Thomas C. H. Lux

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Current Address
807 Cascade Ct.
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Sample Work
github.com/tchlux
tchlux.info

Permanent Address
13330 Cold Bud Lane
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What I Do

I design algorithms and write high performance software to solve prediction and optimization problems with data. I have extensive backgrounds in the application and construction of effective machine learning models. I care a lot about practical value and all my work involves writing fast readable code.

Education

Ph.D. Computer Science, (Expected) June 2020. [3.5 GPA]
Virginia Tech, Blacksburg, VA
- Areas: **Machine Learning, Approximation Theory, Computational Science**
- 13 paper publications, (*5 publications currently under review*)

B.S. Computer Science with *Honors in Major*, May 2016. [3.5 GPA]
Roanoke College, Salem, VA
- Minors: **Physics, Mathematics**
- Phi Beta Kappa, Upsilon Pi Epsilon, Pi Mu Epsilon, Omicron Delta Kappa, 2 paper publications

Skills

Predictive Modeling • Interpretable Models • Ethical Prediction
Numerical Optimization • Parallel Programming • Mathematical Software
Data Science • Data Collection • Data Visualization • Algorithms • Research
Python • C++ • Fortran • Shell script • JavaScript • HTML/CSS

Experience

Graduate Research in Machine Learning and Approximation
Virginia Polytechnic Institute and State University (Virginia Tech)

VarSys - Managing Variability for HPC, Cloud Computing, and Computer Security *Oct. 2018 - present*
- work and collaborate as part of a multidisciplinary team of researchers
- organize and run student meetings, provide critical feedback for others
- use skills in *leadership, goal setting, written and oral communication*

Piecewise Monotone Quintic Spline Interpolation Math Software *Jun. 2019 - present*
- write high performance code that generates state-of-the-art solutions
- apply relevant theoretical math knowledge to a real prediction problem
- *polynomial interpolation, splines, Fortran, Mathematical Software*

Nonparametric Modeling and Analysis for Distribution Prediction *Jun. 2017 - May 2019*
- identified most effective techniques for distribution outcome prediction
- implemented, tested, and evaluated ML methods (*LSHEP, Delaunay, SVR, MARS)*
- applied and investigated practices of *interpolation, regression, cross validation*

Meshes for Multivariate Approximation *Jun. 2017 - Feb. 2018*
- invented three new ML techniques for predicting distribution outcomes
- achieved state-of-the-art results by tailoring algorithms to application
- *Box-Splines, Voronoi, CDF interpolation, Fortran, Mathematical software*

Web-based Visualization and Analysis of Data *Sept. 2016 - May 2017*
- implemented full pipeline for web-based data analysis and visualization
- designed interface, collected data, ran analyses, and visualized results
- *Python Django, JavaScript, HTML+CSS, RESTful API*

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Projects

fmodpy – Automatic Fortran Wrapping for Python *Fall 2017 - present*

I **created** and **maintain** an **open source software** package that automatically synthesizes a Python3 interface for Fortran codes using *NumPy* and *Cython*. This software package can be installed with *pip* and quickly bridges the gap between development prototypes and high performance mathematical codes. For example, an *fmodpy* interface to optimized Fortran code can give **>100% speedups** over equivalent *sklearn* code in ML applications.

Deep Neural Networks for Admissions Assistance *Spring 2016*

I **lead a team** of three students in **cleaning data**, **feature construction**, and the **training** of a **deep neural network** on a **30-computer cluster**. The model predicted with high accuracy which students admissions counselors should prioritize to maximize admission offer acceptance rates to a college. We **delivered the model** predictions in a usable form to the college admissions office for implementation.

Selected Publications

Lux, T.C.H., et al. (under revision review). Interpolation of sparse high-dimensional data. *Numerical Algorithms*. Springer.

- rigorously proved a novel tight error bound for a broad class of ML techniques

Lux, T.C.H., et al. (2019, November). A case study on a sustainable framework for ethically aware predictive modeling. *International Symposium on Technology and Society 2019*. IEEE.

- demonstrated a viable methodology for enforcing ethical standards in applied ML

Lux, T.C.H., et al. (2019, November). Least squares solutions to polynomial systems of equations with quantum annealing. *Quantum Information Processing* (pp. 1-16). Springer.

- proposed a new quantum computing method for solving polynomial least squares problems

Awards and Achievements

- **Thrice** invited Outstanding Alumni panelist for Roanoke College *Mar. 2018, '19, & '20*
- **Thrice** invited Speaker: at Salem Rotary Club, Roanoke College Society of 1842 Banquet, Roanoke College Math, Computer Science, and Physics *Feb. 2015 - Nov. 2016*
- **Thrice** *Outstanding Achievement in Computer Science* award *2014, '15, & '16*
- 1st place of 30 in Southeastern CCSC programming competition *Nov. 2015*
- **Twice** 1st place in Southeastern CCSC Research competition *Nov. 2013 & Nov. 2014*

Leadership Experience

Treasurer, VT Computer Science Graduate Council *May 2019 - present*
Student Representative, VT Graduate Program Committee *Sep. 2018 - May 2019*
Vice President / Cofounder, VT Computer Science Graduate Council *Nov. 2017 - May 2018*
President, RC Student Government Association (2 years, re-elected) *Dec. 2013 - Dec. 2015*
Resident Advisor, RC Residence Life Staff (3 academic years) *Aug. 2013 - May 2016*

Personal Remark

I value my abilities to listen, learn, and adapt more than anything. I hope that this document demonstrates my deep interest in *improving my surroundings* and *building community* while solving important problems. In my eyes, quality teamwork and clear communication are necessary for success. My skills are best demonstrated in action and I welcome personal conversations, tests, challenges, and interviews through any medium.

References Available Upon Request