Yuelin Li

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EDUCATION

Washington University in St. Louis — St. Louis, MO
Ph.D. in Systems Science & Mathematics — *Entering Class of 2021*
Signals and Imaging Focus

Columbia University — New York, NY
M.A./M.P.A. Joint-Degree in Data Science and Development Practice — *May 2021*
GPA: 3.98(overall), 4.06(Math + CS)
Recipient of teaching fellowship ($12k per semester), Earth Institute Research Fund ($3k in May 2019)
Courses: Machine Learning, Artificial Intelligence, Data Structures, Databases, Computer Science Theory, Real Analysis I&II, Computational Inverse Problems, Partial Differential Equations, Probability and Statistics

Peking University — Beijing, China
B.A. in Economics and Literature (Double Major) — *July 2017*
Recipient of Global Korea Scholarship ($5k in 2015)

PUBLICATIONS & PROJECTS

- **Split-step balanced θ-method for stochastic differential equations under non-global Lipschitz conditions** (Accepted at Applied Mathematics and Computation in 2021) with Dr. Wanrong Cao and Yufen Liu. We study the convergence and stability of an implicit numerical method for stochastic differential equations under non-global Lipschitz conditions. Numerical examples are simulated to illustrate the theoretical results

- **Inefficient Control Measures and COVID-19 Second Waves** (Submitted to Engineering in 2021) with Dr. Yongyue Wei, Jinxing Guan, Xiao Ning, Liangmin Wei. We used classification models and data visualization to analyze eight types of performance during COVID-19

- **Bayesian Optimization Algorithm, Hyperparameters Tuning, and Performance Comparison** (Course Project) The project investigated the behaviors of Bayesian optimization, a practical and successful method applied in SVM and deep neural networks in the context of a classification problem with a focus on Bayesian Optimization for hyperparameter tuning

- **Improving Stock Market Predictions Using Optimization Algorithms** (Course Project) The project explored different optimization approaches, including Stochastic Gradient Descent, Adam1, SAGA2, and CoCPC, to predicting closing stock price values across time. A financial API was utilized to query data such as opening/closing prices and turnover rates

- **A Study on Potential Relationship between Environmental News and the Stock Movements of Related Companies** (Master's Thesis) advised by Dr. Gregory M. Eirich. The thesis aimed to investigate any predictive relationship between "green" news and the stock movements of clean energy companies. The thesis applied several NLP and machine learning techniques to news datasets and stock/ETF price data from Yahoo Finance

RESEARCH EXPERIENCE

Computation Imaging Lab, Washington University — St. Louis, MO
Research Assistant, supervised by Dr. Kamilov — *September 2021-December 2021*

- Studied deep equilibrium models and presented a medium-scale implementation of the methods using a ResNet-like convolutional block, applied to CIFAR10

- Implemented deep equilibrium models algorithm to the iterative shrinkage-thresholding algorithm for optimizing a compressive sensing reconstruction model
- Studied SGD-Net algorithm and its efficiency of deep unfolding through stochastic approximations of the data-consistency layer

Graduate School of Architecture, Columbia University   New York, NY
Research Assistant, supervised by Prof. Laura Kurgan   *May 2020-September 2020*

- Led the data entry and verification process for New York City's 1880 census databases, cleaned more than 792,000 records in order to facilitate historical migration analysis
- Built machine learning model to test confidence score options for disambiguation, resolved dwelling data conflict with bipartite matching, run a linear regression on house number prediction
- Set up with geocoding and performed topology techniques in street address data validation using R and GIS

Supervised Mathematical Reading with Professor Florian Johne   New York, NY
Mentee   *January 2020 - May 2020*

- Studied essential partial differential equations in topics such as finite difference numerical methods for PDEs, the method of characteristics for linear and quasilinear wave equations, nonhomogeneous problems

The Earth Institute, Columbia University   Palisades, NY
Research Assistant, supervised by Dr. Robert S. Chen   *June 2019-May 2020*

- Member of the Geo-referenced Infrastructure and Demographic Data for Development (GRID3) project
- Conducted geospatial data analysis on census data in five African countries-using GIS, Python, and R
- Validated settlement data with health agency (hospital) coverage: checked the quality of existing health agency coverage boundaries in the Democratic Republic of Congo, cleaned duplicate data using R
- Performed cost-benefit analysis, stakeholder analysis, and monitoring-evaluation (M&E) for project management, planned detailed itinerary and administered $110,000 budget for two-month data collection fieldwork

Snow Lab, Harvard University   Cambridge, MA
Research Assistant, supervised by Prof. Catherine Snow   *August 2016-December 2016*

- Member of the Teacher Training, Job Performance, and Retention project
- Focused on investigating the causal mechanisms involved in reducing teacher turnover in beginning Early Childhood Education in a disadvantaged bilingual region
- Designed, organized and disseminated Qualtrics questionnaire on 1,785 kindergarten teachers' data
- To test the impact of positive social media reinforcement on retention rates: compiled and posted related articles and teaching plans on targeted social media for both the treatment and control groups every three days

Research Assistant, supervised by Prof. Catherine Snow   *June 2016-August 2016*

- Member of the Catalyzing Comprehension through Discussion and Debate project
- Created and organized a database for further analysis of Word Generation program
- Transcribed 549 essays and 1,038 definitions from 4th-8th grade students into T-units and marked the grammatical errors with CLAN
- Suggested changes related to coding efficiency to professors and doctoral fellows, and participated in revision of experimental design and methodology

Programming Skills & Languages

- **Programming:** Proficient: Python, R, SQL, Stata. Capable of: MATLAB, C/C++, Java, HTML

- **Tools:** LaTeX, GIS, Linux, Tableau

- **Languages:** English (Advanced), Korean (Advanced), Chinese (Native)

Other Experience

- **Teaching Assistant at Columbia University:**
  EMPA6310 Quantitative Techniques (graduate, R)
  SDEV3390 Geographic Information Systems (20 undergraduate students, GIS)
  INAF6006 Computing in Context (40 graduate students, Python)

- **Student Activities:** Association of Women in Mathematics (Community outreach), Society for Quantitative Approaches to Social Research (Community outreach coordinator), Columbia Data Science Society

- **Academic Workshop:**
  Columbia Undergraduate Mathematical Modelling Workshop (CUMMW)
  A four-week workshop on real world mathematical modelling. The workshop consists of a series of hands-on seminars led by faculty, postdoctoral fellows and graduate students. Topics include project design, data analysis and interpretation, modelling and simulation, literature review, scientific writing, and interactive collaboration.