

Accepted Manuscript

Image reconstruction based on circulant matrices



PII: S0923-5965(18)30079-1
DOI: <https://doi.org/10.1016/j.image.2018.01.010>
Reference: IMAGE 15325

To appear in: *Signal Processing: Image Communication*

Received date : 14 March 2017
Revised date : 11 October 2017
Accepted date : 29 January 2018

Please cite this article as: E. Carrasquinha, C. Amado, A.M. Pires, L. Oliveira, Image reconstruction based on circulant matrices, *Signal Processing: Image Communication* (2018), <https://doi.org/10.1016/j.image.2018.01.010>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Image reconstruction based on circulant matrices

Eunice Carrasquinha¹, Conceição Amado², Ana M. Pires², Lina Oliveira³,

Abstract

We propose a new method for image reconstruction based on circulant matrices. The novelty of this method is the image treatment using a simple and classical algebraic structure, the circulant matrix, which significantly reduces the computational effort, nevertheless providing reliable outputs. We compare the results with well established techniques such as the Principal Component Analysis (PCA) and the Discrete Fourier Transform (DFT), and the recently introduced Randomized Singular Value Decomposition (RSVD). We conclude that the quality is comparable whilst the computational time is considerably reduced.

Keywords: PCA, Signal processing, Image reconstruction, Circulant matrices, Toeplitz matrices.

1. Introduction

Image processing is a vast research area which encompasses, for example, reconstruction, compression and encryption (see, e.g., Zhou et al. (2014), Zhou et al. (2015), Zhou et al. (2016), Zhang et al. (2017), Chen et al. (2016) and for a review Setyaningsih and Wardoyo (2017)). The present work is focused on image reconstruction.

Email addresses: eunice.trigueirao@tecnico.ulisboa.pt (Eunice Carrasquinha), conceicao.amado@tecnico.ulisboa.pt (Conceição Amado), apires@math.ist.utl.pt (Ana M. Pires), linaoliv@math.tecnico.ulisboa.pt (Lina Oliveira)

¹IDMEC, Instituto Superior Técnico, Universidade de Lisboa, Lisbon, Portugal

²Department of Mathematics and CEMAT, Instituto Superior Técnico, Universidade de Lisboa, Lisbon, Portugal

³Department of Mathematics and Center for Mathematical Analysis, Geometry and Dynamical Systems, Instituto Superior Técnico, Universidade de Lisboa, Lisbon, Portugal

Download English Version:

<https://daneshyari.com/en/article/6941593>

Download Persian Version:

<https://daneshyari.com/article/6941593>

[Daneshyari.com](https://daneshyari.com)