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شبكة المعلومات الجامعية

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التوثيق الالكتروني والميكروفيلم

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التوثيق الإلكتروني والميكروفيلم

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بالرسالة صفحات لم ترد بالأصل

MENOUFIA UNIVERSITY

Faculty of Electronic Engineering - Menouf

Department of Electrical Communications Engineering

Adaptive Multi Channel Image Processing

By

Fathi El-Sayed Abd El-Samie

B.Sc., Electrical Communications Engineering

A master thesis submitted in partial fulfillment of the requirements for the M.Sc. degree, Communications Engineering
Faculty of Electronic Engineering-Menouf, Menoufia University

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B10VV9

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Abstract

This thesis is concerned with the image restoration problem for both single and multi channel images, which are subject to some degradations in the imaging process. These degradations are studied in the thesis and the mathematical simulations for them are reviewed.

In this thesis, some of the different image restoration techniques are studied like the Linear Minimum Mean Square Error (LMMSE) or Wiener restoration technique and the regularized Image restoration technique, which can be solved iteratively. The performance of these two methods is compared for both single and multi channel cases. The results for the multi channel restoration case outperforms that for the single channel case for both restoration techniques.

In this thesis, two proposed methods are used for enhancing the results of the LMMSE or Wiener restoration. The first approach depends on adaptively merging the Wiener restoration with a regularized restoration technique, which can be solved iteratively. The second approach is a smoothing technique to reduce noise in flat areas in the restored images. The decision that is used for selecting the regions in the image, in which either the regularization or the smoothing processes can be made, is dependent on the 2-D Haar wavelet transform. Better restoration results are obtained using the suggested enhancement techniques.

The thesis also suggests a new approach for choosing the regularization parameter in regularized image restoration. This new approach is independent on the knowledge of noise variance.

The process of 2-D blind image deconvolution is studied also in this thesis using the the two-dimension greatest common divisor GCD algorithm between two scenes.

The thesis suggests an approach for the 2-D blind deconvolution of more than two observations using the two-dimension greatest common divisor GCD algorithm. This approach benefits from the information in each observation at the same time instead of using only two observations at the time. The approach depends on forming a combinational image from the available observations and performing the 2-D GCD on this image with all observations and then averaging the results to obtain the estimated image. Results obtained using the suggested approach for multiple observations are superior to those obtained with applying the 2-D GCD algorithm on each two observations at the time. The averaging process on the obtained results contributes to enhancing the estimated image due to the noise reduction resulting from the averaging process.

NOTE ON PUBLICATIONS

Two papers extracted from the work of this MSc thesis have been published in the 18th National Radio Conference, URSI 2001, Mansoura, Egypt, March 2001.

1- "Enhanced Wiener Restoration Of Images Based on The Haar Wavelet Transform"

Authors: Mohiy M. Hadhoud, Moawad I. Dessouky, Fathi E. Abd El-Samie and Said E. El-Khamy.

2- "Blind Deconvolution Of Blurred Images From Multiple Observations Using The GCD Algorithm"

Authors: Mohiy M. Hadhoud, Moawad I. Dessouky, Fathi E. Abd El-Samie and Said E. El-Khamy.

ACKNOWLEDGEMENTS

I would like to express my gratitude to **Prof. Mohiy Hadhoud** for his effort beginning with selecting the topic of research and continuing with endowing me with the research material and advices during the course of work.

I am also so grateful to **Dr. Moawad Ibrahim** for his effort with me during the course of work and his advices for directing the work in the right direction.

Thanks to **Prof. Said El-Khamy** for his effort and advices in organizing and directing it to the right way the work and also his effort in revising the two papers.

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