

# IEEE TRANSACTIONS ON IMAGE PROCESSING

A PUBLICATION OF THE IEEE SIGNAL PROCESSING SOCIETY



[www.signalprocessingsociety.org](http://www.signalprocessingsociety.org)

Indexed in PubMed® and MEDLINE®, products of the United States National Library of Medicine



SEPTEMBER 2018  
OCTOBER 2018

VOLUME 27  
VOLUME 27

NUMBER 9  
NUMBER 10

IIPRE4

(ISSN 1057-7149)

---

*For the September 2018 issue, see p. 4177 for Table of Contents.  
For the October 2018 issue, see p. 4705 for Table of Contents.*

---



# IEEE TRANSACTIONS ON IMAGE PROCESSING

A PUBLICATION OF THE IEEE SIGNAL PROCESSING SOCIETY



[www.signalprocessingsociety.org](http://www.signalprocessingsociety.org)

Indexed in PubMed® and MEDLINE®, products of the United States National Library of Medicine



SEPTEMBER 2018

VOLUME 27

NUMBER 9

IIPRE4

(ISSN 1057-7149)

## PAPERS

|   |      |
|---|------|
| Effective Sampling: Fast Segmentation Using Robust Geometric Model Fitting .....  | 4182 |
| ..... R. Tennakoon, A. Sadri, R. Hoseinnezhad, and A. Bab-Hadiashar   |      |
| Efficient Intra Mode Selection for Depth-Map Coding Utilizing Spatiotemporal, Inter-Component and Inter-View<br>Correlations in 3D-HEVC ..... | 4195 |
| ..... L. Shen, K. Li, G. Feng, P. An, and Z. Liu  |      |
| Geometry-Consistent Light Field Super-Resolution via Graph-Based Regularization .....   | 4207 |
| ..... M. Rossi and P. Frossard  |      |
| Multi-Task Learning for Blind Source Separation .....   | 4219 |
| ..... B. Du, S. Wang, C. Xu, N. Wang, L. Zhang, and D. Tao  |      |
| SPSIM: A Superpixel-Based Similarity Index for Full-Reference Image Quality Assessment .....  | 4232 |
| ..... W. Sun, Q. Liao, J.-H. Xue, and F. Zhou   |      |
| Exploring Weakly Labeled Images for Video Object Segmentation With Submodular Proposal Selection .....  | 4245 |
| ..... Y. Zhang, X. Chen, J. Li, W. Teng, and H. Song  |      |
| Domain Invariant and Class Discriminative Feature Learning for Visual Domain Adaptation .....   | 4260 |
| ..... S. Li, S. Song, G. Huang, Z. Ding, and C. Wu  |      |
| LFNet: A Novel Bidirectional Recurrent Convolutional Neural Network for Light-Field Image Super-Resolution ....                               | 4274 |
| ..... Y. Wang, F. Liu, K. Zhang, G. Hou, Z. Sun, and T. Tan   |      |
| Multi-Organ Plant Classification Based on Convolutional and Recurrent Neural Networks .....   | 4287 |
| ..... S. H. Lee, C. S. Chan, and P. Remagnino   |      |

(Contents Continued on Page 4178)

IEEE TRANSACTIONS ON IMAGE PROCESSING (ISSN 1057-7149) is published monthly by the Institute of Electrical and Electronics Engineers, Inc. Responsibility for the contents rests upon the authors and not upon the IEEE, the Society/Council, or its members. **IEEE Corporate Office:** 3 Park Avenue, 17th Floor, New York, NY 10016-5997. **IEEE Operations Center:** 445 Hoes Lane, Piscataway, NJ 08854-4141. **NJ Telephone:** +1 732 981 0060. **Price/Publication Information:** Individual copies: IEEE Members \$20.00 (first copy only), nonmembers \$641.00 per copy. (Note: Postage and handling charge not included.) Member and nonmember subscription prices available upon request. Available in print, electronic, and CD-ROM. **Copyright and Reprint Permissions:** Abstracting is permitted with credit to the source. Libraries are permitted to photocopy for private use of patrons, provided the per-copy fee of \$31.00 is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923. For all other copying, reprint, or republication permission, write to Copyrights and Permissions Department, IEEE Publications Administration, 445 Hoes Lane, Piscataway, NJ 08854-4141 Copyright © 2018 by the Institute of Electrical and Electronics Engineers, Inc. All rights reserved. **Postmaster:** Send address changes to IEEE TRANSACTIONS ON IMAGE PROCESSING, IEEE, 445 Hoes Lane, Piscataway, NJ 08854-4141. GST Registration No. 125634188. CPC Sales Agreement #40013087. Return undeliverable Canada addresses to: Pitney Bowes IMEX, P.O. Box 4332, Stanton Rd., Toronto, ON M5W 3J4, Canada. IEEE prohibits discrimination, harassment and bullying. For more information visit <http://www.ieee.org/nondiscrimination>. Printed in U.S.A.

