Modifikasi PDR-Net untuk restorasi citra berkabut luar ruang = PDR-Net modification for outdoor single image dehazing

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Abstrak

Aplikasi computer vision meliputi pendeteksian objek, klasifikasi citra, dan lain-lain. Performa dari aplikasi computer vision ini biasanya kurang baik jika digunakan pada gambar yang kabur. Gambar kabur disebabkan oleh kondisi lingkungan yang melibatkan mikropartikel di udara sehingga menyebabkan penurunan kualitas gambar. Dehazing gambar tunggal diperlukan untuk menjaga kualitas gambar yang baik. Berbagai metode dehazing citra tunggal telah dikembangkan, baik metode berbasis piksel atau deep learning. Berbagai arsitektur deep learning telah dikembangkan untuk mengatasi masalah single image dehazing, salah satunya adalah PDR-Net. Dalam studi ini, penulis mengusulkan modifikasi arsitektur PDR-Net untuk mendapatkan gambar yang direstorasi secara visual sebaik mungkin. Arsitektur Modified PDR-Net (PDR-Net M) yang diusulkan dilatih dengan dua set data, yaitu O-Haze dan Dense-Haze, dan menjalani uji ketahanan menggunakan dataset NH-Haze, SOTS, dan beberapa gambar kabur yang diunduh dari Google Image. Hasil modifikasi PDR-Net menunjukkan hasil terbaik saat restorasi citra citra kabur pada data uji O-Haze dan Dense-Haze, dengan Structural Similarity (SSIM) 0,8042, Peak Signal-to-Noise Ratio (PSNR) 20,65,00perbedaan warna 9,26 , Root Mean Square Error (RMSE) 0.11 dan Naturalness Image Quality Evaluator (NIQE) 3.94. Meskipun pada uji robustness ketiga, PDR Net-Modified mengalami kesulitan dalam restorasi citra karena karakteristik dataset yang sangat berbeda dengan data latih, PDR-Net Modified masih unggul pada uji robustness pertama dan kedua.
.....Computer vision applications include object detection, image classification, and others. The performance of this computer vision application is usually not good when used on blurred images. Blurred images are caused by environmental conditions involving microparticles in the air causing a decrease in image quality. Dehazing a single image is necessary to maintain good image quality. Various methods of single image dehazing have been developed, either pixel-based or deep learning methods. Various deep learning architectures have been developed to overcome the problem of single image dehazing, one of which is PDR-Net. In this study, the authors propose a modification of the PDR-Net architecture to obtain the best possible visually restored image. The proposed Modified PDR-Net (PDR-Net M) architecture was trained with two datasets, namely O-Haze and Dense-Haze, and underwent robustness testing using the NH-Haze dataset, SOTS, and some blurred images downloaded from Google Image. PDR-Net modification results show the best results when restoring blurred images on O-Haze and Dense-Haze test data, with Structural Similarity (SSIM) 0.8042, Peak Signal-to-Noise Ratio (PSNR) 20.65.00 color difference 9.26 , Root Mean Square Error (RMSE) 0.11 and Naturalness Image Quality Evaluator (NIQE) 3.94. Although in the third robustness test, PDR Net-Modified had difficulty in image restoration because the characteristics of the dataset were very different from the training data, PDR-Net Modified was still superior in the first and second robustness tests.