Youlin Liu

Brown 4170, Purdue University, West Lafayette, Indiana, 47907 +1 765-409-6703 yliu0593@gmail.com yliu0593

Overview: *An analytical chemistry PhD student with passion for big data analytics in pharmaceutical industry*

- Research experience in spectroscopic image analysis, physics modeling with machine learning methods
- Interdisciplinary problem solving driven combining broad chemistry knowledge and coding skills
- Documentation system management with scripting languages on an aesthetics level
- Comfortable communicating complex data to lay and technical audiences in written, verbal, and visual formats

Education

Purdue University — **West Lafayette, Indiana**
PhD in Chemistry (expected) — 2016–present

University of Science and Technology of China (USTC) — **Hefei, China**
Bachelor of Science, Chemistry — 2012–2016

Projects

Simpson Lab of Nonlinear Optics — **Purdue University**
Graduate Researcher — 11/2016–present

Hyperspectral infrared imaging microscope design and digital image analysis
- Aligned optical components for a microscope to achieve co-propagation of a visible beam with an IR beam
- Managed electronics for synchronized digitization of the microscope
- Used both traditional and machine learning classification methods and successfully classified clopidogrel form 1 and form 2 as an testing example

Adversarial spectroscopy
- Optimized a genetic algorithm for iteration
- Modeled a traditional statistical probability calculation function as a testing metric
- Optimized a LDA (Linear Discriminate Analysis) algorithm in consideration of the SSS (small sample size) problem

Molecular level protein interaction modeling with experimental observables
- Modeled an untraditional artificial neural network as a regression model with complex layer design for incorporated physics level parameters with experimental measurables
- Tested and validated the model with simulated FRAP (Fluorescence recovery after photobleaching) data

Synchrotron X-ray damage analysis with non-negative matrix factorization
- Performed X-ray diffraction experiments at Argonne National Laboratory
- Converted Synchrotron raw data to Matlab accessible images for in-house analysis
- Indexed the peaks with XDS, HKL2000

DNA-Enabled-Nano-Group, USTC — **Hefei, China**
Undergraduate Researcher — 05/2015–06/2016

SERS (Surface-enhanced Raman spectroscopy) with gold nanoparticles
- Optimized inorganic synthesis via reaction control
- Used DLS (Dynamic Light Scattering), UV-Vis, gel electrophoresis for characterization of the gold dimers

Mesoscale Chemical Systems, University of Twente — **Enschede, The Netherlands**
Research Intern — 06/2015–08/2015

Sonochemical effects analysis with microfluidic sonochemical reactor
- Designed and conducted experiments to analyze sonochemical effects with chemiluminescence
- Analyzed large amount of data for statistical significance
- Validated the microfluidic sonochemical reactor's capability for producing localized radicals

Environmental Engineering Laboratory, USTC — **Hefei, China**
Undergraduate Researcher — 01/2014–04/2015

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SeCd Quantum dots detoxification analysis in C. elegans

- Toxicity analysis with SeCd forming to quantum dots within C. elegans
- Characterization methods: HPLC, fluorescence microscopy
- Maintenance of C. elegans in the laboratory

Skills & Interests

Laboratorial: Standard inorganic&organic synthesis, optical path alignment, X-ray diffraction operation

Familiar python packages: Keras, Scikit, Tensorflow

Proficient coding languages: Matlab, python

Typesetting and documentation management: LaTeX, Markdown, html, pandoc, git, bash

Other standalone suites: LabView, XDS, HKL2000, CCP4, Vina, ImageJ

Awards

- Outstanding USTC student awards, 2^{nd} metalist in 2013, 3^{rd} in 2014&2015
- CSC (China Scholarship Council) Full Scholarship for summer intern in Europe 2015

Outreach & Teaching

Singer Performed acoustic guitar song covers at local open mic nights 2019-present
Dancer Member of D.A.O. (Purdue Dance All Out Club) and performed at invited public events 2018-present
Teaching Assistant General chemistry teaching assistant, Purdue University 2017-2018
Course Coordinator General chemistry II course coordinator for interactive teaching 2018
Graduate TA Mentor Guidance and feedback to new graduate teaching assistants 2018-2019
Volunteer: National Chemistry Week 2016-2019
Hostess: Hostess for Stanford-USTC-MIT evening open dialogue with USTC students 2013
Volunteer: International communication voluntary group in USTC 2013-2016

Conferences

Pittcon Hyperspectral image classification 2020
Turkey Run Adversarial Spectroscopy 2019
Pittcon Hyperspectral IR imaging 2019

Publications

Smith, Casey and **Liu, Youlin** and Simpson, Garth J, *Adversarial Spectroscopy (in review)*

Sarkar, Sreya; Florian, Hilary; **Liu, Youlin**; Geiger, Andreas; Simpson, Garth; *Non-Negative Matrix Factorization for Isolating Damage-Free Reflections in Macromolecular Synchrotron Data Collection (in review)*

Smith, Casey and **Liu, Youlin** and Simpson, Garth J, Big Data: Learning, Analytics, and Applications, 2019, 10989, 109890F

Bram Verhaagen, **Youlin Liu**, Andrés Galdames Pérez, Elena Castro-Hernandez, David Fernandez Rivas, ChemistrySelect 2016, 1, 136.