

Yinuo Xu

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Research Interests

Multimodal AI, Histopathology and Spatial Transcriptomics, Foundation Models for Digital Pathology

Education

University of Pennsylvania

Aug 2024 – May 2026

M.S. in Computer and Information Science

- **GPA:** 4.0 / 4.0
- **Relevant Coursework:** Machine Learning, Natural Language Processing, Advanced Topics in Deep Learning, Bayesian Optimization

New York University

Feb 2021 – May 2024

B.A. in Computer Science and Mathematics

- **GPA:** 3.88 / 4.0
- **Honors:** University Honors Scholar, Dean's List (2020–2023), *Cum Laude*
- **Relevant Coursework:** Algorithms, Machine Learning, Computer Graphics, Computer Systems Organization, Computer Simulation, Data Management and Analysis, Parallel Computing, Numerical Analysis, Real Analysis, Ordinary Differential Equations

Publications

NuClass: An ontology-driven vision-language foundation model for zero-shot nuclei classification.

MMFM-BIOMED @
CVPR2025

Authors: Yinuo Xu, Jina Kim, Zijie Zhao, Zhi Huang

TL;DR: Proposes NUCCLASS, a scalable and interpretable vision-language foundation model that aligns hierarchical cell-type descriptions with ViT-based single-cell feature extraction to enable zero-shot nuclei classification. Across a wide range of benchmarks, NuClass delivers strong and consistent performance, with accuracy gains up to +85% over prior vision-language methods.

Learning Fine-grained Rewards on Video Generation Fakeness via Multimodal Language Models. Under Review, NeurIPS 2025

Authors: Xingyu Fu*, Siyi Liu*, **Yinuo Xu**, Pan Lu, Guangqiuse Hu, Tianbo Yang, Taran Anantasagar, Christopher Shen, Yikai Mao, Yuanzhe Liu, Keyush Shah, Chung Un Lee, Yejin Choi, James Zou, Dan Roth, Chris Callison-Burch

TL;DR: Introduces DEEPTRACEReward, the first fine-grained, expert-annotated benchmark for training reward models to identify fake clues in AI-generated videos. We further conduct extensive experiments to train video fake clue reward models leveraging multimodal language models (LMs), which surpasses GPT 4.1 by 20.5% in fake clue identification.

Research Experience

Research Assistant, supervised by: Prof. Zhi Huang @ University of Pennsylvania

Feb 2025 - Present

- Developed NuClass, a vision-language foundation model enabling zero-shot nuclei classification via alignment of ViT-based visual features with ontology-grounded text embeddings.
- Integrated hierarchical semantic representations from biological ontologies, conducted large-scale training on 8.3M+ patch level annotations across 11 histopathology datasets.
- Provided comprehensive evaluation results across diverse tissue types and imaging modalities, achieving state-of-the-art performance under annotation-scarce settings.

Research Assistant, supervised by: Prof. Dan Roth @ University of Pennsylvania

Aug 2024 - Present

- Co-led the development of DeepTraceReward, a benchmark for evaluating video fakeness using temporally and

spatially localized human annotations.

- Designed and standardized annotation schema for identifying multimodal artifacts (e.g., deformation, inconsistency, trajectory shifts) in 3.3K+ AI-generated videos.
- Trained reward models with multimodal LLMs, achieving a 20.5% improvement over GPT-4.1 in fine-grained fake clue identification.
- Investigated trade-offs between global video-level classification and fine-grained temporal signal modeling.

Research Assistant, supervised by: Prof. H. Wang @ Capital Normal University Jun 2024 - Sep 2024

- Enhanced segmentation accuracy for small abdominal organs by finetuning MedSAM on 8k radiology images.
- Adapted organ geometrical feature enhancement techniques to improve models' clinical application reliability.
- Increased model differentiation between small organs and adjacent structures, improving diagnostic precision.

Research Assistant, supervised by: Dr. Jake Hofman @ Microsoft Research NYC Jun 2024 - Jul 2024

- Completed intensive data science program, acquiring, cleaning, and analyzing real-world data.
- Collaborated on research projects with Microsoft Research scientists, enhancing teamwork skills.
- Applied machine learning to assess CitiBike's impact in NYC, providing measurable insights.
- Utilized Python and R for data analysis, delivering actionable insights on CitiBike deployment.

Selected Project

Classification of Model-Generated Text: Comparing GPT-4, Grok, and LLaMA MAR 2023 - MAY 2023

- Investigated the classification of AI-generated text by developing a system to distinguish outputs from three leading Large Language Models (LLMs): GPT-4, Grok, and LLaMA.
- Achieved near-perfect classification accuracy (e.g., 97.9% in a three-way task) by implementing a Gradient Boosting Classifier that leveraged linguistic features such as POS tags, n-grams, and text length.
- Demonstrated the scalability and robustness of the classification methodology by successfully extending it from binary to three-way classification and validating its performance across different content domains (technology and culture/arts), highlighting the existence of model-specific "fingerprints."

Digital Acoustic Simulation of the Piano MAR 2023 - MAY 2023

- Utilized MATLAB, finite difference methods, and second-order wave equations to simulate piano strings.
- Applied finite difference methods and a time-stepping scheme to discretize the wave equation
- Designed functions to handle the construction of complex musical compositions, demonstrating the practical applicability of the simulation model.
- Conducted validation by comparing the synthesized sounds against actual piano recordings, optimizing parameters like the number of points per string to balance simulation accuracy and computational efficiency

Languages and Technologies

Programming Languages: Python, Java, Javascript, C++, C, HTML, CSS, MATLAB, Stata

Technologies & Tools: LaTeX, Adobe Illustrator, Selenium, SQLAlchemy, Sass, Mocha, Chai, Figma, Git, PostgreSQL, MongoDB, Neo4j,

Frameworks & Libraries: PyTorch, NumPy, ScanPy, Pandas, Matplotlib, TensorFlow

Language Abilities: Chinese (Native), English(Proficient, GRE:332/3.5, TOEFL:105, R27 L26 S26 W26)

Outreach

STEM Outreach and Mentorship Coordinator, NYU Women in Science (WINS) JUN 2022 - MAY 2024

- Guide NYC high school girls in STEM learning and competitions, fostering academic growth and confidence.
- Plan events connecting students with top scientists, enhancing learning and networking opportunities.
- Contribute to programs featuring women leaders and inspiring peers on women's contributions in STEM.
- Mentor WINS Scholars academically and in research, supporting their STEM career paths.