Joshua J. Whiteley

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EDUCATION

Tufts University — Boston, MA
PhD Candidate in Biomedical Engineering — *Aug. 2022 – Present*

Tufts University — Boston, MA
Master of Science in Biomedical Engineering — *Aug. 2021 – Aug. 2022*

University of Illinois at Urbana-Champaign — Champaign, IL
Bachelor of Science in Bioengineering — *Aug. 2017 – May 2021*

EXPERIENCE

Graduate Research Assistant — Boston, MA
Tufts University — Aldridge Lab — *Aug. 2021 – Present*

- Built a multi-stage regressor chain to predict nonhuman primate treatment outcomes from PET/CT and *in vitro* features, predicting intermediate time points then the final outcome, achieving $R^2 > 0.80$ at multiple time points in held-out cross-validation.
- Worked in a team to develop a multimodal variational autoencoder (PET/CT + *in vitro* features) to probe mechanisms of action in novel anti-tubercular drugs, generating testable hypotheses.
- Trained and calibrated Random Forest/XGBoost models to predict *in vivo* combo performance from *in vitro* features; delivered probability-ranked shortlists and confidence scores used to guide candidate prioritization from over 2M candidates.
- Developed and deployed an end-to-end microscopy to cell morphology pipeline (Python, Bash, SLURM, ilastik, NN inference) that ingests raw microscope images, runs parallelized segmentation/feature extraction, and outputs per-cell morphological profiles; used to generate over 50 TB in imaging data.
- Built and maintained a Flask + React app with a relational backend (SQLite); designed normalized schemas, indexing, and QC/validation; exposed REST endpoints to deliver analysis-ready tables and interactive visualizations for the research group.

Teaching Assistant — Boston, MA
Tufts University - BME143: Biological Systems Analysis — *Aug. 2022 – Present*

- Lectured, designed and graded assignments/exams, and held weekly office hours for a graduate course on biological systems modeling and analysis.

Organizing Committee Member — Boston, MA
Boston Bacterial Meeting — *Jan. 2025 – July 2025*

- Planned and coordinated the conference program and logistics for 500+ attendees.

Undergraduate Research Assistant — Urbana, IL
Cancer Center at Illinois - Bhargava Lab — *Feb. 2018 – Mar. 2020*

PUBLICATIONS

- **INFORM: Infrared-based tumor microenvironment features predict survival**. *Science Advances* (2021). DOI: 10.1126/sciadv.abb8292
- **Integration of multimodal measurements identifies mechanisms of TB drug action**. *Cell Systems* (2025). DOI: 10.1016/j.cels.2025.101348
- **Lesion-specific outcome prediction in TB: sequential RF on PET/CT & in vitro correlates**. *In preparation* (2025).

TECHNICAL SKILLS

Programming: Python, R, MATLAB, SQL (SQLite, PostgreSQL), Bash — *Familiar:* Java, JavaScript

ML/DS: *Core ML* (scikit-learn, XGBoost, PyTorch, TensorFlow); *Evaluation/Explanation* (calibration, SHAP); *Data* (pandas, NumPy); *Visualization* (Matplotlib, Seaborn, ggplot2)

Data & Tools: *Backend* (Flask/REST), *Data layer* (SQLAlchemy), *Tracking* (W&B), *DevOps* (Docker, Git), *HPC/OS* (Linux/SLURM), *Interop* (ONNX)