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Ammon Washburn

An applied math PhD student with research interests in machine learning seeking to apply knowledge of programming, statistics, and optimization to solve real world problems.

Education

August 2014 – July 2018 **PhD in Applied Math**, *University of Arizona*, Tucson, AZ, GPA: 4.0/4.0.
- Minor in systems and industrial engineering
- Passed with the highest score on the first year applied math qualifying exam

May 2016 **MS in Applied Math**, *University of Arizona*, Tucson, AZ, GPA: 4.0/4.0.

April 2014 **BS in Math**, *Brigham Young University*, Provo, UT, GPA: 3.91/4.0.
- Graduated *cum laude* with minors in computer science and statistics

Experience

Research

August 2015 – present **Systems and Industrial Engineering**, *University of Arizona*, Dr. Neng Fan.
- Derived new general models of Support Vector Machines to deal with statistical issues such as feature selection, missing or uncertain data, and robustness to mislabeling
- Developed an optimization algorithm that makes a 10-100 fold decrease in computational time compared to general interior point methods for the above models

July 2016 **Summer Institute in Statistics for Big Data**, *University of Washington*.
- Participated in three out of five modules where each lasted two and half days held by the Department of Biostatistics on different aspects of statistical research in big data
- Learned how to write reproducible research with Rmarkdown
- Used supervised machine learning algorithms on real biomedical data
- Created powerful visualizations using unsupervised machine learning concepts

August 2013 – April 2014 **Department of Mathematics**, *Brigham Young University*, Dr. Shue-Sum Chow.
- Implemented an algorithm to solve general nonlinear partial differential equations

Professional

June 2017 – August **Applied Machine Learning Intern**, *Los Alamos National Lab*, Los Alamos, NM.
- Predicted dosage-response curves of many kinds of cancer
- Used kernel Support Vector Regression, Elastic Nets, and Neural Networks
- Coded in Python a multi-task Elastic Net to take advantage of structure in the data
- Ran algorithms on local HPC/HTC centers and presented results in Jupyter Notebooks

August 2014 – April 2017 **Graduate Teaching Assistant**, *University of Arizona*, Tucson, AZ.
- Developed lesson plans, gave lectures, and wrote and graded exams and homeworks

March 2013 – July 2014 **Agent Builder**, *Mozenda*, Orem, UT.
- Gathered Terabytes of data from the web which were worth tens of thousands of dollars
- Integrated Mozenda's systems with Google spreadsheets using Mozenda's API and Javascript to do basic statistical analysis on jobs gathering big data

Additional Skills

- Expert in Matlab, Python, R and Rmarkdown, SQL, and LaTeX
- Very familiar with C++, Java, UNIX/LINUX, shell script, and job scheduler softwares
- Earned three certificates from the Summer Institute in Statistics for Big Data in Reproducible Research, Supervised and Unsupervised Machine Learning
- Familiar with many different machine learning algorithms e.g. K nearest neighbors, Support Vector Machines, Random Forests, and Neural Networks.
- Native in English, speak and write Spanish fluently

Projects

- Developed a program in Java involving servers, and GUIs to coordinate human OCR
- Built and learned how to use many data structures including linked lists, sets, queue, priority queue, red and black trees, and graphs
- Learned, improved and ran shell script code that funneled large amounts of data into SQLite that I then queried and gave reports
- Dealt with uncertain/missing data and incorporated feature selection in SVMs
- Used one-class kernel SVMs in a nested way to find proportions of cancerous/noncancerous cells in tumors
- Generalized solution path algorithms in ML to multiple parameters to speed up training speed 10x and get better asymptotic growth rates
- Coded in Python a coordinate descent algorithm for a sparse multi-task linear regression model
- Generated a novel game based off graph theory which was displayed by the TkInter GUI in Python
- Currently implementing a novel SVM algorithm using Spark in Python

Publications and Presentations

Journal Paper	S-S Chow, A Washburn. "A shooting like method for non-Darcian seepage flow problems". *Numerical Algorithms* (2016). doi:10.1007/s11075-016-0179-7.
Working Paper	A Washburn, N Fan, H Zhang. "Novel SVM-Based Classification Approaches for Evaluating Pancreatic Carcinoma"
Working Paper	A Washburn, N Fan, H Zhang. "Data-Driven SVM with Input Uncertainty Using Wasserstein Metric"
Working Paper	A Washburn, N Fan, H Zhang. "Algorithmic development for Multi-category SVM"
Presentation	A Washburn, N Fan, H. Zhang. "Distributionally Robust CVaR Formulation of SVMs using Wasserstein Metric". Presented at INFORMS optimization conference on March 24, 2018 in Denver, CO
Presentation	A Washburn, N Fan, H. Zhang. "Distributionally-robust CVAR Formulation of SVMs using Wasserstein Metric". Presented at INFORMS annual conference on October 24, 2017 in Houston, TX
Presentation	A Washburn, N Fan. "Sparse Support Vector Machines with Uncertainty". Presented at INFORMS annual conference on November 14, 2016 in Nashville, TN

Presentation	A Washburn, N Fan. “Sparse Support Vector Machines with Uncertainty”. Presented at applied math second-year research conference on December 16, 2015.
Presentation	A Washburn, A Gillette. "Using Sum Factorization and Spectral Methods in FE Methods". Presented at the first-year term paper workshop on May 13, 2015.
Presentation	V Gershuny, J Walter, A Washburn. “Effects of Viscosity on Bead Shape of Polydimethylsiloxane Fluid Flowing down a Fiber”. Presented at first year graduate research conference for applied math on December 9, 2014.
Presentation	A Washburn. “Modeling Metamerials”. Presented at 2014 MAA Intermountain Conference held at Utah Valley University.
Presentation	A Washburn. “Modeling Metamaterials”. Presented at the Student Research Conference March 2014 by College of Mathematical Sciences, BYU.

Awards

Various	Awarded travel funds by Don Wilson Travel fund from the GIDP in Applied Math at the University of Arizona for July 2016, November 2016, and March 2018
July 2016, July 2017	Awarded travel funds by Herbert E Carter Travel award from the GIDP system at the University of Arizona
July 2016	Awarded scholarship and travel fund to attend the Summer Institute in Statistics for Big Data hosted by the Department of Bio-statistics in University of Washington
August 2008	Awarded the Heritage Scholarship from Brigham Young University which is a four-year, full-tuition scholarship
Fall 2011, Winter 2013	Made the Dean’s list in department of Mathematical Sciences which honors those that did the best that semester

Service

April 14, 2016	Designed and presented interactive research for high school and college-aged students
January 2015 - August 2016	Scoutmaster for a troop of about 15 boys in a Tucson BSA chapter
August 2011 - July 2012	Taught and tutored struggling Hispanic kids whose parents didn’t speak English in a program called Connexiones at Brigham Young University
July 2009 - July 2011	Translated for, connected with services, and taught life skills to Hispanics in Virginia as part of a religious mission for the Church of Jesus Christ of Latter-Day Saints