About Lewis-Burke

• Founded in 1992; located in Washington, DC
• In 2018, twenty-eight policy experts with range of expertise/backgrounds allow multi-layered issue teams with deep expertise in agencies and scientific/higher education areas
• Support federal relations activities to develop and implement federal strategies to pursue, shape, and create new sources of funding to increase and diversify research portfolio
• Able to engage on multiple levels:
  - Individual faculty (including early career faculty)
  - Teams of faculty
  - Associate Deans for Research
  - Deans and Center Directors
  - University leadership and campus-wide priorities/activities

www.lewis-burke.com
Data

- NSF activities span directorates:
  - One of the NSF 10 Big Ideas: Harnessing Data for 21st Century Science and Engineering (HDR)
    - Will encompass existing data-related research, infrastructure, and education programs
    - Initial HDR activities:
      - Just released - Partnerships between Science and Engineering Fields and NSF TRIPODS Institutes (TRIPODS + X) - Connect Transdisciplinary Research in Principles of Data Science (TRIPODS) Institutes with domain scientists and engineers to further data science applications
        » May advance to include larger scale TRIPODS centers
      - Big Data Hubs and Spokes continue - new Spokes proposals were due September 18, 2017
        - Focus on: foundational research, new tools, research community needs, scale, sustainability, and workforce
  - DOD: Efforts across Services aimed to cut maneuver planning time, expand access to data, enhance analytical processing and improve predictions.
    - DARPA: PM Wade Shen, Data Driven Discovery of Models (D3M) for automated construction of complex models from data
  - NIH Big Data to Knowledge (BD2K) initiative in flux
    - Recent Request for Information (RFI) for NIH Strategic Plan for Data Science that will influence future opportunities and initiatives
  - USDA (Internet of Agricultural Things; 21st Century Extension) and NOAA (supercomputing initiative)
Autonomy → DATA + AI/Machine Learning

Opportunities

- **ONR: CLAWS** - Development of technologies needed to improve the autonomy and survivability of large and extra-large unmanned underwater vehicles
- **Advancing Artificial Intelligence for the Naval Domain**
- **OSD/ONR (MURI)** - Assuring Composability and Correctness for Intelligent and Learning Systems that Interact with Unstructured Physical Environments
- **DARPA** - Lifelong Learning Machines – R&D to fundamentally new machine learning mechanisms, enabling machines that learn continuously as they operate.
- **AFOSR**: COE - Trusted Human-Machine Teaming; Efficient and Robust Machine Learning
- **Science and Technology for Autonomous Teammates (STAT)**
- **Army** – ARL (CRA) - Distributed and Collaborative Intelligent Systems Technology Collaborative Research Alliance
- **Project Maven**
- **NSF** – Intelligent cognitive assistance, (FW-HTF), (S&AS), Smart and Connected Communities (S&CC), HDR, Smart and Connected Health (SCH)
- **DOE** - Planned Machine Learning Workshop (seeking participants)

www.lewis-burke.com
Project Maven (Army Research Lab)
Algorithmic Warfare Cross-Functional Team (AWCFT), aka Project Maven, launched by the Deputy Secretary of Defense in April 2017 to accelerate DoD’s integration of big data, artificial intelligence, and machine learning

—Phase 1: Develop and integrate computer vision algorithms needed to augment and assist military and civilian analysts with high volume Full-Motion Video (FMV) data primarily from Unmanned Aerial Vehicles (UAVs); program delivered first algorithms to military systems in December 2017

—Phase 2: To partner with industry and academia, on October 24, 2017 the AWCFT led by the Under Secretary of Defense for Intelligence (USD(I)), partnered with the Army Research Laboratory to host the first Project Maven industry day

• Intent is to expand work beyond FMV to all areas of actionable intelligence

• Air Force Lt. Gen. John N.T. “Jack” Shanahan, director for Defense Intelligence for Warfighter Support at USD(I), stressed the need for DOD to partner with industry, academia, and national laboratories as it goes about “operationalizing AI and machine learning for the warfighter.”

• Lt. Gen Shanahan proposed the need for a DOD “Center for AI” to serve as a clearinghouse for data and opportunities, and expressed a desire for a consortium of people to help DOD understand potential new capabilities. The team has visited laboratories and top universities to learn about computer vision and how DOD could better employ it in its data processing, exploitation, and dissemination (PED) enterprise

—Project Maven is seeking white papers through a topic in ARL’s annual Broad Agency Announcement (BAA), within the Information Sciences campaign. A key facet of the program is that the AWCFT will provide access to real data sets for performers to create algorithms. The announcement, amended to include Project Maven’s Artificial Intelligence and Machine Learning needs, was published on October 10, 2017, at https://www.grants.gov/web/grants/view-opportunity.html?oppId=292896

—On November 16, 2017, the BAA was amended to add the opportunity to submit proposals for participation in a Technology Demonstration co-sponsored by ARL and the AWCFT at Trident Spectre 2018 April 30-May 10, 2018, at https://www.fbo.gov/notices/30560cb90b31329b9403cacffcd6113e. Technologies were sought in the following areas:

• Computer Vision models that enable Geospatial Intelligence processing and exploitation in constrained and unconstrained compute environments through: object identification, object classification, object localization, unique object recognition/recall, object pixel georegistration, object tracking, semantic segmentation, logical expression or semantic description, and activity/situation recognition.

