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EDUCATION **Princeton University**, Princeton, NJ

*Bachelor of Arts*

**September 2014 - May 2018**

▷ Major: Mathematics

Dept. GPA: 3.725/4.0, Cum. GPA: 3.642/4.0

▷ Certificates: Applications of Computing, Statistics and Machine Learning

▷ Selected Courses: Topology, Real Analysis, Complex Analysis, Theoretical ML (Graduate), Fairness in ML (Graduate), Machine Learning/Pattern Recognition (Graduate), Neural Networks: Theory & Applications, Theory of Algorithms, Analysis of Big Data, Computer Vision, Computer Graphics, Probability/Stochastic Systems

RESEARCH **Princeton University**, Princeton, NJ  
EXPERIENCE

*Statistical Analysis Research (Senior Thesis)*

**September 2017 - May 2018**

<https://yashpatel5400.github.io/files/deanonimization.pdf>

Worked under the supervision of Matt Weinberg and Arvind Narayanan to investigate the prospects of partially deanonymizing Bitcoin transactions using graph clustering algorithms on a heuristics graph constructed atop the BTC transactions graph. Discovered hierarchical spectral clustering and METIS to have the best performance as measured by F-score, NMI, and purity, after which several BTC wallets were identified.

*Statistical Modelling Research (Junior Paper)*

**January 2017 - May 2017**

<https://yashpatel5400.github.io/files/selfish.pdf>

Worked under the supervision of Matt Weinberg to study the viability of selfish mining attacks in mining pools as an extension to “Majority is Not Enough: Bitcoin Mining is vulnerable” (Eyal) by taking price adjustments into account. Discovered selfish mining was viable for BTC/ETH through 2017.

**Columbia University (Mailman School of Public Health)**, New York, NY

*Statistical Modelling Research*

**May 2015 - September 2015**

<https://github.com/yashpatel5400/SexualEqualityABM>

Worked under the supervision of Professor Abdulrahmen El-Sayed to develop agent-based mathematical models for understanding the dynamics of self-efficacy for sexual minority populations from enrollment in exercise coach programs. Simulated dynamics in Python using Matplotlib, Numpy, and NetworkX.

**Princeton Plasma Physics Lab**, Princeton, NJ

*Numerical Simulations Research*

**June 2013 - January 2014**

Worked under the supervision of Professors Ilya Dodin and Ammar Hakim to develop FTDT (RK4) numerical simulations in C++/Python to empirically study PDE governing plasma phase space evolution derived in <https://arxiv.org/pdf/1006.3717.pdf> (Eq. 88). Evolution behavior was verified on standard potential initializations (i.e.  $\cos(x)$ ,  $x^2$ ,  $x^4$ ): <https://yashpatel5400.github.io/files/cos.mp4>.

**Rutgers University**, Newark, NJ

*Behavioral Neuroscience Research*

**June 2012 - August 2012**

Worked under the supervision of Professor Michael Shiflet to investigate the role of axonal guidance in the manifestation of social withdrawal by studying social behavior in mice with NRP2 gene mutations. Was responsible for preparing brain slices, setting up mice trials, and annotating and analyzing the data. A significant difference was observed in social withdrawal between those mice with and without the NRP2 mutation.

