Xuemei (Missi) Zhang

EDUCATION

Virginia Polytechnic Institute and State University
Degree: Ph.D. in Plant and Environmental Sciences (Jan, 2021)

University of Maine
Degree: Master of Science in Plant, Soil and Environmental Sciences (Dec, 2016)

Southwest University
Degree: Bachelor of Science in Agriculture (June, 2013)

SKILLS & EXPERTISE

Bioinformatic, image, and statistical data analysis and visualization:
- Python, R, Bash Scripting, Julia, JMP, SAS, SQL, and Tableau.
- Machine learning and deep learning on high-performance computing (HPC) platforms.

Interdisciplinary teamwork
- Extensive collaboration with engineers on robotics and automation projects.
- Experience in partnering with clinical researchers on healthcare AI initiatives using real-world patient data.

Effective communication, public speaking, teaching, and instructional design.
Independent problem solving and self-learning.

PROFESSIONAL EXPERIENCE

***Data Scientist*, the Center for Biostatistics and Health Data Science (CBHDS), Virginia Tech**
09/2023 – present
- **Leadership and Team Building**: Built and led researcher and student data science teams to collaborate on interdisciplinary research design, grant proposal writing, data pipelines, analysis, visualization, presentation, and report writing.
- **Reproducible Data Analysis**: Developed robust pipelines and established best practices for reproducible bioinformatics and clinical data analysis, contributing to multiple transcriptomics, genomics, and epigenomics projects that delivered publication-ready results.
- **High-Performance Computing (HPC) Workflows**: Designed and implemented cloud-based HPC workflows for large-scale genomics, transcriptomics, and epigenomics data analysis, optimizing computational efficiency and delivering actionable insights.
- **Machine Learning & Deep Learning Applications**: Participated in healthcare chatbot evaluation method development and building prediction models using patient data, including demographic information, clinical data, and medical imaging, to improve patient outcomes.
- **Educational Content Development**: Created data science courses, bioinformatics workshops, and detailed guidance documents to explain major analysis pipelines/workflows and provide tailored collaboration approaches for diverse client needs.
- **Web Development**: Developed and maintained the CBHDS bioinformatics webpages to ensure accessible and up-to-date resources for researchers and collaborators.

***Postdoc Research Associate*, SPES, Virginia Tech, 05/2021 – 09/2023**
Collaborating with mechanic, biological, and chemical engineers in developing a cyber-physical

system to automate tomato disease detection. Bridging experts and knowledges from different disciplines while providing plant research results yielded from genomic and image data analysis.

- Applied machine learning algorithms to analyze RGB and hyperspectral image data and build classification models that differentiate diseased plants from healthy plants.
- Utilized bioinformatic tools to build customized genome databases, perform pan-genome analysis, phylogeny analysis, metagenomic sequence assembly, and RNA-seq differential expression analysis for bacterial pathogens.
- Performed experimental design and statistical data analysis (using Python, R, and JMP): Applying descriptive and inferential statistics to test scientific hypotheses.
- Provided bioinformatic data analysis, statistical analysis, and machine learning training workshops to postdocs, undergrad and graduate students. Led undergrad and graduate students to conduct research.
- Wrote grant proposals, scientific reports, manuscripts, and presented research work at conferences, seminars, stakeholder meetings, and 4-H congress workshops.
- Reviewed manuscripts for scientific journals including *Biological Control*, *Plant Disease*, *Plant Health Progress*, and *Crop Protection*.

Graduate Research Assistant at Plant Pathology Lab, SPAREC, Virginia Tech, 01/2017 – 01/2021

- Performed experimental design and statistical data analysis (using Python, R, and JMP): Applying descriptive and inferential statistics to test scientific hypotheses; Conducted survey research and data analysis.
- Provided outreach services (providing disease diagnosis service and workshops) to Ag industry, growers, and home gardeners, as well as communicating with stakeholders.
- Wrote grant proposals, scientific reports, manuscripts, and presented at conferences.
- Trained and led undergrad and graduate students to conduct research.

RECEIVED GRANTS

2022 *Development of a CRISPR-Cas12a assay for sensitive and specific detection of Xylella fastidiosa sub-species*. Proposal to USDA-APHIS.

2020 *Tobacco disease management research*. Proposal to Virginia Tobacco Board.

2018 *Understanding the interactions among Pythium species affecting root rot in a hydroponic environment*. Graduate Research Development Proposal grant, Virginia Tech.

SELECTED RECENT PUBLICATIONS (https://orcid.org/0000-0002-3912-5295)

Zhang, X., Johnson, C., & Reed, D. (Accepted) *Interspecific variation in virulence among Pythium Species in Tobacco Transplant Production Greenhouses*. Plant Dis.

Zhang, X., Vinatzer, B., & Li, S. (2024) *Hyperspectral Imaging Analysis for the Early Detection of Tomato Bacterial Leaf Spot Disease*. Scientific Report, 14(1), 27666.

Silwal, A., **Zhang, X.**, Hadlock,T., Neice, j., Haque, s., Kaundanya, A., Lu, C., Vinatzer, B., Kantor, G., Li, S. (2024). *Towards an AI-driven cyber-physical system for closed-loop control of plant diseases*. Proceedings of the AAAI Symposium Series (Vol. 4, No. 1, pp. 432-435).

Dewberry, R. J., Sharma, P., Prom, J. L., Kinscherf, N.A., Lowe-Power, T., Mazloom, R., **Zhang, X.**,

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Arif, M., Stulberg, M., Heath, L. S., Eversole, K., Beattie, G. A., Vinatzer, B., & Allen, C. (2024). *Genotypic and Phenotypic Analysis Shows Ralstonia solanacearum Cool Virulence is a Quantitative Trait Not Restricted to "Race 3 biovar 2".* Phytopathology, (ja).

