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Automatic Near-Infrared Image Colorization Using Synthetic Images

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Abstract : Colorizing near-infrared (NIR) images poses unique challenges due to the absence of color information and the nuances in light absorption. In this paper, we present an approach to NIR image colorization utilizing a synthetic dataset generated from visible light images. Our method addresses two major challenges encountered in NIR image colorization: accurately colorizing objects with color variations and avoiding over/under saturation in dimly lit scenes. To tackle these challenges, we propose a Generative Adversarial Network (GAN)-based framework that learns to map NIR images to their corresponding colorized versions. The synthetic dataset ensures diverse color representations, enabling the model to effectively handle objects with varying hues and shades. Furthermore, the GAN architecture facilitates the generation of realistic colorizations while preserving the integrity of dimly lit scenes, thus mitigating issues related to over/under saturation. Experimental results on benchmark NIR image datasets demonstrate the efficacy of our approach in producing high-quality colorizations with improved color accuracy and naturalness. Quantitative evaluations and comparative studies validate the superiority of our method over existing techniques, showcasing its robustness and generalization capability across diverse NIR image scenarios. Our research not only contributes to advancing NIR image colorization but also underscores the importance of synthetic datasets and GANs in addressing domain-specific challenges in image processing tasks. The proposed framework holds promise for various applications in remote sensing, medical imaging, and surveillance where accurate color representation of NIR imagery is crucial for analysis and interpretation.

Keywords : computer vision, near-infrared images, automatic image colorization, generative adversarial networks, synthetic data
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