RUPALI MANKAR, *RESEARCH SCIENTIST/MACHINE LEARNING ENGINEER*

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Machine and Deep Learning ~ Cross-functional Collaboration ~ Image Processing ~ Process Improvement

SUMMARY

A performance-driven professional with more than 6 years of experience in Machine Learning and Deep Learning: Data Collection and Analysis, Image Processing, GPU Programming, and Cross-functional Collaboration. Experienced at identifying research problems and implementing an end-to-end process to resolve them. Well-versed at data science tools and developing new methods to leverage the state-of-the-art. **US Permanent resident, currently holds a green card.**

SKILLS AND EXPERTISE

Data Science:	TensorFlow2, Keras, PyTorch, Numpy, Scipy, Pandas, Scikit-learn, SQL, Spark
Data Analytics:	Python, Matlab, C/ C++, GPU Programming -CUDA, Jupyter, Java, git
Web/Media Management	JSP, JavaScript, GIMP, C# and AWS

RESEARCH EXPERIENCE

Postdoctoral Fellow, Biomedical Informatics and Data Science *(2019–2021)*

National Library of Medicine and University of Houston | Houston, TX, USA

- Leading a team of two Ph.D. students to develop an image reconstruction algorithm.
- **Applied machine learning and deep learning methods on Terabyte size datasets for object detection, classification, regression, and clustering using Scikit-learn, Tensorflow2, and PyTorch.**
- Accomplished **3X** improvement in spatial resolution of IR images by implementing unsupervised multi-modal image fusion algorithm using curvelet sharpening.
- **Achieved 97% - 98% of classification accuracy on various cancer tissues while overcoming image acquisition limitation with speed by ≈124X.**
- Improved classification accuracy by **21%** on hyperspectral images classification by combining spatial and spectral features using deep learning models like CNN and U-net.
- Conceptualized and implemented a novel method of selective polarized IR imaging to quantify the orientation of collagen fibers up to **1µm** thickness in clinical biopsies using tensor computation.
- Expertise in writing funding proposals, NIH-NLM funded fellowship demonstrates the ability to write successful grant proposals.

Research Assistant, STIM Laboratory *(2015–2019)*

University of Houston | Houston, TX, USA

- **Released an open-source GPU-accelerated code (C++ and CUDA) for optimal feature selection using evolutionary genetic algorithm (GA) and achieved 10X - 100X speedup in feature selection on hyperspectral images (size in TBs).**
- Optimal feature selection reduced image acquisition time and size by ≈80X, maintaining classification accuracy, validated on multiple datasets of cancer tissues using multi-class classifiers.
- **Established a pipeline for automated grading of human bone marrow biopsies for osteosclerosis through label-free IR spectroscopic imaging and machine learning analysis**.
- Attained 99.4% sensitivity and 99.9% specificity with a random forest (RF) classifier for histological classes in the label-free hyperspectral images.
- **Automated the osteosclerosis grading using WHO guidelines by feature engineering spectrally classified bone marrow images and training optimal SVM model**
- Capitalized on prior industry expertise by writing 5 research articles with 48 citations published in high-impact journals such as Analytical Chemistry and Analyst

EDUCATION

Ph. D in Electrical and Computer Engineering, University of Houston | Houston, TX, USA **(2019)**

M. Tech in Electronics Design Technology NIElIT | Aurangabad, MH, India **(2011)**

B. Tech in Electronics and Telecommunication College of Engineering Pune | Pune, MH, India **(2008)**

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AWARDS

SAS Early Career Travel Grant, SciX2021 Conference
National Library of Medicine (NLM) Training Program in Biomedical Informatics and Data Science, 2019 - 2020
Urvish Medh Best Poster Presentation, 12th Annual Graduate Research Conference
Graduate Aptitude Test in Engineering Scholarship, All India Council for Technical Education (AICTE)
Intradepartmental Faculty Award, K. K. Wagh Engineering College

PROFESSIONAL AFFILIATIONS

Member: The Society for Applied Spectroscopy (Member)
Member: The Women in Data (Member)
Member: The Coblentz Society (Member)
Member: The International Society of Optics and Photonics (SPIE)
Paper Reviewer: Transactions on Geoscience and Remote Sensing
Paper Reviewer: Institute of Electrical and Electronics Engineers

SELECTED PUBLICATIONS

1. **R. Mankar**, C. Gajjela, F. Foroozandeh, S. Prasad, D. Mayerich, S. Berisha, and R. K. Reddy. Multi-Modal Image Sharpening in Fourier Transform Infrared (FTIR) Microscopy. Analyst 2021. (IF 4.16)
2. **R. Mankar**, C. Bueso-Ramos, C. Cameron Yin, J. E. Hidalgo-Lopez, S. Berisha, M. Kansiz, D. Mayerich, "Automated osteosclerosis grading of clinical biopsies using infrared spectroscopic imaging." Analytical Chemistry 92. 1(2019), 749-757
3. **R. Mankar**, M. Walsh, R. Bhargava, S. Prasad, D. Mayerich. "Selecting optimal features from Fourier transform infrared spectroscopy for discrete-frequency imaging." Analyst 143(5):1147-56 (Jan 2018)
4. S. Ran, S. Berisha, **R. Mankar**, WC. Shih D. Mayerich. "Mitigating fringing in discrete frequency infrared imaging using time-delayed integration." Biomedical optics express, 9(2), 832-843 (Feb 2018).
5. S. Berisha, C. Shengyuan, S. Saki, D. Daeinejad, Z. He, **R. Mankar**, D. Mayerich. "SIproc: An open-source biomedical data processing platform for large hyperspectral images." Analyst 142:1350 – 1357 (April 2017)