

# **2018 IEEE Southwest Symposium on Image Analysis and Interpretation (SSIAI 2018)**

**Las Vegas, Nevada, USA  
8 – 10 April 2018**



**IEEE Catalog Number: CFP18401-POD  
ISBN: 978-1-5386-6569-5**

**Copyright © 2018 by the Institute of Electrical and Electronics Engineers, Inc.  
All Rights Reserved**

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

***\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP18401-POD
ISBN (Print-On-Demand):	978-1-5386-6569-5
ISBN (Online):	978-1-5386-6568-8
ISSN:	1550-5782

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# TABLE OF CONTENTS

## IMAGE ENHANCEMENT AND RESTORATION

- 1: UNDERWATER IMAGE RESTORATION USING DEEP NETWORKS TO ESTIMATE .....1**  
BACKGROUND LIGHT AND SCENE DEPTH  
*Keming Cao, Yan-Tsung Peng, Pamela C. Cosman, University of California, San Diego, United States*
- 2: THERMAL IMAGE ENHANCEMENT ALGORITHM USING LOCAL AND GLOBAL .....5**  
LOGARITHMIC TRANSFORM HISTOGRAM MATCHING WITH SPATIAL  
EQUALIZATION  
*Viacheslav Voronin, Svetlana Tokareva, Evgenii Semenishchev, Don State Technical University, Russian Federation; Sos Agaian, CUNY/The College of Staten Island Staten Island, United States*
- 3: A REFLECTANCE BASED METHOD FOR SHADOW DETECTION AND REMOVAL.....9**  
*Sri Kalyan Yarlagadda, Fengqing Zhu, Purdue University, United States*

## IMAGE COMPRESSION AND COMPRESSIVE SENSING

- 1: REVERSIBLE COLOR-TO-GRAY MAPPING WITH RESISTANCE TO JPEG .....13**  
ENCODING  
*Takahiko Horiuchi, Xu Wen, Keita Hirai, Chiba University, Japan*
- 2: IMAGE COMPRESSION: SPARSE CODING VS. BOTTLENECK AUTOENCODERS .....17**  
*Yijing Watkins, Oleksandr Iaroshenko, Los Alamos National Lab, United States; Mohammad Sayeh, Southern Illinois University Carbondale, United States; Garrett Kenyon, Los Alamos National Lab, United States*
- 3: COMPLEX CORRENTROPY INDUCED METRIC APPLIED TO COMPRESSIVE .....21**  
SENSING WITH COMPLEX-VALUED DATA  
*João Guimarães, Aluisio Fontes, Federal Institute of Rio Grande do Norte, Brazil; Felipe da Silva, The University of Texas at El Paso, United States; Allan Martins, Federal University of Rio Grande do Norte, Brazil; Ricardo von Borries, The University of Texas at El Paso, United States*

## BIOMEDICAL IMAGE ANALYSIS I

- 1: CTADA: THE DESIGN OF A CROWDSOURCING TOOL FOR ONLINE FOOD .....25**  
IMAGE IDENTIFICATION AND SEGMENTATION  
*Shaobo Fang, Chang Liu, Khalid Tahboub, Fengqing Zhu, Edward J. Delp, Purdue University, United States; Carol Boushey, University of Hawaii Cancer Center, United States*
- 2: SLEEP ANALYSIS USING MOTION AND HEAD DETECTION .....29**  
*Jeehyun Choe, Daniel Mas Montserrat, Amy J. Schwichtenberg, Edward J. Delp, Purdue University, United States*

## BIOMEDICAL IMAGE ANALYSIS II

- 1: GRAPH MODULARITY AND RANDOMNESS MEASURES.....33**  
*Victor Vergara, Qingbao Yu, Vince Calhoun, The Mind Research Network, United States*

**2: F-SIM: A QUASI-REALISTIC FMRI SIMULATION TOOLBOX USING DIGITAL .....37**  
**BRAIN PHANTOM AND MODELED NOISE**

*Harshit Parmar, Xiangyu Liu, Hua Xie, Brian Nutter, Sunanda Mitra, Texas Tech University, United States;  
Rodney Long, Sameer Antani, National Institutes of Health, United States*

