Thomas C. H. Lux

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Current Address	Sample Work	Permanent Address
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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*

Projects	qaml – Quantum Annealing Math Library	*Fall 2019*

I **created** an **open source software** package that automatically synthesizes a quantum circuit for solving polynomial least-squares systems. It can be **easily installed** and provides native support for deterministic local solvers as well as D-Wave's **quantum computing API**. The goal of the qaml package is to give normal programmers quick and easy ways to do linear algebra on real-world quantum computers.

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 Journal*. 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 Journal*. 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	*Feb. 2015 - Nov. 2016*
	Society of 1842 Banquet, Roanoke College Math, Computer Science, and Physics	
	• **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