Michal Borek

B.S. in Computational Data Science
Minor in Mathematics
MSU, East Lansing

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RESEARCH INTERESTS

Deep learning optimization and generalization, ordinal classification for medical imaging, scalable distributed training, and advanced loss function design for robust uncertainty estimation.

EDUCATION

Michigan State University, East Lansing, MI   *Expected May 2026*

Bachelor of Science in Computational Data Science, Minor in Mathematics   CGPA: 3.835/4.0

SELECTED COURSEWORK

Mathematics & Optimization: Honors Linear Algebra (MTH 317H), Matrix Algebra I (MTH 314), Differential Equations (MTH 235), Numerical Analysis I (MTH 451), Optimization Methods (CMSE 382)

Probability & Statistics: Prob. & Stat. for Data Science (STT 380), Regression & Experimental Design

Machine Learning & Algorithms: Intro to ML (CSE 404), Algorithm Engineering (CSE 431), Deep Learning Frameworks

Computation & Modeling: Comp. Modeling I/II (CMSE 201/202)

PUBLICATIONS

Liu, M., Loveless, I., Huang, Z., Borek, M., Rosenman, K., Alessio, A., Wang, L., "Ordinal classification framework for multiclass grading of pneumoconiosis," in *SPIE Medical Imaging 2025: Computer-Aided Diagnosis*, vol. 13407, 134072Q, Apr. 2025. doi:10.1117/12.3046353

RESEARCH EXPERIENCE

Research Assistant, Institute for Quantitative Health Science & Engineering at MSU   *Nov. 2023 – Present*

- Designed and implemented an ordinal classification pipeline on 708 NIOSH chest X-rays, leveraging pre-trained ResNet-50 (TorchXRayVision) with a 64/16/20 split and rigorous data augmentation.
- Benchmarked four loss regimes—Cross-Entropy, MSE regression, multi-task conditional, and novel Hierarchical Cross-Entropy—achieving 71.4% test accuracy and reduced misclassification in critical ordinal boundaries.
- Orchestrated end-to-end training workflows (512×512 resizing, fine-tuning, ensemble averaging).
- Co-authored SPIE 2025 paper and presented findings at Michigan State's UURAF 2025, highlighting advancements in ordinal DL loss design.

PROFESSIONAL EXPERIENCE

Software Engineer Intern, Institute for Cyber-Enabled Research at MSU   *Jun. 2023 – Present*

- Developed and delivered a Python curriculum on MSU HPCC, covering introduction to Python, NumPy-based tensor operations, and best practices for large project developments.
- Authored a Python module to automate loading and launching of LM Studio under SLURM, enabling one-command startup of large language model workflows.
- Engineered an AI-driven agent that statically analyzes SLURM sbatch scripts, identifies suboptimal resource allocations, and recommends tuned CPU/GPU/memory parameters to accelerate DL training.

TEACHING EXPERIENCE

Undergraduate Teaching Assistant, Dept. of CSE, MSU   *Aug. 2022 – May 2023*

- Led Python recitations on data structures and OOP for ~40 students, developed labs emphasizing algorithmic complexity and vectorized computation.
- Hosted weekly office hours and exam reviews, improving average exam performance by 0.4 letter grades.

Technical Skills

Languages: Python, R, C++

DL & ML: PyTorch, TensorFlow, scikit-learn, Hugging Face, TorchXRayVision

Optimization: SGD, Adam, regularization techniques

Tools: Git, Docker, Singularity, SLURM, LM Studio, Jupyter

Data & Databases: NumPy, Pandas, SQL, PostgreSQL

Cloud & HPC: AWS (S3, RDS), MSU HPCC, multi-node parallelism

Awards & Activities

REHS – Excellent Teamwork Award Resident Assistant Excellence	*2025*
Dean's List	*(5/6 terms)*
EGRID Silver Scholarship Academic Excellence	*2024*
International Tuition Grant	*2022*
Co-Founder, Polish Club	*Sep. 2024–Present*
Captain, IM Basketball Team	*Sep. 2023–May 2024*
AI Club Member	*Sep. 2022–Sept. 2024*