Dhakal, K., Sivaramakrishnan, U., **Zhang, X.,** Belay, K., Oakes, J., Wei, X., & Li, S. (2023). *Machine Learning Analysis of Hyperspectral Images of Damaged Wheat Kernels.* Sensors, 23(7), 3523.

Liu, D., Samtani, J., Johnson, C., **Zhang, X.,** Butler, D.M., & Derr, J. (2023) *Brewer's Spent Grain with Yeast Amendment Shows Potential for Anaerobic Soil Disinfestation of Weeds and Pythium irregulare.* Agronomy. https://doi.org/10.3390/agronomy13082081

Zhang, X., Johnson, C., & Reed, D. (2022) *Diversity of Pythium Species Recovered from Float-bed Tobacco Transplant Production Greenhouses.* Plant Dis. https://doi.org/10.1094/PDIS-06-22-1438.

Zhang, X., Johnson, C., & Reed, D. (2021) *Management of Pythium myriotylum in Tobacco Transplant Production Greenhouses.* Plant Health Prog. https://doi.org/10.1094/PHP-03-21-0062-FI

Zhang, X., Jiang, H., & Hao, J. (2019). *Evaluation of the Risk of Development of Fluopicolide Resistance in Phytophthora erythroseptica.* Plant Dis. 103(2), 284-288.

RECENT PRESENTATIONS

Empowering Healthcare with AI: Improving Risk Prediction, Patient Prioritization, and Collaborative Strategies for Equitable Outcomes. Leveraging Real-World Data and AI for Better Patient Outcomes. 2024 Disrupt Up National Emerging Technology Conference. Nov 14, 2024. Roanoke, VA.

Subspecies-Specific Detection of Xylella fastidiosa with CRISPR-Cas12a. 2023 CeZAP Infectious Disease Research Symposium. Oct 06, 2023. Virginia Tech, Blacksburg, VA.

Introduction to Data Science in Automated Plant Disease Detection. School of Data Science at the University of Virginia. May 11, 2023. Charlottesville, VA.

PROFESSIONAL SERVICES & MEMBERSHIPS

iTHRIVE Grant Proposal Reviewer, 08/2024 - present

Peer-Reviewer for the following journals:

- *Plant Health Progress* (American Phytopathological Society), 09/26/2022 – present
- *Crop Protection* (Elsevier), 09/16/2022 – present
- *Plant Disease* (American Phytopathological Society), 10/15/2021 – present
- *Biological Control* (Elsevier), 01/23/2017 – present

Member, American Statistical Association, 06/2024 – present

Member, Whole Health Consortium at Virginia Tech, 04/2024 – present

Member, International Biometric Society, 12/2023 – present

TEACHING & TRAINING

STAT 2274: Basic Python for Statistics

HPC Data Analysis Training Documents:

https://biostat.centers.vt.edu/cbhds_bioinformatics/resources.html

MENTORING

2024 VA-WHPC Student Lightning Talks Mentor of PhD student Xiaorong Shan (2nd Place)

Spring 2024 CMDA capstone: Alex Vidal, Ian Sekelsky, and Yelebe Desta, Virginia Tech

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Computational Modeling and Data Analytics (CMDA).

Fall 2023 CMDA capstone: Siddarth Ravikanti, Judson Powers, and Nicholas Emig, Virginia Tech Computational Modeling and Data Analytics (CMDA).

Research Data Analysis: Adele Matter, medical student, Virginia Tech Carilion School of Medicine (Fall 2024 - present)

Research Data Analysis: Evgeniya Molotkova, medical student, Virginia Tech Carilion School of Medicine (Fall 2024 - present)

Research Data Analysis: Andrew Hartley, medical student, Virginia Tech Carilion School of Medicine (Fall 2024 - present)

Research Data Analysis: Rishitha Anumola, medical student, Virginia Tech Carilion School of Medicine (Fall 2024 - present)

Research Data Analysis: Sean Pierce, medical student, Virginia Tech Carilion School of Medicine (Summer 2024 - present)

Research Data Analysis: Gabriel Borba, PhD student, Virginia Tech Fish and Wildlife Conservation (Summer 2024 - present)

Research Data Analysis: Melissa Greco, medical student, Virginia Tech Carilion School of Medicine (Summer 2024 - present)

Research Data Analysis: Luke Ignell, medical student, Virginia Tech Carilion School of Medicine (Summer 2024 - present)

Research Data Analysis: Christina Stolarchuk, medical student, Virginia Tech Carilion School of Medicine (Summer 2024 - present)

Research Data Analysis: Collin Ocampo, medical student, Virginia Tech Carilion School of Medicine (Summer 2024 - present)

Research Data Analysis: Uma Kelavkar, medical student, Virginia Tech Carilion School of Medicine (Summer 2024 - present)

Research Data Analysis: Adam Hoch, medical student, Virginia Tech Carilion School of Medicine (Summer 2024 - present)

Research Data Analysis: Liliana Ladner, medical student, Virginia Tech Carilion School of Medicine (Summer 2024 - present)

Research Data Analysis: Noor Tasnim, PhD candidate, Virginia Tech Department of Psychology (Summer 2024 - present)

Research Data Analysis: Jasmine Lewis, PhD candidate, Virginia Tech Department of Psychology (Spring 2024 - present)

Research Data Analysis: Yawen He, PhD candidate, Virginia Tech Biological Systems Engineering (BSE) (Spring 2024 - present)

Research Data Analysis: David Ogburn, medical student, Virginia Tech Carilion School of Medicine (Fall 2023 - present)

Research Data Analysis: Caroline de Jager, PhD candidate, Virginia Tech Translational Biology, Medicine, and Health (TBMH) (Fall 2023 - present)