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# Low Light Image Enhancement with Multi-Stage Interconnected Autoencoders Integration in Pix to Pix GAN

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**Abstract :** The enhancement of low-light images is a significant area of study aimed at enhancing the quality of captured images in challenging lighting environments. Recently, methods based on convolutional neural networks (CNN) have gained prominence as they offer state-of-the-art performance. However, many approaches based on CNN rely on increasing the size and complexity of the neural network. In this study, we propose an alternative method for improving low-light images using an autoencoder-based multiscale knowledge transfer model. Our method leverages the power of three autoencoders, where the encoders of the first two autoencoders are directly connected to the decoder of the third autoencoder. Additionally, the decoder of the first two autoencoders is connected to the encoder of the third autoencoder. This architecture enables effective knowledge transfer, allowing the third autoencoder to learn and benefit from the enhanced knowledge extracted by the first two autoencoders. We further integrate the proposed model into the PIX to PIX GAN framework. By integrating our proposed model as the generator in the GAN framework, we aim to produce enhanced images that not only exhibit improved visual quality but also possess a more authentic and realistic appearance. These experimental results, both qualitative and quantitative, show that our method is better than the state-of-the-art methodologies.

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