Daniel Smolyak | Curriculum Vitae

6428 Western Star Run – Clarksville, MD – 21029

443-838-4075 • dsmolyak@umd.edu
www.linkedin.com/in/daniel-smolyak/

Education

University of Maryland, College Park — **College Park, MD**
B.S. in Computer Science and Economics, 3.99 GPA — *Expected Graduation: May 2020*
Honors College, Gemstone Honors Program

Atholton High School — **Columbia, MD**
Graduated in Top 5% of Class, 4.00 GPA — *September 2012 – May 2016*

Research Experience

Data Science REU — **Indiana University - Purdue University Indianapolis**
Advisor: Dr. George Mohler — *June 2018 – September 2018*

- Developed generative adversarial networks (GANs) to generate synthetic GPS trajectory data and to find anomalies within real GPS trajectory data.
- Improved upon current benchmarks in GAN-based anomaly detection by using Gaussian Mixture Models.
- Worked in a team with one undergraduate and one graduate student, presented progress updates to all other members of the REU each week.
- Presented at the 5th National Symposium for NSF REU Research in Data Science, Systems, and Security.

Gemstone Honors Program — **University of Maryland, College Park**
Advisors: Dr. Sean Barnes and Dr. Margaret Bjarnadottir — *May 2017 – Present*

- Member of a 7 person team of undergraduates conducting a 3-year (sophomore to senior year) research project on predictors of success in the NBA, and how a team's place in the success cycle should affect its front-office decisions, such as signing a free agent, selecting players via the draft, trading draft selections, signing a new coach, or adopting a new style of play.
- Wrote a literature review, methodology, and project proposal, which was presented to an expert panel.
- Conducting various types of data analytics, including clustering, regression, and decision trees, to answer research questions, including descriptive, predictive, and prescriptive analytics.
- Presented work at annual Do-Good Showcase and Undergraduate Research Day, and will complete and present a thesis by the end of senior year.

Human Computer Interaction Laboratory — **University of Maryland, College Park**
Advisors: Dr. Eun Kyoung Choe and Dr. Bongshin Lee — *September 2017 – May 2018*

- Read and annotated scholarly papers in the fields of human computer interaction and psychology.
- Designed a study to leverage goal-setting and streaks in mobile applications to provide support for lapse-management in order to promote healthy behavior change.
- Designed a study to examine individuals' interactions with voice/audio devices in an exercise context.
- Developed an Android mobile application and an Amazon Alexa skill for the above study.
- Published an extended abstract to the 2018 ACM CHI Conference on Human Factors in Computer Systems.

Computer Science Department: Independent Study **University of Maryland, College Park**
Advisor: Dr. William Gasarch *September 2017 – February 2019*

- Conducting research in the field of combinatorics on *The Muffin Problem*: "How can you divide and distribute m muffins to s students so that each students gets $\frac{m}{s}$ and the smallest piece is maximized?"
- Coding in Python mixed-integer programs and multiple algorithms and procedures to find and verify solutions to the muffin problem.
- Writing and proofreading mathematical theorems and proofs for various sub-problems and their solutions.
- Co-author on a full length book on the topic, *Mathematical Muffin Morsels*, as well as a paper presenting our research in the 2018 FUN with Algorithms Conferenc.

REU: Combinatorial Algorithms Applied Research **University of Maryland, College Park**
Advisor: Dr. William Gasarch *June 2015 – August 2015*

- Conducted research and developed algorithms for exploring topics in Ramsey Theory by using Satisfiability (SAT) solvers.
- Collaborated with a small group of undergraduates to code SAT solvers using C++.
- Resulting research was presented at an unrefereed math conference, and submitted to the Siemens competition, where the paper was chosen as a semi-finalist.

Work Experience

Microsoft, Research and AI Group **Bellevue, WA**
Software Engineering Intern *June 2019 – August 2019*

- Member of the Bing Conversational Search Team, which generates options for query reformulation.
- Extending the scope of the feature by allowing for faceted search. Finding facets through data science experimentation in C#, Scope, and Cosmos DB with word ontologies and classifiers.

Johns Hopkins University, Applied Physics Laboratory **Laurel, MD**
Software Development Intern *September 2014 – August 2017*

- Interned for two years, during the school year, as a high school intern (2014-2016), and interned for two summers as a college intern (2016-2017).
- Implemented an interface for conducting depth perception with two stereo-cameras using the OpenCV library in C++, including wiring the electronic synchronization of the cameras and calibrating the cameras. Images were received and processed at the rate of 20 frames per second, requiring proper data and memory management.
- Earned first place in the Intern Challenge, where interns were placed in teams to design an innovative office space for implementation in renovations, and presented their design to staff and management.
- Added and enhanced functionality of an image annotator written in Python, using the PyQt library and used for identifying boats in images: the annotated images are used for training a boat-recognizing machine learning software. The annotator was integrated with a MySQL database containing data on approximately 30,000 images of boats in various settings.
- Developed an image recognition program for identifying hand-written numbers through a computer's webcam, using the OpenCV Library in Python. An image classifier was created and trained on a data set of 60,000 images of hand-written numbers.
- Worked on the spatial indexing aspect of a multi-agent simulation of potential autonomous vehicles (i.e. drones or self-driving cars) using C++ and openFrameworks for the graphical user interface.