• New data labeling techniques, tools, and tradecraft for data annotation in support of deep learning: “edge” or “labeling on the line”, use of synthetic or photorealistic data, and relabeling/retraining in near-real time.

• Interfaces for the display, search, and interaction with algorithmically derived metadata and tabular structured algorithmic output: anomaly and pattern of life analysis, object search (visual and metadata), visualization, and fusion with other structured data.

• Storage and indexing capabilities for local algorithmically-produced data.

• Language algorithms to process verbal form and written text, including, but not limited to: natural language processing, automated language translation, and sentiment detection.
DARPA

Programs:

• PM Dr. Boyan Onyshkevych Active Interpretation of Disparate Alternatives (AIDA) - strategic understanding of events, situations, and trends around the world, in a variety of domains.

• PM Dr. Boyan Onyshkevych Deep Exploration and Filtering of Text (DEFT)

• PM Mr. Steve Jameson: Big Mechanism - develop technology to read research abstracts and papers to extract pieces of causal mechanisms, assemble these pieces into more complete causal models, and reason over these models to produce explanations;

• PM Dr. Jim Gimlett, Deep Purposeful Learning (Deep Purple) - advance the modeling of complex dynamic systems using new information-efficient approaches that make optimal use of data and known physics at multiple scales

• PM David Gunning Explainable Artificial Intelligence (Explainable AI) – Create a suite of new or modified machine learning techniques that produce explainable models that, when combined with effective explanation techniques, enable end users to understand, appropriately trust, and effectively manage the emerging generation of Artificial Intelligence (AI) systems

• PM Hava Siegelmann is developing a program in Safe Machine Learning.

• PM John Paschkewitz has an RFI out now on Foundations for Strategic Mechanism Design, which is looking at mathematical and algorithmic foundations for design and assessment of strategic mechanisms. This includes bringing in artificial intelligence advances.

  – He also runs the Agile Teams (A-Teams) program to discover, test, and demonstrate predictive and generalizable mathematical methods to enable optimized design of agile hybrid teams for humans and machines.

• New PM Joshua Elliott, DARPA I2O, is interested in “how computational technologies can be leveraged to improve all aspects of science and modeling from data discovery to analysis.”

  – “World Modelers” program

• PM Jennifer Roberts is interested in, “scalable analytics and machine learning algorithms that yield insights to human users.” She started a program called Synergistic Discovery and Design

  – “Probabilistic Programming for Advanced Machine Learning (PPAML)”

• Proposed for FY19 - Machine Common Sense - will explore approaches to common sense reasoning by machines.
Office of Naval Research (ONR)

• Program focus areas:

• Opportunities:
  – “Advancing Artificial Intelligence for the Naval Domain” special program announcement released February 8, 2018, under the Long Range BAA for Navy and Marine Corps Science and Technology
    – Integration of Domain Knowledge and Machine Learning
    – Artificial Intelligence in Support of Collaborative Complex Decision-Making
    – Decentralized Perception and Planning in Dynamic Environments
  • White Papers were due to Tom.McKenna@navy.mil with “WHITE PAPER” in the subject line NLT March 22, 2018 at 2:00 PM Eastern Time. Full proposals due May 11, 2018 by 2:00 PM Eastern Time
  • Multiple awards planned at an average of $500,000 per year for four years.
Air Force Research Lab

  — Air Force seeking help to create a new consortium made up of 50 to 100 autonomy technology developers to drive collaboration and address current and future tech issues
  — Papers were due January 19, 2018
  — Consortium funding of $100 million for five years
  — Consortium would provide Air Force with software, frameworks, and algorithms for:
    • Machine learning
    • Data fusion
    • Machine perception/vision
    • Software assurance
    • Formal methods
    • Optimization techniques
    • Planners (task and route)
    • Course of action generators

• “Science and Technology for Autonomous Teammates (STAT)” BAA, expected to award $950 million from FY 2018 to FY 2023 through multiple solicitations
  — Develop and demonstrate autonomy technologies that will enable Air Force mission sets
    • Multi-domain Command and Control
    • Intelligence, Surveillance, Reconnaissance (ISR) Processing Exploitation and Dissemination (PED)
    • Manned-Unmanned Combat Teaming for human-machine teaming and autonomous decision-making
Questions?

lauren@lewis-burke.com

Lewis-Burke Associates LLC
May 2018