circumstances, we proposed a network of layout analysis and image fusion system. Firstly, we trained models by using Deep Convolution Generative against Networks (DCGAN) to synthesize multi-style ancient textures; then, we analyzed layouts based on the Position Rearrangement (PR) algorithm that we proposed to adjust the layout structure of foreground content; at last, we realized our goal by fusing rearranged foreground texts and generated background. In experiments, diversified samples such as ancient Yi, Jurchen, Seal were selected as our training sets. Then, the performances of different fine-tuning models were gradually improved by adjusting DCGAN model in parameters as well as structures. In order to evaluate the results scientifically, cross entropy loss function and Fréchet Inception Distance (FID) are selected to be our assessment criteria. Eventually, we got model M8 with lowest FID score. Compared with DCGAN model proposed by Radford et al., the FID score of M8 improved by 19.26%, enhancing the quality of the synthetic images profoundly.

Keywords : deep learning, image fusion, image generation, layout analysis

Conference Title : ICAPS 2020 : International Conference on Automated Planning and Scheduling

Conference Location : Buenos Aires, Argentina

Conference Dates : February 27-28, 2020