Publications

- Smolyak, D., Lee, B., & Choe, E. K. (2018, April). TandemTrack: Promoting Consistent Exercise Leveraging Multimodal Training and Tracking. In Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems (p. LBW543). ACM.
- Gray, K., Smolyak, D., Badirli, & S., Mohler, G (2018, December). Coupled IGMM-GANs for deep multimodal anomaly detection in human mobility data. 5th National Symposium for NSF REU Research in Data Science, Systems, and Security.
- Gasarch, W., Metz, E., Prinz, J., Smolyak, D. (2019). *Mathematical Muffin Morsels*. World Scientific.
- Cui, G., Dickerson, J., Durvasula, N., Gasarch, W., Metz, E., Prinz, J., Raman, N., Smolyak, D. & Yoo, S. H. (2018, June). A Muffin-Theorem Generator. In Proceedings of the 9th International Conference on Fun with Algorithms.
- Canakci, B., Christenson, H., Fleischman, R., McNabb, N., & Smolyak, D. (2015, November). On SAT Solvers and Ramsey-type Numbers. Presented at American Mathematical Society Fall Eastern Sectional Meeting.

Skills

- **Programming Languages:**
  Proficient in: Java, Python, C, C++, MySQL, R, Javascript, Kotlin, OCaml, Ruby, Prolog, LaTeX
  Experience with: Matlab, Typescript, Assembly
- **Version Control:** Git, SVN
- **Environments:** IntelliJ, PyCharm, Eclipse, Emacs, Atom, Android Studio, Visual Studio
- **Languages:** Russian (heritage), French (elementary)

Teaching Experience

CMSC 434: Introduction to Human-Computer Interaction
Teaching Assistant *August 2018 – May 2019*

- Managing multiple class teams for the semester-long project to prototype and develop a software application.
- Grading and proofreading projects, homeworks, and exams throughout the course.

GEMS 100: Introduction to Gemstone
Section Leader *Aug 2017 – Dec 2017 & Aug 2018 – Dec 2018*

- Co-taught a 10-person class of first-semester freshman in Gemstone.
- Presented information and guided activities on topics including: Introduction to the University and the Gemstone Program, Team Dynamics, How to do Research, and Social Innovation.

Leadership and Service

Gemstone Leadership Council
Co-President *May 2018 – Present*

- Leading the coalition of student leaders from the Gemstone student body, whose goal is to support Gemstone students through the four-year undergraduate research experience and beyond through academic, professional, and community engagement events and initiatives.
- Communicating and discussing the organization's agenda with Gemstone staff and the Executive Board.
- Facilitating the smooth operation of and collaboration between the various organizations within Gemstone.
- Overseeing and delegating the various tasks within event/initiative planning, organization, and execution.

Technica Hackathon
Organizer, Technology Team *May 2019 – Present*

- Member of the student-lead group organizing UMD's all-women and non-binary hackathon.
- As part of the tech team, implementing designs and features for the Technica website and mobile app.

Girls Who Code
Tutor *September 2018 – April 2019*

- Instructing middle and high school students in programming fundamentals in Javascript.

Honors and Awards

- **Omicron Delta Kappa National Leadership Honors Society** - In recognition of campus involvement
- **BSOS Undergraduate Experience Funds Recipient** - Funding for IEEE BigData conference attendance
- **Banneker/Key Scholar** - Full scholarship for attendance at University of Maryland, College Park
- **National Merit Scholar** - Annual scholarship earned by high performance on the NMSQT

Selected Coursework

CMSC 828R: Adv. Topics in Info. Processing; Applied Mechanism Design for Social Good	Spring 2020
CMSC 454: Algorithms for Data Science	Spring 2020
ECON 436: Financial Econometrics	Spring 2020
ECON 415: Market Design	Fall 2019
ECON 406: Advanced Microeconomics	Fall 2019
CMSC 433: Programming Language Technologies and Paradigms	Fall 2019
CMSC 451: Design and Analysis of Computer Algorithms	Spring 2019
CMSC 420: Data Structures	Spring 2019
ECON 423: Econometrics II	Spring 2019
CMSC 422: Introduction to Machine Learning	Fall 2018
ECON 422: Econometrics I	Fall 2018
ECON 414: Game Theory	Fall 2018
CMSC 320: Introduction to Data Science (R)	Spring 2018
CMSC 434: Introduction to Human-Computer Interaction	Spring 2018
CMSC 858R: Advanced Topics in Theory of Computing: Ramsey Theory (Graduate Course)	Spring 2018
CMSC 330: Organization of Programming Languages (Ruby, OCaml, and Prolog)	Fall 2017
STAT 400: Applied Probability and Statistics I	Fall 2017
CMSC 216: Introduction to Computer Systems (C and Assembly)	Spring 2017
CMSC 250: Discrete Structures	Spring 2017
MATH 341: Multivariable Calculus, Linear Algebra and Differential Equations II (Honors)	Spring 2017
MATH 340: Multivariable Calculus, Linear Algebra and Differential Equations I (Honors)	Fall 2016
CMSC 132H: Object-Oriented Programming II (Java)	Fall 2016