

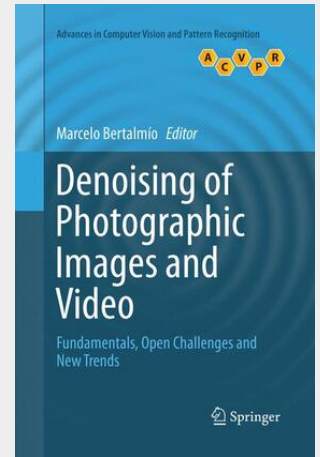
Bertalmio

Denoising of Photographic Images and Video

Fundamentals, Open Challenges and New Trends

This unique text/reference presents a detailed review of noise removal for photographs and video. An international selection of expert contributors provide their insights into the fundamental challenges that remain in the field of denoising, examining how to properly model noise in real scenarios, how to tailor denoising algorithms to these models, and how to evaluate the results in a way that is consistent with perceived image quality. The book offers comprehensive coverage from problem formulation to the evaluation of denoising methods, from historical perspectives to state-of-the-art algorithms, and from fast real-time techniques that can be implemented in-camera to powerful and computationally intensive methods for off-line processing. Topics and features: describes the basic methods for the analysis of signal-dependent and correlated noise, and the key concepts underlying sparsity-based image denoising algorithms; reviews the most successful variational approaches for image reconstruction, and introduces convolutional neural network-based denoising methods; provides an overview of the use of Gaussian priors for patch-based image denoising, and examines the potential of internal denoising; discusses selection and estimation strategies for patch-based video denoising, and explores how noise enters the imaging pipeline; surveys the properties of real camera noise, and outlines a fast approximation of nonlocal means filtering; proposes routes to improving denoising results via indirectly denoising a transform of the image, considering the right noise model and taking into account the perceived quality of the outputs. This concise and clearly written volume will be of great value to researchers and professionals working in image processing and computer vision. The book will also serve as an accessible reference for advanced undergraduate and graduate students in computer science, applied mathematics, and related fields. "The relentless quest for higher image resolution, greater ISO sensitivity, faster frame rates and smaller imaging sensors in digital imaging and videography has demanded unprecedented innovation and improvement in noise reduction technologies. This book provides a comprehensive treatment of all aspects of image noise including noise modelling, state of the art noise reduction technologies and visual perception and quantitative evaluation of noise." Geoff Woolfe, Former President of The Society for Imaging Science and Technology. "This book on denoising of photographic images and video is the most comprehensive and up-to-date account of this deep and classic problem of image processing. The progress on its solution is being spectacular. This volume therefore is a must read for all engineers and researchers concerned with image and video quality." Jean-Michel Morel, Professor at Ecole Normale Supérieure de Cachan, France.

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106,99 €

99,99 € (zzgl. MwSt.)

Lieferfrist: bis zu 10 Tage

Artikelnummer: 9783030071356

Medium: Buch

ISBN: 978-3-030-07135-6

Verlag: Springer International Publishing

Erscheinungstermin: 20.12.2018

Sprache(n): Englisch

Auflage: Softcover Nachdruck of the original 1. Auflage 2018

Serie: Advances in Computer Vision and Pattern Recognition

Produktform: Kartoniert

Gewicht: 601 g

Seiten: 333

Format (B x H): 155 x 235 mm

