Yizhou Lu

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Education

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

Skills

- **Programming:** Python, C/C++, MATLAB, Visual Basic for Applications, Julia, Mathematica, LaTeX, HTML, MySQL, Git
- **Techniques:** Machine Learning, Deep Learning, Convex Optimization, Signal/Image Processing, Fourier Transform, Wavelets Transform, Compressed Sensing, Time-of-flight Sensing, Modeling

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 and encapsulated the model and methods via OOP
- **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
- **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
  - Designed a module for PyTorch encapsulation by quick layer construction and sequential insertion for project group members unfamiliar with PyTorch to simplify the implementation
- **Transmission Electron Microscopy Image Processing** — Jul 2018 - Aug 2018
  - Developed a noise filter adaptively removing the irregular shadow of the beam-stopper on TEM images; implemented the filter in IgorPro language and wrote a script of it as a quick setup for material scientists
  - Developed a algorithm adaptively finding the center of the scattering pattern which is invisible due to the beam-stopper shadow in order to avoid most inaccurate manual operations on TEM image
  - Designed a Monte Carlo method improving the time complexity from $O(N^6)$ to $O(dN^4)$ for approximately calculating the scattering damping factors of spherical and cubic particles in C++
- **Chemistry Solvers** — Apr 2018 - May 2020
  - Designed a Python solver reading the chemical formulas and calculate the corresponding scattering factor under X-ray and also balancing the chemical equations based on mass balance and electron balance boundary conditions
  - Embedded a Visual Basic for Applications(VBA) module in Excel file simplifying the acquisition of Atomic Pair Distribution Function from X-ray/TEM diffraction data by adaptive denoising and Fourier Transform for non-programmer users