SEAN GRATE

TheGrateSalmon.github.io/home.htm

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EDUCATION

University of Kentucky, Lexington   *August 2016 - Present*
Overall GPA: 3.6
Bachelor of Science in Mathematics, minors in History and Classics.

RESEARCH

Resampling Point Clouds   *August 2019-Present*
Used machine learning and geometric approaches to develop methods to resample point clouds. This allows for finer or coarser resolutions of the point cloud from any arbitrary view angle. Implemented with PyTorch. Joint work with Hunter Blanton and Nathan Jacobs.

Noncommutative Polytopes of the Heisenberg Group   *January 2019-Present*
Studied the polytopes generated by the Heisenberg group in $\mathbb{Z}^3$. Used Python for computations and generating STL files for 3D models of the polytopes. Investigated under the direction of Christopher Manon.

Math Lab Assignments   *August 2019-Present*
Implemented algorithm to match students to faculty-led lab groups under constraints such as time availability and student preferences. Investigated under the direction of Kate Ponto.

Estimating Flight Lines   *July 2019-Present*
Used machine learning to estimate the flight path a plane capturing LiDAR data took. Implemented with PyTorch. Working under the direction of Nathan Jacobs.

Visualizing Algebraic Surfaces   *January 2019-Present*
Created 3D-printed interactive representations of common surfaces and objects encountered in a Calculus III course. Moved on to generating more complex surfaces such as the Clebsh cubic surface. Used Python, Tinkercad, Mathematica, and Blender to generate STL files. Joint work with Nathan Fieldsteel.

Generating Minecraft Worlds   *September 2019-Present*
Using tools available in machine learning and borrowing persistent homology from computational topology, we try to generate Minecraft-like worlds through a generative adversarial network.

TECHNICAL STRENGTHS

Software & Tools   Python, PyTorch, C++

RELEVANT WORK EXPERIENCE

UK Department of Computer Science   August 2019-current
Undergraduate Research Assistant

· Continued researching the topics looked at in the 2019 Computer Vision REU, e.g. estimating flight routes, point cloud resampling, etc.

Computer Vision REU   May-August 2019
Undergraduate Researcher

· REU in computer vision under the guidance of Dr. Nathan Jacobs at the University of Kentucky. Used machine learning to estimate the flight paths of planes capturing LiDAR data across all of Kentucky.

Expanding Your Horizons   April 21st, 2019
Workshop Mentor

· Ran a workshop with two fellow undergraduates that taught middle school girls the basics of rockets and propulsion. We built bottle rockets with vinegar and baking soda and then launched them outside.

ACADEMIC ACHIEVEMENTS AND AWARDS

Best presentation	*2019 Computer Vision REU*
Dean's List	*August 2016 - Present*
Student of Good Standing	*August 2016 - Present*
Kentucky Educational Excellence Scholarship (KEES)	*$2,225 per year*
University of Kentucky Provost Scholarship	*$1,500 per year*

SERVICE

University of Kentucky Math Club

University of Kentucky Math Lab

2019 Julia Robinson Math Festival volunteer

National Society for Collegiate Scholars

Tau chapter of the Eta Sigma Phi Classics honorary at the University of Kentucky