Opportunity Title: Bandit Models for Optimizing Collection
Opportunity Reference Code: ICPD-2022-30

Organization	Office of the Director of National Intelligence (ODNI)
Reference Code	ICPD-2022-30
How to Apply	**Create and release your Profile on Zintellect** – Postdoctoral applicants must create an account and complete a profile in the on-line application system. **Please note: your resume/CV may not exceed 2 pages.**

Complete your application – Enter the rest of the information required for the IC Postdoc Program Research Opportunity. The application itself contains detailed instructions for each one of these components: availability, citizenship, transcripts, dissertation abstract, publication and presentation plan, and information about your Research Advisor co-applicant.

Additional information about the IC Postdoctoral Research Fellowship Program is available on the program website located at: https://orise.orau.gov/icpostdoc/index.html.

If you have questions, send an email to ICPostdoc@orau.org. Please include the reference code for this opportunity in your email.

Application Deadline	2/28/2022 6:00:00 PM Eastern Time Zone
Description	**Research Topic Description, including Problem Statement:**

The "multi-armed bandit" problem (named for an array of slot machines with unknown payouts) provides a general framework for selecting among alternatives with uncertain values. Variations have been studied across disciplines and the literature has been broadly applied to problems which feature exploration-exploitation tradeoffs including experiment design, advertising, sales, recommender systems, and anomaly detection.

Several problems across the Intelligence Community (IC) involve an exploration-exploitation tradeoff, and may benefit from being investigated from this perspective. Research for this topic should:

- Establish an appropriate formalism which models a suitable IC problem as a multi-armed bandit problem. Assess the state of the art algorithms appropriate for the formalized problem.
- Investigate how existing algorithms and methods can be adapted or extended to meet the domain specific challenges of the IC.
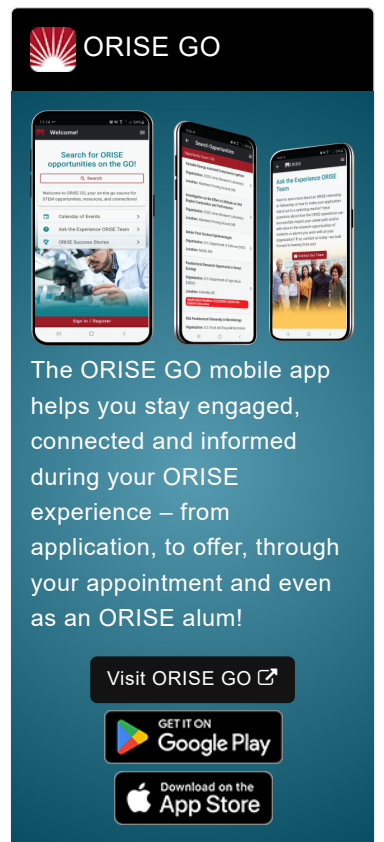
Example Approaches:

A few example problems that may provide suitable directions for this research:

- Improve tasking of remote sensing assets in order to maximize the intelligence value of collections.
- Improve tasking of space object surveillance and identification assets in order to find new and characterize objects while maintaining custody of previously detected objects.
- Design recommender systems for intelligence analysts.

Relevance to the Intelligence Community:

This research aims to apply a fresh perspective to enduring IC problems. If

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successful, it will connect them to a growing body of literature, which may continue to provide new approaches.

Key Words: Multi-Armed Bandits, Bayesian Inference, Information Theory, Machine Learning

Qualifications

Postdoc Eligibility

- U.S. citizens only
- Ph.D. in a relevant field must be completed before beginning the appointment and within five years of the application deadline
- Proposal must be associated with an accredited U.S. university, college, or U.S. government laboratory
- Eligible candidates may only receive one award from the IC Postdoctoral Research Fellowship Program

Research Advisor Eligibility

- Must be an employee of an accredited U.S. university, college or U.S. government laboratory
- Are not required to be U.S. citizens

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (12 👁)
  - **Communications and Graphics Design** (2 👁)
  - **Computer, Information, and Data Sciences** (16 👁)
  - **Earth and Geosciences** (21 👁)
  - **Engineering** (27 👁)
  - **Environmental and Marine Sciences** (14 👁)
  - **Life Health and Medical Sciences** (45 👁)
  - **Mathematics and Statistics** (10 👁)
  - **Other Non-Science & Engineering** (2 👁)
  - **Physics** (16 👁)
  - **Science & Engineering-related** (1 👁)
  - **Social and Behavioral Sciences** (27 👁)