

Opportunity Title: USDA-ARS SCINet Postdoctoral Fellowship in Deep Learning

Workflows and Image Libraries

Opportunity Reference Code: USDA-ARS-2022-0156

Organization U.S. Department of Agriculture (USDA)

Reference Code USDA-ARS-2022-0156

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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 2/28/2023 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), Horticultural Crops Research Unit in Prosser, WA, with Devin A. Rippner, Ph.D.

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.

The Fellow will have the opportunity to gain experience in and learn about multi-modal image analysis and plant trait feature extraction from a variety of imaging instrumentation and plant types. Participants will develop deep learning based feature extraction workflows for use on HPC platforms including those run by USDA-ARS and DOE to support plant breeders, plant physiologists, and soil scientists. Images will come from a variety of sources including RGB and hyperspectral cameras, light, FTIR, and electron microscopes, and X-ray Computed Tomography instruments. Funds will be provided for annual travel to Prosser, WA, Berkely, CA, and Chatsworth, NJ to engage with scientist end-users. Additional responsibilities will be to coordinate and develop a database of agriculturally relevant annotated images for use in training deep learning models.

Learning Objectives: The Fellow will learn HPC computing technologies and will develop and co-lead ARS-wide workshops, resulting in a community of scientific practice on agricultural image analysis. Additionally, the Fellow will build and curate a database of agriculturally relevant annotated images for use training deep learning models. The Fellow will have the opportunity to collaborate with multiple USDA ARS scientists developing workflows to train and apply deep learning models for feature/trait extraction from images of a variety of crops from a variety of camera systems. The Fellow will be expected to write collaborative scientific method development and research papers dealing with applying deep learning approaches to multi-modal image analysis and plant trait feature extraction challenges.

USDA-ARS Contact: If you have questions about the nature of the research, please contact Devin A Rippner (devin.rippner@usda.gov)

Anticipated Appointment Start Date: June 2022. 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.

Citizenship Requirements: This opportunity is available to U.S.

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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 should have received a doctoral degree in one of the relevant fields, or be currently pursuing the degree with completion by the appointment start date.

Preferred skills:

- Extensive experience developing workflows for using deep learning models for image analysis using Python
- Additional experience with data base and repository development and management
- Experience working on high performance computing systems
- Experience analyzing image with a deep learning approach using Python libraries such as Pytorch or Tensorflow
- Experience with plant trait extraction from images
- Experience with HPC platforms
- Proficiency in Python, R, Bash (Linux)
- Proficiency with C++, Java, SQL, and Javascript
- Experience working with large image data sets
- Experience working with multiple imaging modalities (X-ray, RGB, Hyperspectral, IR, Fluorescence, EM, etc)
- Experience with database development and management
- Strong oral and written communication skills
- Desire and ability to travel to different parts of the USA

Eligibility • **Degree:** Doctoral Degree.

- Requirements** • **Discipline(s):**
- **Chemistry and Materials Sciences** ([4](#) )
 - **Computer, Information, and Data Sciences** ([4](#) )
 - **Earth and Geosciences** ([3](#) )
 - **Engineering** ([7](#) )
 - **Environmental and Marine Sciences** ([4](#) )

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- **Life Health and Medical Sciences** ([8](#) 👁)
- **Mathematics and Statistics** ([3](#) 👁)
- **Physics** ([3](#) 👁)