Opportunity Title: USDA-ARS SCINet Fellowship for Developing AI and ML Techniques to Advance Understanding of How Dietary Patterns Influence Human Health
Opportunity Reference Code: USDA-ARS-2022-0164

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 2/1/2023 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), Beltsville, MD Human Nutrition Research Center, Food Components and Health Lab.

About Us: 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, deep learning, and statistical software needed for a fellow to use the HPC to analyze large datasets.

Research Project: Under the guidance of a mentor, the fellow will have the opportunity to gain experience in and learn about the challenges of investigating dietary patterns and human health to develop new methodological machine learning approaches. The fellow will be housed in the Food Components and Health Lab at the Beltsville, MD Human Nutrition Research Center, but will also work closely with the Food Surveys Research Group and Methods and Applications of Food Composition Lab. These three units consist of food chemists, nutritionists, and physiologists with extensive expertise in assessing dietary patterns, dietary assessment, food intake, food composition, public health, and human health outcomes. Our Center has rich dietary datasets collected using methods which provide a daily detailed snapshot of dietary intake and behavioral patterns, which include details at the food level and contextual information about eating events. We also have measured markers of food intake and dietary patterns from urine, blood, and feces of research participants within these datasets which can be used for multiple -omics applications for markers of food intake and metabolism, including microbiome, metabolomics, and genomics. The high dimensionality and complexity of all this information combined outpaces standard statistical applications, thus are ripe for Artificial Intelligence (AI) and Machine Learning (ML) techniques to advance the understanding of how dietary patterns influence different aspects of human health.

Learning Objectives: The participant will apply and advance skills in HPC computing technologies and will help develop and co-lead ARS-wide workshops, resulting in a community of scientific practice on using high-dimensional data in which the number of measurements on an individual is orders of magnitude larger than the sample size. An example of this is a dietary intervention of 50 individuals with untargeted metabolomic analysis of urine, blood, and stool resulting in >1000 data points per individual. The participant will have the opportunity to

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collaborate with multiple USDA ARS scientists on identifying biomarkers of different dietary patterns to be used in reducing measurement error of self-reported dietary data, as well as investigating how dietary patterns influence measured health outcomes such as fasting glucose or the microbiome.

USDA-ARS Contact: If you have questions about the nature of the research, please contact Lauren O'Connor at Lauren.OConnor@usda.gov or David Baer at David.Baer@usda.gov.

Anticipated Appointment Start Date: Fall 2022 - Spring 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.

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 should be currently pursuing or have received a master's or doctoral degree in one of the relevant fields. Doctoral degree candidates are preferred.

Preferred skills:

- Expertise in modeling high-dimensional data such as

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metabolomics, genomics, or microbiomics
- Expertise in applying and developing machine learning methods to high-dimensional data
- A public health research focus, ideally specific to food and nutrition, but other research areas (physical activity, air pollution, or other behavioral public health concerns) will be considered
- Experience working with data from human research participants
- Efficient in computer programming languages, including R
- Strong oral and written communication skills
- Experience publishing research findings in peer-reviewed scientific journals

Eligibility Requirements

- **Degree:** Master's Degree or Doctoral Degree.
- **Discipline(s):**
  - **Computer, Information, and Data Sciences** (17 👁)
  - **Earth and Geosciences** (1 👁)
  - **Engineering** (27 👁)
  - **Environmental and Marine Sciences** (14 👁)
  - **Life Health and Medical Sciences** (13 👁)
  - **Mathematics and Statistics** (3 👁)
  - **Other Non-Science & Engineering** (1 👁)