WORK EXPERIENCE	<p><b>Facebook</b>, Menlo Park, CA <span style="float: right;"><b>July 2018 - Present</b></span></p> <p><i>Undisclosed Projects (2019-)</i></p> <ul style="list-style-type: none"> <li>▷ Implemented real-time (72 FPS) HMD-rendered point cloud and TSDFs (KinectFusion) scene reconstruction in C++/OpenGL/OpenGL ES/OpenCL</li> <li>▷ Implemented, optimized, and trained deep learning model for deployment on Portal platforms. Model was implemented in PyTorch and optimized via SNPE, quantization with QAT, and layer fusion to run at 30 FPS on Qualcomm SoC.</li> <li>▷ Added translation support for quantized nodes in JIT-compiled PyTorch to Caffe2.</li> </ul> <p><i>Manifold (2018-19)</i></p> <p><a href="https://research.fb.com/wp-content/uploads/2019/09/An-Integrated-6DoF-Video-Camera-and-System-Design.pdf">https://research.fb.com/wp-content/uploads/2019/09/An-Integrated-6DoF-Video-Camera-and-System-Design.pdf</a></p> <ul style="list-style-type: none"> <li>▷ Added farm rendering through Docker, RabbitMQ, and Kubernetes. Improved depth estimation efficiency by 20% with “Gaussian funnel.”</li> <li>▷ Created test suite with Travis CI integration, extending coverage from 10% to 100%.</li> </ul> <p><b>Amazon</b>, Seattle, WA <span style="float: right;"><b>June 2017 - August 2017</b></span></p> <ul style="list-style-type: none"> <li>▷ Developed debugging service for Kiva Picking Optimization (Amazon team) developers. Deployed globally to all Amazon Robotics-enabled fulfillment centers. Implemented in Java with Spring MVC. Deployed on AWS (EC2, S3, SNS/SQS, DDB).</li> </ul> <p><b>Spirent Communications</b>, Holmdel, NJ <span style="float: right;"><b>June 2016 - August 2016</b></span></p> <ul style="list-style-type: none"> <li>▷ Developed parallelized data profiling web application, which efficiently produces interactive graphics and statistics for large data streams and exposes SQL query features. Implemented using Python (2000 SLOC), with Flask, SQLite, and Plotly.</li> <li>▷ Developed Python (bs4) tool to extract ~8000 license files from packaged product.</li> </ul>
AWARDS	<p>Siemens Westinghouse National Competition Semifinalist (2014)</p> <p>1st in Category: 2013 Regional Delaware Valley Science Fair, 1/10 considered for ISEF</p> <p>2nd in Category: 2014 Regional Delaware Valley Science Fair</p> <p>1st in Category: 2013 Jersey Shore Science Fair</p> <p>1st in Category: 2014 Jersey Shore Science Fair</p> <p>American Psychological Association: American Psychological Award Winner (2013)</p> <p>3rd Overall &amp; Student Choice Award: 2013 Monmouth Junior Science Symposium</p> <p>Regional Junior Humanities and Science Symposium Semifinalist (2013)</p> <p>AIME Qualifier (2014)</p> <p>Bausch + Lomb Science Honorary Award (2014)</p> <p>National AP Scholar and AP Scholar with Distinction</p> <p>National Merit Commended Scholar</p> <p>1st Place Team: Shore Math League in NJ (2012)</p> <p>1st Place Computer Numerical Control (CNC): TSA NJ State Conference (2013)</p> <p>2nd Place Team: National MATE ROV (2012)</p> <p>2nd Place Team: Physics II League in NJ (2013)</p> <p>3rd Place Team: Physics I League in NJ (2012)</p> <p>2x Top 30 Team: International SpaceX HyperLoop Competition (2017, 2018)</p> <ul style="list-style-type: none"> <li>▷ <a href="https://yashpatel5400.github.io/files/hyperloop.pdf">https://yashpatel5400.github.io/files/hyperloop.pdf</a></li> </ul> <p>Top 6: Regional Goldman Sachs Quant Quest Competition (2016)</p> <p>Accepted into Columbia SHP (Science Honors Program) (2012-2013)</p> <p>2x Honorable Mention (50 of 1150): SIAM Moody’s Mega Math Challenge (2013, 2014)</p> <ul style="list-style-type: none"> <li>▷ <a href="https://yashpatel5400.github.io/files/moodys.pdf">https://yashpatel5400.github.io/files/moodys.pdf</a></li> </ul>
INVITED PRESENTATIONS	<p><i>Implementation of Novel Magneto-Inertial Confinement Reactor Designs Towards Viable Confined Fusion</i>, Monmouth Junior Science Symposium (2014, 1 of 10 in NJ).</p> <p><i>Upon the Effect of Excess Neurons on the Manifestation of Autism</i>, Monmouth Junior Science Symposium (2013, 1 of 6 in NJ).</p> <p><i>Upon the Effect of Excess Neurons on the Manifestation of Autism</i>, South Jersey Chapter Human Factors and Ergonomics Society Conference (2013, 1 in NJ).</p> <p><i>Upon the Effect of Excess Neurons on the Manifestation of Autism</i>, Institute of Electrical and Electronics Engineers (IEEE) Annual Research Conference (2013)</p>

TEACHING	<b>Princeton University</b> , COS 126, 217, 226 Lab TA	<b>Jan 2016 - May 2016</b>
EXPERIENCE	Undergraduate lab teaching assistant for introductory CS sequence (Introduction to CS, Algorithms and Data Structures, and Introduction to Programming Systems)	
NOTABLE PROJECTS	<p><b>FairTear (Fairness in Machine Learning: COS 597E)</b>  <i>Report:</i> <a href="https://yashpatel5400.github.io/files/fairtear.pdf">https://yashpatel5400.github.io/files/fairtear.pdf</a>            Probabilistic fairness checker on hidden variables in machine learning models. Interfaces with decision trees, SVMs, and basic MLPs from scikit-learn. This work was an extension of Fairsquare (<a href="https://dl.acm.org/doi/pdf/10.1145/3133904">https://dl.acm.org/doi/pdf/10.1145/3133904</a>).</p> <p><b>Optimal Charging Station Locations, (Optimal Learning: ORF 418)</b>  <i>Report:</i> <a href="https://yashpatel5400.github.io/files/tesla.pdf">https://yashpatel5400.github.io/files/tesla.pdf</a>            Investigated policies to determine the optimal locations to place Tesla charging stations in a city setting. For this task, we developed a lookup-table model, with altered updating equations, and tested a few learning policies, in the forms of online and offline Knowledge Gradient Exploration (KG), Interval Estimation (IE), Boltzmann Exploration, and Pure Exploitation. Upon doing so, we found that the Knowledge Gradient Policy was the most effective in maximizing our total usage over our time horizon.</p> <p><b>NeuroPath (Great Moments in Computing: COS 583)</b>  <i>Code/Demo:</i> <a href="https://github.com/yashpatel5400/neuropath">https://github.com/yashpatel5400/neuropath</a>            Implemented two neural branch predictors (single neuron and path-incorporating network) in x86 Gem5 emulator environment. Compared with performance with standard BPs, such as Tournament and LTAGE, finding increased latency. This work was an extension of “Fast Path-Based Neural Branch Prediction” (Jimenez).</p> <p><b>Synalyze (Best Use of Machine Learning: HackPrinceton 2017)</b>  <i>Code:</i> <a href="https://github.com/yashpatel5400/synalyze">https://github.com/yashpatel5400/synalyze</a>            Business meeting-centric application for analyzing pain points and how to improve upon them. Produces analytics on voice audio recordings of business meetings using Watson NLP API. Implemented in Python/Ruby on server-side.</p>	
PROGRAMMING	Python, C++, C, Java, Bash, L <sup>A</sup> T <sub>E</sub> X, GLSL/OpenGL, C#	