**3: HIGH-HOMOGENEITY FUNCTIONAL PARCELLATION OF HUMAN BRAIN FOR .....41**  
**INVESTIGATING ROBUST FUNCTIONAL CONNECTIVITY**

*Xiangyu Liu, Hua Xie, Brian Nutter, Sunanda Mitra, Texas Tech University, United States*

**IMAGE MODELS I**

**1: A MARKED POINT PROCESS MODEL INCORPORATING ACTIVE CONTOURS .....49**  
**BOUNDARY ENERGY**

*Camilo Aguilar, Mary Comer, Purdue University, United States*

**2: CONJOINTLY SPACE AND 2D FREQUENCY LOCALIZED FILTERBANKS .....45**

*Peter Tay, Yanjun Yan, Western Carolina University, United States*

**3: SHAPE ADAPTIVE ACCELERATED PARAMETER OPTIMIZATION .....49**

*Anthony Yezzi, Navdeep Dahiya, Georgia Institute of Technology, United States*

**4: GOLDEN NUMBER SAMPLING APPLIED TO COMPRESSIVE SENSING .....53**

*Felipe Batista da Silva, Ricardo von Borries, The University of Texas at El Paso, United States; Cristiano  
Jacques Miosso, The University of Brasilia, Brazil*

**5: A COMPARISON OF COLUMN SUBSET SELECTION METHODS FOR .....57**  
**UNSUPERVISED BAND SUBSET SELECTION IN HYPERSPECTRAL IMAGERY**

*Maher Aldeghlawi, Miguel Velez-Reyes, The University of Texas at El Paso, United States*

**OBJECT DETECTION AND DEEP LEARNING**

**1: VIOLA-JONES ALGORITHM FOR AUTOMATIC DETECTION OF HYPERBOLIC .....61**  
**REGIONS IN GPR PROFILES OF BRIDGE DECKS**

*Mohammed Abdul Rahman, Tarek Zayed, Concordia University, Canada*

**2: ROBUST HEAD DETECTION IN COLLABORATIVE LEARNING ENVIRONMENTS .....65**  
**USING AM-FM REPRESENTATIONS**

*Wenjing Shi, Marios Pattichis, Sylvia Celedón-Pattichis, Carlos LópezLeiva, University of New Mexico, United  
States*

**3: DRIVE-NET: CONVOLUTIONAL NETWORK FOR DRIVER DISTRACTION .....69**  
**DETECTION**

*Mohammed S. Majdi, University of Arizona, United States; Sundaresh Ram, Cornell University, United States;  
Jonathan T. Gill, Jeffrey J. Rodriguez, University of Arizona, United States*

**4: THE PRECISION OF TRIANGULATION IN MONOCULAR VISUAL ODOMETRY .....73**

*Nolang Fanani, Rudolf Mester, Goethe University Frankfurt, Germany*

## IMAGE AND VIDEO QUALITY MODELS

### 1: STRATEGIES FOR QUALITY-AWARE VIDEO CONTENT ANALYTICS.....77

*Amy R. Reibman, Purdue University, United States*

### 2: ON THE NATURAL STATISTICS OF CHROMATIC IMAGES .....81

*Zeina Sinno, Alan Bovik, The University of Texas at Austin, United States*

### 3: NATURAL SCENE STATISTICS FOR NOISE ESTIMATION.....85

*Praful Gupta, Christos Bampis, Yize Jin, Alan Bovik, The University of Texas at Austin, United States*

## BIOMEDICAL IMAGE ANALYSIS III

### 1: CLASSIFICATION OF PRIMARY CILIA IN MICROSCOPY IMAGES USING .....89 CONVOLUTIONAL NEURAL RANDOM FORESTS

*Sundaresh Ram, Cornell University, United States; Mohammed S. Majdi, Jeffrey J. Rodriguez, University of Arizona, United States; Yang Gao, University of Utah, United States; Heddwen L. Brooks, University of Arizona, United States*

