Hannah Park-Kaufmann

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Annandale-on-Hudson
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Education

B.A. in Mathematics 2020-2024
B.M. in Classical Piano Performance 2020-2025
Bard College Annandale-on-Hudson, NY
Cumulative GPA: 3.83/4.00

Scholarships, Grants and Awards

Conservatory Scholarship
Distinguished Scientist Scholar Award (DSS)
DSS independent summer research grant
Sustainability Track at hackMIT 2022, winning project
International piano competition "Piano Talents", first prize
Austrian national piano competition "Prima la Musica", first prize

Relevant Coursework

Mathematics: Complex Analysis, Discrete and Computational Geometry, Math Methods of Physics I, Abstract Algebra, Linear Algebra, Proofs and Fundamentals, Calculus II
Programming: Machine Learning, Data Structures, Object Oriented Programming
Other: To Overthrow the World, Translating Tact

Experience

Murthy Lab Research Intern 2022
Harvard University Cambridge, MA

On determining the key movement formations that characterize healthy movement of piano playing through methods of computational ethology

- We aim to make a nuanced definition of 'types of movement' at the piano and quantify the efficiency of types of movements, finally aiming to create a faithful artificial intelligence based posture analysis algorithm which can give real-time correcting feedback to pianists. Conducted with funding from Bard College. **Advisor:** Dr. Souvik Mandal

Computational Mathematics for Data Science REU Researcher 2022
Emory University Atlanta, GA

Data Assimilation for Glacier Models

- Combined computational mathematics with very tangible geoscience applications, implemented ensemble kalman filter to explore how data can best be used to improve predictions of glacier melt on simplified ice sheet model, and on a complex storm surge model to explore sea level rise and climate change impacts to hurricane storm surges. **Advisor:** Professor Talea Mayo

Math Tutor 2022-present
Bard Math Department
Bard Prison Initiative (BPI) Annandale-on-Hudson | Green Haven, NY

- TA (dedicated course tutor) for Proofs and Fundamentals (MATH261), Time, Space and Infinity (MATH105), and one of the course tutors for Calculus 1 and 2 (MATH141 and Math142) at Bard

– Math tutor for BPI at Green Haven Correctional Facility

Research Experience for Undergraduates(REU) Researcher 2021
Polymath Jr. REU (Virtual)

Minimal Presentation Sizes of Numerical Semigroups

– Introduced a combinatorial approach involving posets to determine the attainable minimal presentation sizes given a fixed multiplicity, which has been a long-standing open problem in the field. **Advisor:** Professor Christopher O'Neill

Self-employed 2015-2020
Co-founder of Vienna Music Space (VMS) and International Performing Arts Center(IPAC)
Dalian, China | Seoul, South-Korea

– Concerts live-streaming for IPAC. Organizer for concerts for local musicians in Seoul, South-Korea, started and maintained online streaming platform (youtube.com/c/IPACMusicCenter) during Covid cultural crisis, did audio, video and lighting.
– On founding team of VM, in Dalian, China. Taught piano and music theory, designed website, organised summer camps, translated for foreign professors, designed program curricula.

Skills

Programming

Extensive experience coding with Python, and significant experience with Java. Functionally proficient with MATLAB, Mathematica, C++, R, and coding 3D models with Blender. Comfortable with LaTeX, excel, and HTML/CSS.

Data collection, modelling and analysis

Turned physics-based model into python code. Generated realistic synthetic data sets for physical phenomena to run twin experiments on. Performed linear and nonlinear data assimilation on time series models and data. Ran large-scale mathematical calculations with sage. Implemented machine learning algorithms and dimensionality reduction for data analysis.

Languages

English (native), German (native), Chinese (fluent), Korean (proficient), French (beginner)

Publications

[1] Ceyhun Elmacioglu, Kieran Hilmer, Christopher O'Neill, Melin Okandan, **Hannah Park-Kaufmann**. On the cardinality of minimal presentations of numerical semigroups with fixed multiplicity. *In preparation for Journal of Algebraic Combinatorics*.

[2] Emily Corcoran, Logan Knudsen, **Hannah Park-Kaufmann**. Ensemble Kalman Filtering for Glacier Models. *Submitted to SURIO*. arXiv:2210.02647 (2022)

Contributed Talks and Posters

[1] *Data Assimilation for Glacier Models*, presented at Emory Math Department Poster Presentations, Atlanta, GA, July 2022.

[2] *Minimal Presentation Sizes of Numerical Semigroups*, presented at the Joint Mathematics Meetings (JMM) - American Mathematical Society and Pi Mu Epsilon (AMS-PME) Poster Session, (virtual), April 2022.

[3] *Minimal Presentation Sizes of Numerical Semigroups*, presented at The Women in Mathematics in New England (WIMIN) at Smith College, Northampton, MA (virtual), October 2021.