CONTENTS

SPECIAL SECTION—CONVEX OPTIMIZATION IN SIGNAL PROCESSING

19 FROM THE GUEST EDITORS

Yonina C. Eldar, Zhi-Quan Luo, Wing-Kin Ma, Daniel P. Palomar, and Nicholas D. Sidiropoulos

20 SEMIDEFINITE RELAXATION OF QUADRATIC OPTIMIZATION PROBLEMS

Zhi-Quan Luo, Wing-Kin Ma, Anthony Man-Cho So, Yinyu Ye, and Shuzhong Zhang

35 CONVEX OPTIMIZATION, GAME THEORY, AND VARIATIONAL INEQUALITY THEORY

Gesualdo Scutari, Daniel P. Palomar, Francisco Facchinei, and Jong-Shi Pang

50 REAL-TIME CONVEX OPTIMIZATION IN SIGNAL PROCESSING

Jacob Mattingley and Stephen Boyd

[COVER] ©PHOTODISC, DIGITAL VISION



62 CONVEX OPTIMIZATION-BASED BEAMFORMING

Alex B. Gershman, Nicholas D. Sidiropoulos, Shahram Shahbazpanahi, Mats Bengtsson, and Björn Ottersten

76 L1-L2 OPTIMIZATION IN SIGNAL AND IMAGE PROCESSING

Michael Zibulevsky and Michael Elad

89 ENRICHING THE ART OF FIR FILTER DESIGN VIA CONVEX OPTIMIZATION

Timothy N. Davidson

102 DYNAMIC RESOURCE ALLOCATION IN COGNITIVE RADIO NETWORKS

Rui Zhang, Ying-Chang Liang, and Shuguang Cui

115 PARAMETER ESTIMATION OF STATISTICAL MODELS USING CONVEX OPTIMIZATION

Hui Jiang and Xinwei Li

FEATURE

128 COGNITIVE USER INTERFACES

Steve Young

COLUMNS

2 FROM THE EDITOR

From Admiration, Celebration, and Guessing to Innovation Ghassan AlRegib

SCOPE: IEEE Signal Processing Magazine publishes tutorial-style articles on signal processing research and applications, as well as columns and forums on issues of interest. Its coverage ranges from fundamental principles to practical implementation, reflecting the multidimensional facets of interests and concerns of the community. Its mission is to bring up-to-date, emerging and active technical developments, issues, and events to the research, educational, and professional communities. It is also the main Society communication platform addressing important issues concerning all members.

IEEE SIGNAL PROCESSING MAGAZINE (ISSN 1053-5888) (ISPREG) is published bimonthly by the Institute of Electrical and Electronics Engineers, Inc., 3 Park Avenue, 17th Floor, New York, NY 10016-5997 USA (+1 212 419 7900). Responsibility for the contents rests upon the authors and not the IEEE, the Society, or its members. Annual member subscriptions included in Society fee. Nonmember subscriptions available upon request. Individual copies: IEEE Members \$20.00 (first copy only), nonmembers \$175.00 per copy. Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limits of U.S. Copyright Law for private use of patrons: 1) those post-1977 articles that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923 USA; 2) pre-1978 articles without fee. Instructors are permitted to photocopy isolated articles for noncommercial classroom use without fee. For all other copying, reprint, or republication permission, write to IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854 USA. Copyright@2010 by the Institute of Electrical and Electronics Engineers, Inc. All rights reserved. Periodicals postage paid at New York, NY, and at additional mailing offices. Postmaster: Send address changes to IEEE Signal Processing Magazine, IEEE, 445 Hoes Lane, Piscataway, NJ 08854 USA. Capadian GST #125634188

Printed in the U.S.A.

Digital Object Identifier 10.1109/MSP.2010.935870

4 PRESIDENT'S MESSAGE

Capturing the Breadth of Our Activities Mostafa (Mos) Kaveh

6 SPECIAL REPORTS

DSPs Evolving in Consumer Electronics Applications Ron Schneiderman

12 READER'S CHOICE

Top Downloads in IEEE Xplore

141 DSP HISTORY

Parametric Representation of Speech Signals James L. Flanagan

146 APPLICATIONS CORNER

Convex Optimizations for Distance Metric Learning and Pattern Classification Kilian Q. Weinberger, Fei Sha, and Lawrence K. Saul

151 LECTURE NOTES

The Higher-Order Singular Value Decomposition: Theory and an Application Göran Bergqvist and Erik G. Larsson

155 LIFE SCIENCES

Accurate Vascular Delay Estimation from Low-Temporal Resolution Image Data Set Kelvin Wong, Chipan Tam, and Michael Ng

159 STANDARDS IN A NUTSHELL

The Reconfigurable Video Coding Standard Marco Mattavelli, Ihab Amer, and Mickaël Raulet

166 BOOK REVIEW

Gregory Wright

176 IN THE SPOTLIGHT

Gadgets and Signal Processing: The 2010 International CES Andres Kwasinski and Ghassan AlRegib

Examining H1N1 Through Its Information Entropy William A. Thompson, Andy Martwick, and Joel K. Weltman

DEPARTMENT

168 DATES AHEAD