

Opportunity Title: USDA-ARS SCINet Postdoctoral Fellowship in AI Methods for Predicting Protein Function and Disease Susceptibility in Crops

Opportunity Reference Code: USDA-ARS-2022-0436

Organization U.S. Department of Agriculture (USDA)

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A complete application consists of:

- An application
- Transcript(s) – For this opportunity, an unofficial transcript or copy of the student academic records printed by the applicant or by academic advisors from internal institution systems may be submitted. All transcripts must be in English or include an official English translation. Click [here](#) for detailed information about acceptable transcripts.
- A current resume/CV, including academic history, employment history, relevant experiences, and publication list
- Two educational or professional recommendations

All documents must be in English or include an official English translation.

Application Deadline 9/29/2023 3:00:00 PM Eastern Time Zone

Description ***Applications will be reviewed on a rolling-basis and this posting could close before the deadline.**

ARS Office/Lab and Location: A postdoctoral research opportunity is available with the U.S. Department of Agriculture (USDA), Agricultural Research Service (ARS), Dale Bumpers National Rice Research Center (DB NRR), located in Stuttgart, AR.

Research Project: The U.S. Department of Agriculture - Agricultural Research Service (USDA ARS) mission involves problem-solving research in the widely diverse food and agricultural areas encompassing plant production and protection; animal production and protection; natural resources and sustainable agricultural systems; and nutrition; food safety; and quality. The programs are conducted in 46 of the 50 States, Puerto Rico, and the U.S. Virgin Islands. For ARS to maintain its standing as a premier scientific organization, major investments in computing, networking, and storage infrastructure are required. Training in data and information management are integral to the integrity, security, and accessibility of research findings, results, and outcomes within the ARS research enterprise. Nearly 2000 scientists and support staff conduct research within the ARS research enterprise.

The SCINet/Big Data Research Participation Program of the USDA ARS offers research opportunities to motivated postdoctoral fellows interested in collaborating on agricultural-related problems at a range of spatial and temporal scales, from the genome to the continent, and sub-daily to evolutionary time scales. One of the goals of the SCINet Initiative is to develop and apply new technologies, including AI and machine learning, to help solve complex agricultural problems that also depend on collaboration across scientific disciplines and geographic locations. In addition, many of



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these technologies rely on the synthesis, integration, and analysis of large, diverse datasets that benefit from high performance computing clusters (HPC). The objective of this fellowship is to facilitate cross-disciplinary, cross-location research through collaborative research on problems of interest to each applicant and amenable to or required by the HPC environment. Training will be provided in specific AI, machine learning, deep learning, and statistical software needed for a fellow to use the HPC to analyze large datasets.

Under the guidance of a mentor, the participant will have the opportunity to gain experience in AI protein structure prediction methods and apply those methods to mining diverse rice (*Oryza sativa*) genome sequence datasets to identify new potential rice blast disease resistance genes. In addition, the participant will gain experience with deep convolutional neural network (CNN) methods for image analysis to quantify foliar symptoms of rice blast disease.

Training opportunities will include an introduction to AI methodologies, use of high performance computation (HPC) resources, participation in various SCINet/AI COE working groups to learn and share new skills, and interactions with USDA-ARS experts in plant pathology, molecular genetics, and genomics.

Professional development activities will include leading a new AI-COE working group focused on use deep learning methods such as AlphaFold2 and RoseTTafold for 3D protein structure prediction as it relates to the study of plant disease resistance.

Learning Objectives: The participant will learn HPC computing technologies and will help develop and co-lead ARS-wide workshops, resulting in a community of scientific practice on the use of deep learning methods such as AlphaFold2 and RoseTTafold for 3D protein structure prediction as it relates to the study of plant disease resistance. The participant will have the opportunity to collaborate with multiple USDA ARS scientists on plant pathology, molecular genetics, and genomics projects, and to write collaborative scientific papers dealing with *in silico* prediction of plant protein interactions and automated high-throughput phenotyping of plant disease symptoms.

USDA-ARS Contact: If you have questions about the nature of the research, please contact Jeremy Edwards (jeremy.edwards@usda.gov).

Anticipated Appointment Start Date: September 1, 2023. Start date is flexible and will depend on a variety of factors.

Appointment Length: The appointment will initially be for one year, but may be renewed upon recommendation of the mentor and ARS, and is contingent on the availability of funds.

Level of Participation: The appointment is full-time.

Participant Stipend: The participant(s) will receive a monthly stipend commensurate with educational level and experience.

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Citizenship Requirements: This opportunity is available to U.S. citizens, Lawful Permanent Residents (LPR), and foreign nationals. Non-U.S. citizen applicants should refer to the [Guidelines for Non-U.S. Citizens Details page](#) of the program website for information about the valid immigration statuses that are acceptable for program participation.

ORISE Information: This program, administered by ORAU through its contract with the U.S. Department of Energy (DOE) to manage the Oak Ridge Institute for Science and Education (ORISE), was established through an interagency agreement between DOE and ARS. Participants do not become employees of USDA, ARS, DOE or the program administrator, and there are no employment-related benefits. Proof of health insurance is required for participation in this program. Health insurance can be obtained through ORISE.

Questions: Please visit our [Program Website](#). If you have additional questions about the application process please email ORISE.ARS.SCINet@orau.org and include the reference code for this opportunity.

Qualifications The qualified candidate must have received a doctoral degree in one of the relevant fields (e.g. Computational Biology, Bioinformatics, Molecular Genetics, Biochemistry, Plant Breeding, Plant Pathology) before the start date of their appointment.

Preferred skills:

- Proficiency in programming with demonstrated experience using programming languages such as R and/or Python
- Experience in molecular genetics or biochemistry
- Experience using large genomic datasets
- Experience in plant breeding and plant biology
- General understanding of artificial intelligence (AI) methods
- Proficiency in Linux
- Strong oral and written communication skills

Eligibility Requirements • **Degree:** Doctoral Degree.

- **Discipline(s):**
- **Chemistry and Materials Sciences** ([1](#)👁)
 - **Computer, Information, and Data Sciences** ([1](#)👁)
 - **Life Health and Medical Sciences** ([12](#)👁)
 - **Mathematics and Statistics** ([1](#)👁)