Mangal Prakash

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Education

Max-Planck Institute (CBG)/ Technische Universität Dresden — Dresden, Germany
PhD in Computer Science (Advisor: Dr. Florian Jug) — *Aug 2017 – July 2021*

University of Minnesota, Twin Cities — Minneapolis, USA
MS in Electrical Engineering (Advisor: Prof. Murti V. Salapaka) — *Aug 2014 – Dec 2016*

National Institute of Technology, Durgapur — Durgapur, India
B.Tech in Electrical Engineering — *Aug 2010 – April 2014*

Selected Projects

Unsupervised deep image denoising | *Python, PyTorch* — Aug 2019 – Present

- Developed a novel state-of-the-art approach to model unsupervised diversity denoising task within variational autoencoder framework using learned/estimated model of imaging noise. Results on Arxiv.
- Introduced Gaussian Mixture Models based parametric representation of camera noise characteristics for training deep learning based algorithms for fully unsupervised denoising. Results published in IEEE ISBI 2020.

Few shot cell and nuclei segmentation | *Python, TensorFlow* — Jan 2019 – Present

- Analyzed the impact of deep learning based unsupervised denoising for cell segmentation in presence of limited ground truth annotations. Results published in IEEE ISBI 2020.
- Implemented end-to-end training schemes for joint unsupervised denoising and segmentation with very limited amount of segmentation ground truth available. Results published in BIC@ECCV 2020.

Consensus segmentation | *Python, Java, PyTorch, ILP solvers* — Aug 2018 – Present

- Created a framework for obtaining diverse plausible segmentation for objects of interest using only noisy input images. Results on Arxiv.
- Working on an ILP based optimization formulation for segmentation fusion from different segmentation sources using active learning based framework.

Optimal resource allocation for smart grids | *MATLAB* — Aug 2014 – Nov 2016

- Developed a distributed scheme that enables a distributed energy resource in a network to arrive at viable power reference commands while satisfying local constraints on its generation and loads it has to service. Results published at IEEE Transactions on Control of Network Systems 2020, Allerton Conference 2018, SmartGridComm 2017.

Publications

M. Prakash, A. Krull, and F. Jug. *Fully Unsupervised Diversity Denoising with Convolutional Variational Autoencoders.* International Conference on Learning Representations (ICLR) 2021.

S. Haller, **M. Prakash**, L. Hutschenreiter, T. Pietzsch, C. Rother, F. Jug, P. Swoboda, and B. Savchynskyy. *A Primal-Dual Solver for Large-Scale Tracking-by-Assignment.* Proceedings of the 24th International Conference on Artificial Intelligence and Statistics (AISTATS) 2020.

M. Prakash, T-O. Buchholz, D. Schmidt, A. Krull, and F. Jug. *DenoiSeg: Joint Denoising and Segmentation.* Bio Image Computing Workshop@ECCV 2020 (**Selected for oral presentation**).

M. Prakash, M. Lalit, P. Tomancak, A. Krull, and F. Jug. *Fully Unsupervised Probabilistic Noise2Void.* IEEE International Symposium on Biomedical Imaging (ISBI) 2020 (**Selected for oral presentation**).

M. Prakash, T-O. Buchholz, M. Lalit, P. Tomancak, F. Jug, and A. Krull. *Leveraging Self-Supervised Denoising for Image Segmentation.* IEEE International Symposium on Biomedical Imaging (ISBI) 2020.

A. Krull, T. Vicar, **M. Prakash**, M. Lalit, and F. Jug. *Probabilistic Noise2Void: Unsupervised Content-Aware Denoising.* Frontiers in Computer Science, 2020.

A. Jain, V. Ulman, A. Mukherjee, **M. Prakash**, M.B. Cuenca, L.G. Pimpale, S. Münster, R. Haase, K.A. Panfilio, F. Jug, S.W. Grill, P. Tomancak, and A. Pavlopoulos. *Regionalized tissue fluidization is required for epithelial gap closure during insect gastrulation.* Nature Communications, 2020.

M. Prakash, S. Talukdar, S. Attree, V. Yadav, and M.V. Salapaka. *Distributed stopping criterion for consensus in the presence of delays.* IEEE Transactions on Control of Network Systems, 2020.

M. Prakash, S. Talukdar, S. Attree, S. Patel, and M.V. Salapaka. *Distributed stopping criterion for ratio consensus.* 56th Annual Allerton Conference on Communication, Control, and Computing, 2018.

S. Patel, S. Attree, S. Talukdar, **M. Prakash**, and M.V. Salapaka. *Distributed apportioning in a power network for providing demand response services.* IEEE International Conference on Smart Grid Communications (SmartGridComm), 2017.

S. Talukdar, **M. Prakash**, D. Materassi, and M.V. Salapaka. *Reconstruction of networks of cyclostationary processes.* 54th IEEE Conference on Decision and Control (CDC), 2015.

Scholarships and Awards

- **2014-2015 College of Science and Engineering Fellowship** at the University of Minnesota. Full year funding for pursuing graduate studies.
- **2015-2016 Electrical and Computer Engineering Department Fellowship** at the University of Minnesota. Full year funding for pursuing graduate studies.
- **2013 Indian Academy of Sciences Summer Fellowship**. Two month funding for undergraduate research.
- **2007 Certificate of Merit** by CBSE for being among the top 0.1% in Mathematics and English in nationwide matriculation examinations.

Training, Workshops and Hackathons

EMBO Practical Course Light Sheet Microscopy Dresden — Dresden, Germany, Aug 2018

Deep learning Bootcamp — Dresden, Germany, Sep 2017

DAIS/KNIME Image Processing Hackathon — Konstanz 2017, Dresden 2019, Germany

Teaching Experience

Mentor for Dresden Deep Learning Hackathon. — Sep 2019
TU Dresden — *Dresden, Germany*

Teaching Assistant for the course Signals and Systems. — Aug 2016 – Dec 2016
University of Minnesota — *Minneapolis, USA*

Teaching Assistant for the course State Space Control System Design. — Jan 2016 – May 2016
University of Minnesota — *Minneapolis, USA*

Proficient Technical Skills

Programming Languages: Python (advanced), Java (advanced), MATLAB (basic)
Deep Learning Frameworks: PyTorch (advanced), Keras (good), TensorFlow (good)
Developer Tools: Git (advanced), Github (advanced), PyCharm (advanced), Eclipse (advanced)
Bioimage Analysis Softwares: Fiji/ImageJ (advanced), Ilastik (advanced), Labkit (advanced)
Others: Light sheet microscopy (basic), Latex (advanced)