


RUPALI MANKAR

✉ rupali.mankar@gmail.com ☎ 713.471.4098  [linkedin.com/RupaliM](https://www.linkedin.com/RupaliM)

Data Scientist/Machine Learning Engineer

Data Collection and Analysis ~ Cross-functional Collaboration ~ Image Processing ~ GPU Programming
Process Improvement ~ Algorithm Development and Implementation

QUALIFICATIONS PROFILE

Performance-driven and solutions-focused professional with hands-on experience in biomedical informatics and data science. Skilled at solving interdisciplinary problems in hyperspectral imaging, microscopy, and biomedicine using advanced machine learning and deep learning techniques. Well-versed at using existing data science tools and developing new methods to complete challenging projects and improve team capabilities. **Published 7 research papers in biomedical informatics and data science.**

US Permanent resident, **currently holds a green card**

TECHNICAL ACUMEN

Programming Languages:	Python, C++, C, CUDA, MATLAB, and Java
Data Analytics:	SQL, Apache Spark, TensorFlow 2, and PyTorch
Web/Media Management	JSP, JavaScript, GIMP, C# and AWS

RESEARCH EXPERIENCE

University of Houston – Department of Electrical and Computer Engineering ▪ Houston, TX, USA

National Laboratory of Medicine Postdoctoral Fellow, *Biomedical Informatics and Data Science*, 2019–2021

- Implemented a multi-modal image fusion algorithm using the curvelet transform to improve the spatial information in infrared (IR) hyperspectral images
- **Succeeded in increasing spatial resolution by 3X and acquisition speed by 124X using FTIR imaging**
- **Designed algorithms that obtain infrared images at 1000X faster than O-PTIR at comparable resolution**
- **Improved classification accuracy of hyperspectral images by 21% by combining spatial and spectral features via a novel 2D-CNN and U-net model utilizing TensorFlow 2 and Pytorch**
- Designed a polarization-sensitive IR imaging and image analysis technique for quantifying the orientation of thin ($\leq 1\mu\text{m}$) collagen fibers in clinical biopsies
- NIH-funded postdoctoral fellowship demonstrates the ability to write successful funding proposals and offered experience mentoring two graduate students

Research Assistant, *Scalable Tissue Imaging and Modeling Laboratory*

2015–2019

- Designed software to perform multi-class classification of hyperspectral images using K-means, Random Forests, and support vector machines (SVM)
- Led a project to automate osteosclerosis grading in bone marrow biopsies through machine learning, including RF and SVM, with 84.4% accuracy
- **Built an open-source GPU-accelerated genetic algorithm for feature selection and linear discriminant analysis, reducing data sizes by $\approx 80\text{X}$**
- **Capitalized on prior industry expertise by writing 5 research articles with 48 citations published in high-impact journals such as Analytical Chemistry and Analyst**

OTHER EXPERIENCE

National Institute of Electronics and Information Technology ▪ Aurangabad Area, MH, India

Graduate Teaching Assistant

K. K. Wagh, Engineering College ▪ Nasik, MH, India

Lecturer

EDUCATION

Doctor of Philosophy in Electrical and Computer Engineering (GPA: 3.94/4.0)

University of Houston | Houston, TX, USA

Master of Technology in Electronics Design Technology (GPA: 6.78/8.0)

National Institute of Electronics and Information Technology | Aurangabad, MH, India

Bachelor of Technology in Electronics and Telecommunication (GPA: 7.48/10)

Savitribai Phule Pune University–College of Engineering Pune | Pune, MH, India

PROJECTS

Project Name: Multi-modal Image Fusion for Enhanced Spectral and Spatial Information (2020)

Overview/Objective: Enhance spatial resolution of diffraction-limited IR images by fusing high resolution dark-field images

- Deployed unsupervised curvelet sharpening to fuse spatial information from high- and low-resolution infrared hyperspectral images
- **Succeeded in optimizing classification accuracy by 97% in breast tissue and 98% in ovarian tissue while decreasing imaging speed by 124X**

Project Name: Automated Bone Marrow Osteosclerosis Grading (2019)

Overview/Objective: Automate Osteosclerosis grading in bone marrow with label-free infrared spectroscopic imaging

- Established a pipeline to automatically grade clinical samples of human bone marrow biopsies for osteosclerosis through label-free IR spectroscopic imaging
- **Attained 99.6% classification accuracy with 99.4% sensitivity and 99.9% specificity, utilizing a random forest (RF) classifier**
- Feature engineered classified bone marrow images into four grades as per WHO guidelines
- **Created a support vector machine (SVM) model resulting in 84.4% accuracy for 20 clinical samples**

Project Name: GPU Accelerated Feature Selection (GA-LDA) (2018)

Overview/Objective: Identify optimal features (bands) from hyperspectral images to enable discrete band imaging

- Made use of C++ and CUDA to integrate GPU accelerated feature selection with a genetic algorithm (GA) and linear discriminate analysis (LDA)
- Validated optimal dimension reduction on various datasets by conducting RF multi-class classification
- **Achieved 10 to 100 times speedup in feature selection as well as up to 80 times and 100 times reduction in image size and imaging time**

AWARDS

SAS 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 International Society of Optics and Photonics (SPIE)

Paper Reviewer: Transactions on Geoscience and Remote Sensing

Paper Reviewer: Institute of Electrical and Electronics Engineers