### 2: IN-BETWEEN AND CROSS-FREQUENCY DEPENDENCE-BASED .....93 SUMMARIZATION OF RESTING-STATE FMRI DATA

*Maziar Yaesoubi, Rogers Silva, Vince Calhoun, The Mind Research Network, United States*

### 3: FULLY AUTOMATIC BASELINE CORRECTION IN MAGNETIC RESONANCE .....97 SPECTROSCOPY

*Omid Bazgir, Sunanda Mitra, Brian Nutter, Eric Walden, Texas Tech University, United States*

## MACHINE LEARNING AND DEEP LEARNING METHODS

### 1: ARTIFACT DETECTION MAPS LEARNED USING SHALLOW CONVOLUTIONAL .....101 NETWORKS

*Todd Goodall, Alan Bovik, The University of Texas at Austin, United States*

### 2: ESTIMATING PLANT CENTERS USING A DEEP BINARY CLASSIFIER.....105

*Yuhao Chen, Javier Ribera, Edward J. Delp, Purdue University, United States*

### 3: AUTOMATIC ASSESSMENT OF HOARDING CLUTTER FROM IMAGES USING .....109 CONVOLUTIONAL NEURAL NETWORKS

*M. Ozan Tezcan, Janusz Konrad, Jordana Muroff, Boston University, United States*

### 4: PERFORMANCE OF SUPERVISED CLASSIFIERS FOR DAMAGE SCORING OF .....113 ZEBRAFISH NEUROMASTS

*Rohit C. Philip, Sree Ramya S. P. Malladi, Maki Niihori, University of Arizona, United States; Abraham Jacob, Center for Neurosciences, United States; Jeffrey J. Rodriguez, University of Arizona, United States*

## REAL-TIME IMAGE PROCESSING AND HARDWARE ACCELERATION

### 1: EFFICIENT FACE AND GESTURE RECOGNITION FOR TIME SENSITIVE .....117 APPLICATION

*Anush Ananthakumar, Georgia Institute of Technology, United States*

**2: EFFICIENT GPU-BASED IMPLEMENTATION OF THE MEDIAN FILTER BASED ON .....121**  
**A MULTI-PIXEL-PER-THREAD FRAMEWORK**  
*Gabriel Salvador, Juan M. Chau, Jorge Quesada, Cesar Carranza, Pontificia Universidad Catolica del Peru, Peru*

**3: A NEW HARDWARE ARCHITECTURE FOR THE RIDGE REGRESSION OPTICAL .....125**  
**FLOW ALGORITHM**  
*Taylor Simons, Dah Jye Lee, Brigham Young University, United States*

## **OBJECT DETECTION AND DATA FUSION**

**1: A NOVEL SEMI-SUPERVISED DETECTION APPROACH WITH WEAK ANNOTATION .....129**  
*Eric K. Tokuda, Gabriel B. A. Ferreira, University of São Paulo, Brazil; Claudio Silva, New York University, United States; Roberto M. Cesar-Jr., University of São Paulo, Brazil*

**2: FUSED REASONING UNDER UNCERTAINTY FOR SOLDIER CENTRIC .....133**  
**HUMAN-AGENT DECISION MAKING**  
*Adrienne Raglin, Andre Harrison, Douglass Summers-Stay, Army Research Lab, United States*

**3: A GROUND-TRUTH FUSION METHOD FOR IMAGE SEGMENTATION .....137**  
**EVALUATION**  
*Sree Ramya S. P. Malladi, University of Arizona, United States; Sundaresh Ram, Cornell University, United States; Jeffrey J. Rodriguez, University of Arizona, United States*

**4: CONTEXT-SENSITIVE HUMAN ACTIVITY CLASSIFICATION IN COLLABORATIVE .....141**  
**LEARNING ENVIRONMENTS**  
*Abigail Jacoby, Marios Pattichis, Sylvia Celedón-Pattichis, Carlos LópezLeiva, The University of New Mexico, United States*

**5: DDT: DECENTRALIZED EVENT DETECTION AND TRACKING USING AN .....145**  
**ENSEMBLE OF VERTEX-REINFORCED WALKS ON A GRAPH**  
*Tamal Batabyal, Scott T. Acton, University of Virginia, United States*