# Jeff Winchell

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## Education

**Drexel University**, Philadelphia, Pennsylvania
Bachelor of Science in Computer Science — June 2021
Bachelor of Arts in Mathematics — 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)*
Advisor: Dr. Bianca Migliori

- Developing an efficient image classification framework for near-real-time analysis for characterizing image focus assessment, bacterial contamination, and embryoid body morphology in microscopy images
- Building a scalable pipeline for fixed feature extraction on high-content imaging data for characterizing morphology of different cell types
- Developing single-cell instance segmentation framework generalizable to different cell types and imaging configurations
- Quantitatively analyzing sub-cellular localization of fluorescent protein tags via deep image embeddings, unsupervised clustering, and deep image classifiers for millions of cells
- Characterizing 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
- Mentoring college-level interns on projects expanding functionality of existing internal image analysis tools
- Presenting progress and current project-related literature to colleagues in journal clubs and final results in manuscripts and conferences

**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/Preprints

**Winchell, J.**, et al. (October 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. (publication)

Comolet, G.*, Bose, N.*, **Winchell, J.***, et al. (August 2024). *A Highly-Efficient, Scalable Pipeline for Fixed Feature Extraction from Large-Scale High-Content Imaging Screens.* In *bioRxiv*. https://doi.org/10.1101/2023.07.06.547985. (under review)

## Presentations

**Winchell, J.** (October 2024). *Imaging Analysis Focus: How do you Ensure Your Data is High Quality?*. Future Labs Live, Philadelphia, PA, United States. (presentation)

**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

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| 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 |

## Technical Skills

Languages: *Python, C++*
Libraries: *Tensorflow, PyTorch, Jupyter, OpenCV, Matplotlib, Pillow, pandas, scikit-learn*
Machine learning: *GANs, CNNs, sparse coding, transformers, auto-encoders, representation learning*
Software: *Anaconda, VS Code, ImageJ/Fiji, Microsoft SQL Server, LaTeX, AWS*

## Honors and Grants

Drexel University Dean's List (Fall 2019, Winter 2019, Fall 2020)
NSF Research Experiences for Undergraduates Grant (Summer 2017)