Opportunity Title: USDA-ARS SCINet Postdoctoral Fellowship in Using AI Technology to Develop a Drought Prediction Tool
Opportunity Reference Code: USDA-ARS-2022-0151

Organization U.S. Department of Agriculture (USDA)

Reference Code USDA-ARS-2022-0151

How to Apply

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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), Great Plains Agroclimate and Natural Resources Research Unit, El Reno, OK.

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 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 (ML), deep learning, and statistical software needed for a fellow to use the HPC to analyze large datasets.

Under the guidance of two mentors, the fellow will have the opportunity to gain experience in developing a long lead-time drought prediction based on the standardized precipitation-evapotranspiration index (SPEI) to provide critical information for timely decision-making by agricultural producers and water resource managers. The fellow will develop core MATLAB functions for computing SPEI, preprocessing SPEI and large-scale atmospheric and oceanic data, and commands for assessing statistical significance, causality, and selection of the most effective predictors. Training will be provided in several standalone/hybrid ML models used to predict SPEI (with one to three months lead time). Co-kriging interpolation will be used to display the areal distribution of the predicted SPEI using recent ground truth data updated to produce monthly drought forecasts.

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 dynamic months-ahead prediction of meteorological drought for decision-making by agricultural producers and water resource managers. The participant will have the opportunity to collaborate with multiple USDA ARS scientists on climate-related agricultural projects, and to write scientific papers on potential impacts of different adaptive management systems to address water stress and determine plausible systems.

USDA-ARS Contact: If you have questions about the nature of the research, please contact Daniel Moriasi (daniel.moriasi@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(s) 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, 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. [this code will be added later]

Qualifications

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

Preferred skills:

- Experience with machine learning, artificial intelligence modeling
- Experience with MATLAB and QGIS
- Strong oral and written English communication skills

Eligibility Requirements

- **Degree:** Doctoral Degree.
- **Discipline(s):**
  - **Communications and Graphics Design** (6 👁)
  - **Computer, Information, and Data Sciences** (3 👁)
  - **Earth and Geosciences** (1 👁)
  - **Engineering** (3 👁)
  - **Environmental and Marine Sciences** (1 👁)
  - **Mathematics and Statistics** (2 👁)
  - **Physics** (1 👁)