

Andrew Scott Barr

University of Washington

andyasb@uw.edu
www.andy-barr.com
(+1) 425 829 7011

Education

UNIVERSITY OF WASHINGTON	I am in the process of obtaining a Bachelor's degree in Applied and Computational Mathematical Sciences. I am currently in my senior year and have taken 10 graduate level courses and am sitting through another 2 before I graduate. President and founder of the Applied Math club. Current GPA from UW: 3.26
BELLEVUE COLLEGE	Associates Degree, graduating in Spring 2008 as a member of the Phi Theta Kappa Honor Society. I went there, starting when I was 16, through the Running Start program. GPA from BC: 3.81

Research Experience

ASTRONOMICAL DATA PROCESSING	I spent all three quarters of the 2008-2009 school year participating in research through Pre-MAP (Pre-Majors in Astronomy Program) under Professor Andrew Connolly. We used the LLE algorithm of Saul and Roweis to create reduced dimension plots of the galaxies where their different 'dimensions' were the parameters. The goal was automated classification of galaxies.
FACE RECOGNITION AND X-LETS	I spent two quarters investigating facial recognition techniques. In the process, I had the chance to experiment with contemporary tools such as curvelets, noiselets, and the K-SVD. I reported my progress to Professor J. Nathan Kutz, chair of the Applied Math department.
NUMERICAL GEOMETRY AND IMAGE SEGMENTATION ALGORITHMS	I spent 7 weeks as a visiting research student at the Technion in Haifa, Israel in Summer 2011. I rushed through a graduate level course in Numerical Geometry from Ron Kimmel and had a thorough and intense study of advanced signal processing. I met and interviewed notable professors such as Prof. Yehoshua Zeevi, Prof. Michael Elad, and Prof. Ron Kimmel. I worked under PhD student Vadim Ratner and Professor Eli Appleboim.
TENSOR DECOMPOSITIONS AND VIDEO GESTURE RECOGNITION	My current research involves applying the HOSVD and CANDECOP decomposition to video for use in gesture recognition on smartphones. Once again, dimension reduction techniques play a prominent role and principles from compressed sensing are applied.

Summary of Relevant Classes Taken

MATHEMATICS	Differential Equations (Math 307), Introductory Linear Algebra (Math 308) Advanced Multivariable Calculus (Math 324). Math Reasoning (Math 300). Partial Differential Equations (AMath 353). Calculus for Teachers (Math 422). Programming for the Working Mathematician (Math 480). Programming for Pure Mathematicians (Math 581). Scientific Computing (Amath 481). Computational Methods for Data Analysis (Amath 482). High-Performance Scientific Computing (Amath 483). Vector Calculus/Complex Variables (Amath 401). Dynamic Systems (Amath 402). Advanced Partial Differential Equations (Amath 403). Computer Graphics Programming (Arch 486). Calculus of Variations (Amath 507). Continuous-Time Systems (EE 235). Discrete-Time Systems (EE 341). Image Processing (EE 586). I audited a Point-Set Topology Course (Math 441).
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Technical Abilities

PROGRAMMING LANGUAGES	I have experience using Python with NumPy, SciPy, and other libraries. My Math 581 class, taught by Sage's creator, William Stein, detailed the inner-workings of Sage. I have used Mercurial in multiple courses and feel confident in its use. I have implemented parallel routines in Fortran and C using OpenMP and MPI. I have used an Ubuntu machine for two years so am familiar with Unix operating systems. OpenGL, OpenCV, MATLAB, JAVA
OTHER	I regularly use L ^A T _E X and have experience editing audio and video. As part of my studies of computer graphics, I know how to use Scalable Vector Graphics (svg) and have an in-progress Sage program to create 'graph paper' for curvilinear bases and those defined by complex function. I am intimately familiar with JPEG and MPEG compression on the HEX level (from EE 586).

Professional Experience

PIANO TEACHER, 2005-PRESENT	I have taught piano to over 25 children, teenagers, and adults over the last 5 years. Teaching piano has given me much insight into how people learn things and what are the most effective ways of communicating something to different kinds of learners. I have integrated computers into my studio and am able to send parents mp3 recordings of my lessons and annotated sheet music in pdf format.
GNOMEDEX, 1-2 WEEKS PER YEAR, 2006-2010	Since I turned 16, I have had the opportunity to work directly for Chris Pirillo (206-819-7298), web celebrity and organizer of the Gnomedex conference. The conference has exposed me to many applications of computer science especially pertaining to the intersection of technology and the new, social media.
CONCERT PROMOTING, OCCASIONAL	I helped Patricia Mejia (206-854-0696), a local music promoter, with duties related to the promotion of bands and concerts. At times I worked at merchandise tables, hung posters, handed out flyers, and had people fill out email lists.
ZUMIEZ INC. , JUNE 2006 - APRIL 2007	I worked at retail location of Zumiez Inc. as a sales associate. While the job required no technical expertise, it was a great experience where I learned how to interact with people who were very different than me. My former manager, Rosie Esper (206-601-9386), was happy to accommodate my desire to work long hours and accept my input for ways to make the store run more efficiently.

