

JEFF WINCHELL

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EDUCATION

Drexel University, Philadelphia, Pennsylvania
Bachelor of Science in Computer Science
Bachelor of Arts in Mathematics

June 2021
June 2021

RESEARCH EXPERIENCE

The New York Stem Cell Foundation Research Institute

Associate Data Scientist (Jan 2023 – Present)

Assistant Data Scientist (Apr 2022 – Dec 2022)

Data Science Intern (Nov 2021 – Apr 2022)

Supervisors: Dr. Bianca Migliori (Nov 2021 - Nov 2024); Dr. Stefan Semrau (Dec 2024 - Present)

• *Image Analysis & Machine Learning:*

- Develop an efficient, generalizable image classification framework for image focus assessment, bacterial contamination detection, and embryoid body morphology characterization in brightfield microscopy images
- Build a scalable pipeline for fixed feature extraction on high-content imaging data for characterizing morphology of different cell types
- Develop single-cell instance segmentation framework generalizable to different cell types and imaging configurations
- Quantitatively analyze sub-cellular localization of fluorescent tags via deep image embeddings, unsupervised clustering, and deep image classifiers for millions of cells
- Characterize phenotypic signatures of diabetes-affected cells at various stages of differentiation from induced pluripotent stem cells into pancreatic beta cells via image analysis/machine learning

• *Leadership & Communication:*

- Mentor 2 college-level interns on projects expanding functionality of existing internal image analysis tools
- Present progress, project-related literature, and final results to colleagues, external collaborators and at conferences and in manuscripts

Drexel University, Department of Computer Science

Research Assistant (Sept 2020 – May 2021)

Advisor: Dr. Edward Kim

- Improved sparse coding feature extraction performance for natural videos using temporally smooth representations leading to ~45% greater sparsity and ~17% greater reconstruction fidelity
- Extended the functionality of sparse coding model to use patch-based dictionary learning with RGB input with 95% reconstruction accuracy and 50% sparsity
- Reviewed and discussed academic literature relating to sparse coding, representation learning, and causal inference

Drexel University, Department of Mathematics

Research Assistant (June 2019 – Feb 2020)

Advisor: Dr. Hugo Woerdeman

- Explored minimal rank properties of matrices and their corresponding augmentations via their Kronecker products with identity matrices of progressively higher dimensions
- Experimented with partial matrix patterns, their minimal rank completions, and the minimal rank completions of their sub-patterns

Drexel University, Department of Engineering

Research Assistant (Aug 2017 – Mar 2018)

Advisors: Dr. Gary Friedman, Dr. Dmitri Vainchtein

- Applied classical image processing techniques to segment and track magnetized bead moving through clear agarose gel for a real-time, vision-based sensor control system
- Validated and compared image segmentation methods using statistical evaluation metrics

Drexel University, Department of Computer Science

Research Assistant (May 2017 – Aug 2017)

Advisor: Dr. Ali Shokoufandeh

- Shadowed PhD student on project related to 3D Object Recognition under NSF Research Experiences for Undergraduates grant
- Wrote Python scripts to ingest RGB-Depth videos from the Xbox Kinect and fit meshes to 3D point clouds using Blender

PUBLICATIONS

Comolet, G.*, Bose, N.*, **Winchell, J.***, et al. (2024). *A Highly-Efficient, Scalable Pipeline for Fixed Feature Extraction from Large-Scale High-Content Imaging Screens*. In *iScience*. Elsevier BV. <https://doi.org/10.1016/j.isci.2024.111434>

Winchell, J., et al. (2023). *FocA: A deep learning tool for reliable, near-real-time imaging focus analysis in automated cell assay pipelines*. In *SLAS Discovery* (Vol. 28, Issue 7, pp. 306–315). Elsevier BV. <https://doi.org/10.1016/j.slasd.2023.08.004>.

*indicates co-first authorship

PRESENTATIONS

Winchell, J. (October 2024). *Ensuring Data Quality in High-Content Imaging*. Future Labs Live, Philadelphia, PA, United States. (presentation)

Winchell, J. (September 2024). *An Efficient, Scalable Pipeline for Fixed Feature Extraction from Large High-Content Imaging Screens*. Biomolecular Imaging and Informatics Conference, Boston, MA, United States. (poster)

Winchell, J. (October 2023). *FocA: A deep learning tool for reliable, near-real-time imaging focus analysis in automated cell assay pipelines*. Biomolecular Imaging and Informatics Conference, Boston, MA, United States. (poster)

Albahra, S., **Winchell, J.**, Migliori, B., & Wendel, W. (October 2023). *Quality Control in Artificial Intelligence*. Future Labs Live, Philadelphia, PA, United States. (panel)

Winchell, J. (October 2022). *Deep learning tools for high-quality data production and analysis in large high-content imaging screens*. NYSCF Conference, New York, NY, United States. (poster)

MEMBERSHIP, HONORS, AWARDS

Membership

Society for Biomolecular Imaging and Informatics (SBI ²)	Member	Oct 2023 – Present
SPARSE (SPiking And Recurrent SoftwarE) Coding Lab	Research Assistant	Sept 2020 – May 2021
Drexel Society of Artificial Intelligence	Secretary/Member	Jan 2021 – May 2021
Drexel Math and Computer Science Club	Vice President	Winter 2018
Upsilon Pi Epsilon Drexel Chapter	Vice President	Winter 2018
Drexel University Symphony Orchestra	Principal Oboist	Summer 2017

Awards

Drexel University Dean’s List	Fall/Winter 2019, Fall 2020
NSF Research Experiences for Undergraduates Grant	Summer 2017

TECHNICAL SKILLS

Languages: *Python, MATLAB*

Libraries: *Tensorflow, PyTorch, Jupyter, OpenCV, Matplotlib, Pillow, pandas, scikit-learn*

Tools: *Anaconda, VS Code, ImageJ/Fiji, Microsoft SQL Server, LaTeX, AWS*

Machine learning: *CNNs, GANs, transformers, auto-encoders, representation learning*