Yizhou Lu

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Education

- University of Wisconsin-Madison — 2017-now, Madison, WI
  Ph.D. in Electrical Engineering — May 2024 (expected)
  M.S. in Materials Science — Dec 2019 (conferred)
- Nanjing University — 2013-2017, Nanjing, China
  B.S. in Geochemistry — Jun 2017 (conferred)

Skills

- Programming: Python, C/C++, MATLAB, Julia, Java, Mathematica, HTML, MySQL, LaTeX, Visual Basic for Applications, Git
- Techniques: Machine Learning, Computational Imaging, Optimization, Signal/Image Processing, Compressed Sensing, Time-of-flight Sensing, Fluorescence Lifetime Imaging, Numerical Simulation, Probability & Statistics, Mathematical Analysis

Experiences

- Computational Optics Group — UW-Madison
  Student Researcher — Jun 2019 - now
  - Research on Fluorescence Lifetime Imaging Microscopy(FLIM) and Computational Hyper-spectral Fluorescence Camera; took part in a FLIM test on mouse brains by an Intensified CCD camera which showed a possible approach for fluorescence cancer diagnosis
  - Investigated a Digital-mirror-device(DMD) for single pixel sensor imaging and controlled the DMD by scripts; predicted the performances of different DMD masks by simulation; develop direct target capture method by Principal Component Analysis(PCA) and hyper-spectral data capture approach based on single pixel sensor
- Voyles Group — UW-Madison
  Student Researcher — Jul 2018 - Aug 2018
  - Analyzed the Transmission Electron Microscopy(TEM) images and developed the Pair Distribution Function method on TEM for materials characterization; contributed to promoting this costly material characterization technique in national X-ray synchrotron labs into the common institute TEM labs with lower cost
  - Independently worked on adaptive TEM image data processing for automatically removing irregular shadows and non-manual accurate image calibration

Projects

- Single Pixel Sensor Imaging Simulation — Sep 2019 - Now
  - Simulated the reconstruction of the field of view under low light level environments by a Photon-multiplier(PMT) and a Digital-mirror-device(DMD) with Python and MATLAB
  - Analyzed the signal-to-noise ratio(SNR) under Poisson noise during the photon counting process from different DMD mask and scan strategies(raster scan, basis scan, compressed sensing, etc) selections; developed an adaptive QuadTree and a hyper-resolution algorithm for PMT denoising; designed a Python module for automatic saving and converting outputs to PDF files
  - Implemented the classification with non-reconstruction approach by the Principal Component Analysis(PCA) and tested on EigenFaces samples
  - (side projects) generate fake faces from EigenFace dataset by GAN; improved the performance in python via Cython and Cupy; applied multi-threading and distributed computing methods
- Rosette Nebular Image Processing — Oct 2020 - Nov 2020
  - Calibrated the images to imporve the SNR in MATLAB; corrected the errors including "hot pixel", "dark noise" and "sensor non-uniformity"; aligned images by geometric transformation; designed a function-oriented-programming approach
  - Coloring the black-white image; modify the RGB channels' distributions from known nebular images by matching histograms
- Sentiment Analysis — Apr 2020 - May 2020
  - Built the natural language processing tool for sentiment analysis under PyTorch framework; constructed the Convolutional-Neural-Networks(CNN) and Long-Short-Term-Memory(LSTM) for classification focusing on IMDb reviews
  - Designed a module for PyTorch encapsulation by quick layer construction and sequential insertion for project group members unfamiliar with PyTorch to simplify the implementation