Awards and Extracurricular

SACNAS CONFERENCE TRAVEL SCHOLARSHIP	I was given a travel scholarship to attend and present at the SACNAS(Society for the Advancement of Chicanos and Native Americans Society) conference, for the 2009, 2010, and 2011 conferences. These scholarships are competitive and I am very fortunate to receive them three years in a row.
MIXED CLUB	I was asked to serve as an officer for the UW mixed club (http://students.washington.edu/mixed/) after being referred there by a classmate and making insightful comments in the discussions. Due to school and work constraints, my duties in the club are limited.
APPLIED MATH CLUB	I am a founder and president. I created it to encourage the creation of an undergraduate Applied Math community, where research ideas are discussed and new projects made.

Other Skills

LANGUAGES	My native language is English. My mother is Peruvian so I can communicate effectively in Spanish and learn new technical vocabulary as needed. I have spent time in Brazil and feel confident communicating in Portuguese. I can speak Hebrew and Farsi (Persian) at ILR level 2.
GEOMETRY	I have a deep interest in topics relating to geometry that has been very indulged by my school's mathematics library. I have read a number of books that have exposed me to many different concepts of both abstract and numerical geometry.
FOURIER ANALYSIS AND WAVELETS	I have been working through multiple books on wavelets and created a variety of Sage functions to explore them. I created the following worksheet during some spare time in the last summer to show a friend the use of Sage to look at Haar wavelets. (http://480.sagenb.org/home/pub/25/). For my final project in my Math 581 course, I gave a 15 minute presentation and wrote a paper on Fast Fourier Transforms and implementations of them. I created the slides using the L ^A T _E Xbeamer class and they are available here (http://s3.amazonaws.com/FFT/slides.pdf). My paper is currently undergoing revision but a draft of it may be seen here (http://s3.amazonaws.com/FFT/FFT-DRAFT-ANDREW.pdf) I am currently enrolled in a class (AMath 482) where the use of wavelets transforms and orthogonal decomposition will be taught.
ASTRONOMY INTEREST	I attended the 2009 'Search for Life in the Universe' symposium held at STSCI. I have also visited and toured the TRIUMF accelerator (through the Pre-Map program). I am currently applying to REUs where I can work on visualizations and gain experience doing graphic programming.

References

- J. NATHAN KUTZ I have taken two courses with Professor Kutz and researched under his supervision since spring 2011. During our first meetings, I presented him results and tutorials using curvelets and other multiscale methods. I am continuing to work under him in his gesture recognition group, for which I was awarded a Mary Gates Scholarship. He is my primary recommender and is the current chair of the Applied Math department. <http://www.amath.washington.edu/~kutz/>. He is reachable at kutz@amath.washington.edu.
- ERIC HORVITZ I have known Eric since approximately November 2010, when I began teach his son piano. He is an artificial intelligence researcher at Microsoft Research and I have discussed my projects and goals with him extensively. His guidance has served me well and I look forward to future collaborations. His website is <http://research.microsoft.com/en-us/um/people/horvitz/>. He is reachable at horvitz@microsoft.com.
- WILLIAM STEIN I have taken two courses with Professor Stein and he knows me well through visits during office hours. I was one of two undergraduates in his autumn 581 course, which I received a 3.9 grade in. I also received a 3.9 grade in his 480 course. He is well known for his work in Elliptic curves and for being the creator of the open-source package Sage. Professor Stein is another one of my primary recommenders. His website is <http://www.wstein.org>. He is reachable at wstein@gmail.com.
- ELI APPLEBOIM AND VADIM RATNER These were my supervisors for my research at the Technion. Vadim is a PhD student who mentored me for the first four weeks of my stay and came up with my project. Eli is a researcher who continued to work with me and guided me through some of the complex math involved in our image processing work. They are reachable at vad@tx.technion.ac.il and eliap@ee.technion.ac.il.
- YEHOSHUA ZEEVI Professor Zeevi was an important mentor during my time at the Technion. He and I discussed future career options and he inspired me to look for ways to use applied math to help people. Professor Zeevi arranged for me to visit Intel Labs and discussed contemporary methods in image processing and sparse representations with me. His email is zeevi@ee.technion.ac.il
- YONGMIN KIM I took his graduate level image processing course (EE 568). He knows me well through visits during office hours and agreed to be a reference, even though I am only midway through his course. He chaired the BioEngineering department and ran the Image Computing Systems Laboratory (ICSL). He is currently president of the Pohang POSTECH University in South Korea. ykim@u.washington.edu.
- JAKE VANDERPLAS I worked under the close guidance of Jake VanderPlas during my first two quarters at the University of Washington. He mentored me for my research in Pre-MAP and continues to point me to new ideas and opportunities. <http://www.wstein.org>. He is reachable at vanderplas@astro.washington.edu.
- CHRISTINA ZUBELLI I took two Portuguese classes from her and she is particularly proud of my abilities in the language. She has recommended me on multiple occasions in the past and is reachable at zubelli@u.washington.edu.
- OTHER PAST RECOMMENDORS In the past, I have received letters of recommendation from other University of Washington faculty. These include Professor Kenneth Bube (bube@math.washington.edu) of the math department, Professor Stephen Mitchell (mitchell@math.washington.edu) of the math department, and Professor Andrew Conolly (ajc@astro.washington.edu) of the astronomy department. From Bellevue College, I have received letters from Professor Woody West (wwest@bcc.ctc.edu), Professor Russ Payne (wpayne@bellevuecollege.edu), Professor Guzel Khakimova (gkhakimo@bellevuecollege.edu), and Laura Toussaint (laura.toussaint@lwtc.edu)