Opportunity Title: ORNL Machine Learning and Mathematics Post-Bachelor's
Research Associate
Opportunity Reference Code: ORNL20-40-NSET

Organization	Oak Ridge National Laboratory (ORNL)
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Description	Oak Ridge National Laboratory (ORNL) is the largest U.S. Department of Energy (DOE) science and energy laboratory, conducting basic and applied research to deliver transformative solutions to compelling problems in energy, environment, and security.

The Geographic Data Science Group within the National Security Emerging Technology (NSET) Division at ORNL is seeking a talented candidate to apply mathematics, machine learning, and data science to the research and development (R&D) of algorithms for remote sensing imagery and other spatial, and spatiotemporal, referenced data.
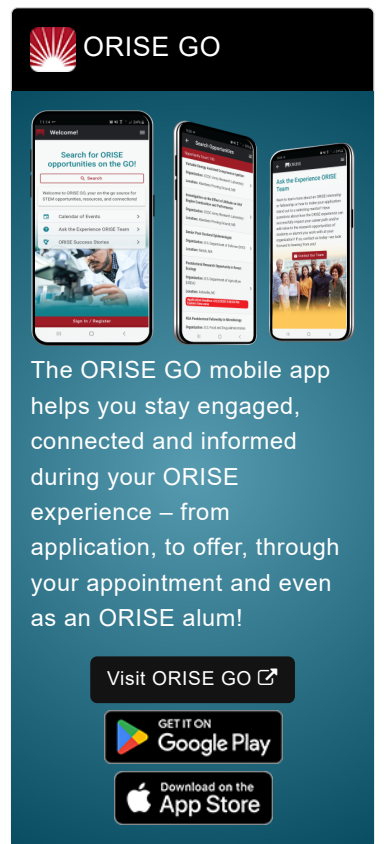
As a Post-Bachelor's Research Associate in the Geographic Data Science Group, the candidate will work on challenging, multi-disciplinary projects that advance data science methods, software, and systems. Solving problems motivated by national security challenges, the candidate will have the opportunity to work with a talented team, expand his/her skills, publish his/her findings, and leverage world-class computing facilities.

This particular position focuses on researching and applying methods in mathematics and machine learning to model and analyze remote sensing data, imagery, geospatial information, global open-source data, and other sources of information in order shed light on the human and physical landscapes that shape our national concerns. Applications include object detection, image classification, computer vision, and decision support. These applications are rolled out as solutions that directly impact capabilities in national defense, emergency management, agricultural and urban resiliency, infrastructure security, and human dynamics. Methods include artificial intelligence, mathematical modeling, numerical optimization, data mining, uncertainty quantification, and many more.

What sets this opportunity apart from many research and data science career opportunities is the sheer scale of analysis and possible impact. ORNL is developing massive, advanced workflows that process and analyze global imagery and geographic data on platforms with astonishing computational power, such as the Summit supercomputer. This position offers a unique opportunity to combine skills in mathematics, machine learning, and scientific computing. Working alongside the other renowned scientists and engineers who are seeking to push the limit of computational power at ORNL, the candidate will scale his/her methods and analysis to deploy high-performance computing solutions for problems of national and worldwide importance.

Major Duties and Responsibilities:

- Contribute to the conceptualization, design, and implementation of new models, methods, and algorithms that solve pressing data science challenges.
- Prototype new algorithms as proof of concept, and contribute to

optimizing and scaling algorithms.

- Support R&D efforts in machine learning, artificial intelligence, mathematical and statistical modelling, and scientific computing.
- Promote own career by contributing to team publications in journals, participating in conferences, and writing open-source software.

This appointment may not begin until ORNL lifts the suspension on Oak Ridge Institute for Science and Education (ORISE) appointments that is currently in place, due to health and safety concerns over the COVID-19 outbreak. Interested candidates are still encouraged to apply as applicants will be screened/interviewed in preparation for filling this position as soon as the suspension is lifted.

Qualifications Candidates should have recently completed a bachelor's degree in pure or applied mathematics, or a related field with commensurate experience.

Required Skills:

- A thorough knowledge of linear algebra, abstract algebra, analysis, and numerical analysis is required.

Preferred Skills:

- Demonstrated ability in researching and applying machine learning and deep learning.
- Proficiency in Linux, Bash, and standard Unix command-line tools.
- Substantial programming experience in Julia, Rust, Haskell, Common Lisp or Scheme, C++, Python, or other similar languages.
- Excellent skills in technical writing, communication, and teamwork.
- Demonstrated ability to conduct scientific and mathematical research.
- Experience with Julia, functional programming, high-performance computing, GPU programming, and Git.
- Experience with automatic differentiation and differentiable programming, and/or probabilistic programming and Bayesian machine learning.
- Experience applying machine learning to imagery, spectral data, 3D-point clouds, and multi-model input.
- Knowledge of remote sensing and geographic information system (GIS) analysis and data such as multi-spectral and hyperspectral data, spectral analysis, lidar, and geographic metadata.
- Experience with tools such as QGIS, GDAL, and PostGIS.

Living in East Tennessee: While the opportunity to work at ORNL is an amazing experience in itself, it's easy to overlook everything else East Tennessee has to offer if you haven't had the opportunity to spend time here. From spending your weekends downtown at Knoxville's farmers market, the Rhythm n' Blooms Music Festival, or the Dogwood Arts Festival, to some of the best hiking, kayaking, and camping in the U.S., East Tennessee has something to offer everyone.

The ORNL Post-Bachelor's Research Associate Program is administered by Oak Ridge Associated Universities through its contract with DOE to manage

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ORISE.

Eligibility Requirements	• **Citizenship:** U.S. Citizen Only
	• **Degree:** Bachelor's Degree received within the last 36 month(s).
	• **Discipline(s):**
	○ **Computer, Information, and Data Sciences** (1 👁)
	○ **Mathematics and Statistics** (10 👁)
	• **Age:** Must be 18 years of age

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