



Value-centered Information Theory for Adaptive Learning, Inference, Tracking, and Exploitation

Wrapup

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Opportunities for future investment?



Some opportunities and directions for future investment

- Hierarchical/multiscale situational awareness
 - Task-aware learning and inference
 - Privacy-aware learning
 - Resource-aware learning (computation, energy, bw)
 - Timeliness-aware learning
 - Just-in-time push-pull of information
- Decisionmaking that integrates nontraditional datatypes
 - Primary sensor data (Imaging, radar, acoust, LIDAR, etc)
 - Secondary behavioral data (text/microtext/emoticon data)
 - Geo data (GPS, DEM, blueprints, etc)
 - Event-tagged data (heavy-tailed spatio-temporal)
- Learning and exploitation with small sample sizes





Cumulative education activities 2012-2015



- Education of students for next generation
 - Over 60 graduate student research assistantships
 - Over half a dozen undergraduate student appointments
 - Over a dozen Postdoctoral appointments
- Degrees awarded to students supported on MURI
 - Over a dozen PhD, MS and BS/BA degrees
- Summer student internships at federal and associated labs
 - Over a dozen student internships at ARL
 - Over half a dozen student internships at AFRL
 - Several student internships at Lincoln Laboratory





Tech transfer (2012-2015)



- Co-PI Soatto working with China Lake to transition DSP SIFT (POC: Matthew Kirchner)
- Co-PI Cochran ARL-ASU CRADA in process (POC: Brian Sadler)
- Co-PI Hero and post-doc Hye Won Chung are working to transition human-in-the-loop query models at **ARL** in 2014 (POC: B. Sadler)
- Co-PI Hero and student Kristjan Greenewald transitioning Kronecker sum decompositions to video and SAR at **AFRL** in 2013 and 2014. (AFRL POC: Ed Zelnio).
- Co-PI Hero and student Mark Hsiao transitioned Pareto web image search engine to **ARL** in 2013 for evaluation and adaptation into an in-house interface (ARL POC: Brian Sadler).
- Co-PI Fisher transferred in 2013 implementations of information planning algorithms to DARPA sub-contractor (**Systems Technology Research**) under the All Source Positioning and Navigation (ASPN) program. The method is being adapted to sensor planning and anomaly detection. (STR POC: Joel Douglas).





Synergistic activities (2012-2015)



- Service on National/International Advisory Boards
 - How serves on Air Force Scientific Advisory Board
 - Hero serves on NAS Committee on Applied and Theoretical Statistics (CATS).
 - Jordan chaired NAS Committee on Frontiers in Massive Data Analysis
 - Jordan runs Big Data program at Simons Institute
 - Moses serves on NAS Committee on Science and Technology for Defense Warning.
 - Moses serves on NRC ARL TAB for CISD
 - Hero is member of Strategic Advisory Group (SAG) of University Defence Research Collaboration (URDC), U. Edinburgh and Heriot-Watt U. (UK).
- Workshop/session organization on MURI-related topics
 - Fisher and Hero co-organized special session at Fusion meeting in 2015
 - Nadakuditi organized Random Matrix Theory and Algorithms Workshop at FOCM 2014.
 - Hero and Zelnio co-organized special session on Vol at 2013 SPIE DSS Conference
 - Fisher and Sadler co-organized 2 sessions on Vol at 2012 IEEE SSP
 - Moses chaired Government Panel at 2012 IEEE SSP
 - Hero and Nadakuditi co-chaired 2012 ARO SIEEE Workshop





Other cumulative statistics (2012-2015)



- Technical progress under MURI is reported in over 160 peer reviewed publications (<https://wiki.eecs.umich.edu/voimuri>)
- Over a dozen papers co-authored with ARL collaborators
- Quality of MURI team's research has been recognized by
 - Several best paper awards
 - Several major career awards to co-PIs
 - Over 40 invited talks and distinguished lectures
 - Over 30 keynote and plenary talks