|  |  |      |
|--|--|------|
| A Winner-Take-All Strategy for Improved Object Tracking .....  | <i>F. Zheng and L. Shao</i>  | 4302 |
| Compressive Online Robust Principal Component Analysis via $n$ - $\ell_1$ Minimization .....                                       | <i>H. V. Luong, N. Deligiannis, J. Seiler, S. Forchhammer, and A. Kaup</i>     | 4314 |
| A Variational Pansharpener Approach Based on Reproducible Kernel Hilbert Space and Heaviside Function .....                        | <i>L.-J. Deng, G. Vivone, W. Guo, M. Dalla Mura, and J. Chanussot</i>          | 4330 |
| Multi-Modal Joint Clustering With Application for Unsupervised Attribute Discovery .....   | <i>L. Liu, F. Nie, A. Wiliem, Z. Li, T. Zhang, and B. C. Lovell</i>            | 4345 |
| Gabor Convolutional Networks .....   | <i>S. Luan, C. Chen, B. Zhang, J. Han, and J. Liu</i>                          | 4357 |
| Recursive Texture Orientation Estimation Based on Space Transformation and Hypersurface Reconstruction .....                       | <i>S. Doghraj, M. Donias, and Y. Berthoumieu</i>                               | 4367 |
| Beyond Joints: Learning Representations From Primitive Geometries for Skeleton-Based Action Recognition and Detection .....        | <i>H. Wang and L. Wang</i>   | 4382 |
| Image Haze Removal via Reference Retrieval and Scene Prior .....   | <i>F. Yuan and H. Huang</i>  | 4395 |
| Cross-Paced Representation Learning With Partial Curricula for Sketch-Based Image Retrieval .....                                  | <i>D. Xu, X. Alameda-Pineda, J. Song, E. Ricci, and N. Sebe</i>                | 4410 |
| Robust 3D Hand Pose Estimation From Single Depth Images Using Multi-View CNNs .....  | <i>L. Ge, H. Liang, J. Yuan, and D. Thalmann</i>                               | 4422 |
| Joint Hypergraph Learning for Tag-Based Image Retrieval .....  | <i>Y. Wang, L. Zhu, X. Qian, and J. Han</i>                                    | 4437 |
| Deep Constrained Siamese Hash Coding Network and Load-Balanced Locality-Sensitive Hashing for Near Duplicate Image Detection ..... | <i>W. Hu, Y. Fan, J. Xing, L. Sun, Z. Cai, and S. Maybank</i>                  | 4452 |
| Blurriness-Guided Unsharp Masking .....  | <i>W. Ye and K.-K. Ma</i>  | 4465 |
| Visual Tracking With Weighted Adaptive Local Sparse Appearance Model via Spatio-Temporal Context Learning ....                     | <i>Z. Li, J. Zhang, K. Zhang, and Z. Li</i>                                    | 4478 |
| Object-Location-Aware Hashing for Multi-Label Image Retrieval via Automatic Mask Learning .....                                    | <i>C.-Q. Huang, S.-M. Yang, Y. Pan, and H.-J. Lai</i>                          | 4490 |
| Simultaneously Discovering and Localizing Common Objects in Wild Images .....  | <i>Z. Wang and J. Yuan</i>   | 4503 |
| A Gabor Feature-Based Quality Assessment Model for the Screen Content Images .....   | <i>Z. Ni, H. Zeng, L. Ma, J. Hou, J. Chen, and K.-K. Ma</i>                    | 4516 |
| Find Who to Look at: Turning From Action to Saliency .....   | <i>M. Xu, Y. Liu, R. Hu, and F. He</i>   | 4529 |
| An Unsupervised Game-Theoretic Approach to Saliency Detection .....  | <i>Y. Zeng, M. Feng, H. Lu, G. Yang, and A. Borji</i>                          | 4545 |
| A Frequency Domain SIM Reconstruction Algorithm Using Reduced Number of Images .....   | <i>A. Lal, C. Shan, K. Zhao, W. Liu, X. Huang, W. Zong, L. Chen, and P. Xi</i> | 4555 |
| From Focal Stack to Tensor Light-Field Display .....   | <i>K. Takahashi, Y. Kobayashi, and T. Fujii</i>                                | 4571 |
| Interacting Tracklets for Multi-Object Tracking .....  | <i>L. Lan, X. Wang, S. Zhang, D. Tao, W. Gao, and T. S. Huang</i>              | 4585 |
| Learning a Patch Quality Comparator for Single Image Dehazing .....  | <i>S. Santra, R. Mondal, and B. Chanda</i>                                     | 4598 |
| FFDNet: Toward a Fast and Flexible Solution for CNN-Based Image Denoising ....   | <i>K. Zhang, W. Zuo, and L. Zhang</i>  | 4608 |
| LAPSE: Low-Overhead Adaptive Power Saving and Contrast Enhancement for OLEDs .....   | <i>D. Jahier Pagliari, E. Macii, and M. Poncino</i>                            | 4623 |
| Image Super-Resolution With Parametric Sparse Model Learning ....  | <i>Y. Li, W. Dong, X. Xie, G. Shi, J. Wu, and X. Li</i>                        | 4638 |
| Landmark Free Face Attribute Prediction .....  | <i>J. Li, F. Zhao, J. Feng, S. Roy, S. Yan, and T. Sim</i>                     | 4651 |
| Edge Information Diffusion-Based Reconstruction for Cone Beam Computed Laminography .....  | <i>Y. Zhao, J. Xu, H. Li, and P. Zhang</i>                                     | 4663 |
| Learning Depth From Single Images With Deep Neural Network Embedding Focal Length .....  | <i>L. He, G. Wang, and Z. Hu</i>   | 4676 |
| Mutual Learning Between Saliency and Similarity: Image Cosegmentation via Tree Structured Sparsity and Tree Graph Matching .....   | <i>Y. Ren, L. Jiao, S. Yang, and S. Wang</i>                                   | 4690 |