Opportunity Title: Theory-Driven Big Data for Predicting Human Behavior
Opportunity Reference Code: ARL-R-HCxS-400027-F1

Organization DEVCOM Army Research Laboratory

Reference Code ARL-R-HCxS-400027-F1

Description By taking highly reductive perspectives, traditional approaches and experimental methods in the human sciences have been quite successful in detecting large statistical effects (e.g., large differences in condition or group means), with many well-established models built upon such results. However, while they do well enough in accounting for behavior in highly controlled laboratory conditions, their predictions often fail in real-world application. By contrast, exploitation of statistical regularities discoverable in very large datasets has enabled data-driven approaches to produce generative models with high predictive power and real-world applicability. However, these models often do not behave well when used outside of the limited domain delineated by their training data, while a focus on optimizing for prediction yields models with enormous numbers of parameters that cannot inform or guide theoretical inference or explanation. This effort posits that the strengths that have led to the successes of both theory-driven and data-driven approaches may be combined to overcome their respective weaknesses. Our goal is to advance the foundational knowledge and methods needed to develop models that enable assessment of the critical factors that drive the highly multidimensional, real-time, human behavior in real-world conditions. The Associate will conduct research within one or more of three overlapping thrusts: advancing concepts for a general framework for theory-driven Big Data approaches to understand human behavior in real-world conditions; collecting and/or executing analytic efforts within large datasets to develop, adapt, and test new methodologies for implementing a theory-driven Big Data approach, and applying these methods to develop proof-of-concept methods to demonstrate the potential advantages and test the limitations of the approach. The Associate should have experience in one or more of the following (or other related) fields: Applied Mathematics, Artificial Intelligence, Cognitive and Behavioral Sciences, Cognitive Neuroscience, Complexity Science, Computer Science, Data Science, Network Science, Probability and Statistics, or Social Science, with expertise and/or interests that bridge human and computational sciences of particular interest.

ARL Advisor:

Kelvin Oie
kelvin.s.oie.civ@army.mil
(410) 274-9923

About ARD

ARL's Army Research Directorate (ARD) focuses on exploiting concept development, discovery, technology development, and transition of the most promising disruptive science and technology to deliver to the Army fundamentally advantageous science-based capabilities through laboratory's 11 research competencies. This intramural research directorate

also manages the laboratory's essential research programs, which are flagship research efforts focused on delivering defined outcomes.

About ARL-RAP

The Army Research Laboratory Research Associateship Program (ARL-RAP) is designed to significantly increase the involvement of creative and highly trained scientists and engineers from academia and industry in scientific and technical areas of interest and relevance to the Army. Scientists and Engineers at the CCDC Army Research Laboratory (ARL) help shape and execute the Army's program for meeting the challenge of developing technologies that will support Army forces in meeting future operational needs by pursuing scientific research and technological developments in diverse fields such as: applied mathematics, atmospheric characterization, simulation and human modeling, digital/optical signal processing, nanotechnology, material science and technology, multifunctional technology, combustion processes, propulsion and flight physics, communication and networking, and computational and information sciences.

About HUMANS IN COMPLEX SYSTEMS (HCxS)

Multi-disciplinary non-medical approaches to understand and modify the potential of humans situated in and interacting within complex social, technological, and socio-technical systems.

A complete application includes:

- **Curriculum Vitae or Resume**
- **Three References Forms**
  - An email with a link to the reference form will be available in Zintellect to the applicant upon completion of the on-line application. Please send this email to persons you have selected to complete a reference.
  - References should be from persons familiar with your educational and professional qualifications (include your thesis or dissertation advisor, if applicable)
- **Transcripts**
  - Transcript verifying receipt of degree must be submitted with the application. Student/unofficial copy is acceptable

If selected by an advisor the participant will also be required to write a **research proposal** to submit to the ARL-RAP review panel for :

- Research topic should relate to a specific opportunity at ARL (see Research Areas)
- The objective of the research topic should be clear and have a defined outcome
- Explain the direction you plan to pursue
- Include expected period for completing the study
- Include a brief background such as preparation and motivation for the research

- References of published efforts may be used to improve the proposal

A link to upload the proposal will be provided to the applicant once the advisor has made their selection.

Questions about this opportunity? Please email ARLFellowship@orau.org.

Eligibility Requirements

- **Degree:** Master's Degree or Doctoral Degree.
- **Academic Level(s):** Master's Degree (Journeyman Fellow), Master's Degree 7+ years (Senior Fellow), Doctoral Degree (Postdoctoral Fellow), Doctoral Degree 5+ years (Senior Fellow), or Faculty.
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (12)
  - **Communications and Graphics Design** (2)
  - **Computer, Information, and Data Sciences** (17)
  - **Earth and Geosciences** (21)
  - **Engineering** (27)
  - **Environmental and Marine Sciences** (14)
  - **Life Health and Medical Sciences** (51)
  - **Mathematics and Statistics** (11)
  - **Physics** (16)
  - **Science & Engineering-related** (2)
  - **Social and Behavioral Sciences** (29)