

Restorasi Citra Buram dengan Swin Transformer UNet = Image Deblurring with Swin Transformer UNet

Salomo, Roy Godsend, author

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Abstrak

Citra buram atau blur dapat terjadi akibat gerakan objek, lensa kamera alat akuisisi yang kehilangan fokus, atau getaran saat akuisisi citra. Buram membuat citra menjadi kurang tajam dan tidak fokus pada beberapa bagian pada citra. Buram pada citra mengakibatkan terjadinya penurunan kualitas dan informasi citra sehingga menyebabkan penurunan performa aplikasi computer vision seperti deteksi objek, identifikasi objek, dan klasifikasi. Hal tersebut membuat banyak dikembangkan penelitian restorasi citra buram untuk mengembalikan kualitas citra yang terdegradasi, mulai dari penggunaan metode konvensional hingga metode berbasis pembelajaran mesin. Pada penelitian ini, penulis menggunakan model Swin Transformer UNet dalam merestorasi citra buram. Model ini berbasis Swin Transformer yang diintegrasikan dengan arsitektur UNet. Data citra yang digunakan dalam penelitian ini adalah dataset buram Dual-pixel Defocus Deblurring(DPDD) dan Real Depth Of Field(RealDOF). Analisis dilakukan terhadap hasil restorasi citra model secara kuantitatif dan kualitatif. Selain itu, penulis juga melaksanakan analisis cross dataset untuk melihat kemampuan generalisasi model. Hasil restorasi dibandingkan dengan hasil restorasi model Iterative Filter Adaptive Network(IFAN) yang dianggap sebagai state-of-the-art dalam merestorasi citra buram. Evaluasi hasil restorasi Swin Transformer UNet menunjukkan bahwa model tersebut berhasil mendeteksi daerah buram pada citra dengan baik namun hasil restorasi yang didapat belum sebaik hasil restorasi pada model IFAN dalam merestorasi citra buram pada dataset yang digunakan.

.....Blurred images can occur from the motion of the photographed object, the camera lens of the acquisition tool losing focus, or vibration during image acquisition. Blurring makes the image less sharp and unfocused on some parts of the image. Blur in images results in a decrease in image quality and information, causing a decrease in the performance of computer vision tasks such as object detection, object identification, and classification. This has led to the development of many deblurring image restoration studies to restore the quality of degraded images or image restoration, ranging from the use of conventional methods to machine learning-based methods. In this research, the author uses the Swin Transformer UNet model to restore blurry images. This model is based on Swin Transformer integrated with UNet architecture. The images used in this research come from the Dual-pixel Defocus Deblurring (DPDD) and Real Depth Of Field (RealDOF) blur image datasets. The image restoration results are analyzed quantitatively and qualitatively.

Additionally, the author also conducts a cross-dataset analysis to see the generalization potential of the model. The restoration results were compared with the restoration results of the Iterative Filter Adaptive Network (IFAN) model which is considered as state-of-the-art in image deblurring. The evaluation of the Swin Transformer UNet restoration model shows that the model successfully detects blurred regions in the image well but the restoration results obtained are not as good as the restoration results in the IFAN model in restoring blurred images on the dataset used.