Opportunity Title: USDA-ARS SCINet Postdoctoral Fellowship in AI-driven Phenotype Extraction from UAS Imagery
Opportunity Reference Code: USDA-ARS-SCINet-2023-0424

Organization U.S. Department of Agriculture (USDA)

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How to Apply ***Connect with ORISE...on the GO!*** Download the new ORISE GO mobile app in the Apple App Store or Google Play Store to help you stay engaged, connected, and informed during your ORISE experience and beyond!

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 12/8/2023 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), Plant Genetics Research Unit, Columbia, MO.

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 conducting research 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 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 fellow will develop tools and methods for the automated analysis and interpretation of image and other sensor data from Unoccupied Aerial Systems (UAS) and other remote sensing devices. The fellow will focus on the extraction of plot and plant level phenotype data from agricultural trials. Current methods require extensive manual input and tuning and are not flexible across diverse crop materials. The fellow will use machine learning, artificial intelligence, deep learning, and/or other suitable methods to improve the quality and automation of current methods and to develop new and better methods. The fellow's research project will focus on images obtained from corn fields but the research will have applications for other crops as well.

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 UAV phenotyping methods and automation. The participant will have the opportunity to collaborate with multiple USDA ARS scientists on this project and contribute to UAV database and analysis pipelines for use throughout the agency.

USDA-ARS Contact: If you have questions about the nature of the research, please contact Jacob Washburn (jacob.washburn@usda.gov).

Anticipated Appointment Start Date: As soon as a qualified candidate is identified. 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 will receive a monthly stipend commensurate with educational level and experience.

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,

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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 by the fellowship start date in one of the relevant fields listed below.

Preferred skills:

- Experience processing and working with UAV image data in agricultural settings
- Experience with machine learning, deep learning, or artificial intelligence applications to image recognition and classification
- Experience analyzing time series data
- Experience modeling spatial data
- Proficiency in Linux and computational programming
- Strong oral and written communication skills

Eligibility Requirements

- **Degree:** Doctoral Degree.
- **Discipline(s):**
  - **Computer, Information, and Data Sciences** (5)
  - **Earth and Geosciences** (21)
  - **Environmental and Marine Sciences** (14)
  - **Life Health and Medical Sciences** (48)
  - **Mathematics and Statistics** (11)