AI Image Colorization

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Abstract: *Image colorization is a challenging problem in computer vision that involves adding color to grayscale images. Traditional manual techniques require expert knowledge and significant time investment. With advancements in deep learning, automated colorization has become feasible using Convolutional Neural Networks (CNNs), Generative Adversarial Networks (GANs), and transformer-based models. These approaches learn spatial and contextual information from large datasets to generate realistic colors. This paper explores various AI-based image colorization techniques, discussing their architectures, training methodologies, and evaluation metrics. Experimental results indicate that deep learning-based methods significantly improve the accuracy and visual appeal of colorized images. The study also highlights the advantages and limitations of existing models while suggesting future research directions to enhance efficiency and realism in image colorization tasks.*
Furthermore, the study highlights challenges such as ambiguous color prediction, model generalization, and computational constraints. The research concludes with insights into future improvements, including transformer-based architectures and self-supervised learning, to enhance colorization accuracy and efficient..

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