APPLIED RESEARCH LABORATORY FOR
INTELLIGENCE
AND SECURITY

Research for Intelligence and Security Challenges (RISC) Summer 2022
Tentative Project Topics* as of 5/4/22

---

* Each project is assigned a unique U.S. state identifier

AL   CFIUS Over the Horizon Forecasting for Critical and Emerging Technologies

08/Sponsor: OUSD(I&S) CL&S
USG Champion: Kristoffer Buquet, Chief TechProtect Div
Faculty Mentor: Christopher Nissen, UMD Applied Research Laboratory for Intelligence and Security
Interns: Lauren Shanley-DeBuse, Danielle Mixon, Jiin Kim

The Foreign Ownership, Control, and Influence (FOCI) threat to our current and future Critical and Emerging Technologies continues to grow and become more invasive. The is further compounded by the direct foreign investment, both private sector and Foreign Government Control, in U.S. companies as highlighted by the Committee for the Foreign Investment in the U.S. (CFIUS) process.

This project would focus on an identified technology area/sector, and the U.S. companies working on or directly supporting the identified technology. The scoped example would be to define companies working on our Critical and Emerging Technologies (C&ET) down to the CAGE code as they relate to the identified technology, and as determined based on a defined proximity to a DoD facility/installation.

Highly desired skill sets include analytical skills, critical thinking and writing skills, excellent research abilities and general knowledge management processes.

Expected Output:
- Predictive analysis or over the horizon forecast of what companies working on an identified C&ET may be susceptible to direct foreign investment or FIE activities directed at those identified companies/cage codes.
- Detailed documentation of the methodology for the research and analysis that can be replicated or applied to other C&ET areas and able to be scalable in effort.
- Development or refinement of a risk-based taxonomy that can be applied to companies/ CAGE codes to then be leveraged at a strategic level in the Department and beyond.

AZ   Foreign Influence over Small Businesses

16/Sponsor: OUSD(R&E) SBIR
USG Champion: Susan Celis, Acting Director SBIR/STTR Program Manager
Faculty Mentor: Dr. Marcus Boyd, University of Maryland National Consortium for the Study of Terrorism and Responses to Terrorism (START)
Interns: Rachel Rodriguez, James Campbell, Shelia Edwards

Interns will support research into foreign influence over small businesses and help the OUSD(R&E) Small Business Innovation and Research (SBIR) office with determining Paperwork Reduction Act requirements to address implementation of the various legislative provision that go along with performing due diligence and setting up some processes.

CA   Sustaining Support for Critical and Emerging Technology Protection

09/Sponsor: OUSD(I&S) CL&S
USG Champion: Kristoffer Buquet Chief TechProtect Div
Faculty Mentor: Brett Berlin, George Mason University Volgenau School of Engineering
Interns: Gabrielle Fagbohunka and Michelle Gutierrez

The current Deputy Secretary of Defense directed OUSD(R&E) developed Critical Technologies and Programs (CT&P) lists exists only in a classified enclave environment. This consolidated DoD list does not exist at the CUI level; however, such a list is vital for the continued protection of U.S. Critical and Emerging Technologies as identified by Undersecretary of Defense for Intelligence and Security Ronald Moultrie in his "Memo for Sustaining Support for Critical and Emerging Technology Protect".

This project would focus on compiling current unclassified critical technology lists in the Department and for direct support to the Critical Technology Protection and Integration Cell (CTPIC) and BLUE ADVANTAGE Assessment efforts. Highly desired skill sets include analytical skills, critical thinking and writing skills, excellent research abilities and general knowledge management processes.

Expected Output:
- Provide a common understanding of CUI level critical technologies and associated cleared DIB companies via the developed CUI list. This would be done via the consolidation and identification of current unclassified level critical technologies lists; including but not limited to the R&E Strategic Vision List, Small Business Innovation Research list, etc.
- Detailed documentation of the lists assembled, including the sources derived from, and the methodology for the research and analysis that can be replicated or applied to this and other efforts regarding the development and refinement of critical technologies lists at the CUI level.
- The development or refinement of a risk-based taxonomy that can be applied to critical and emerging technologies and cleared DIB companies to then be leveraged at a strategic level in the Department and beyond.

CN   Data Visualization to Compare Critical Technologies to the U.S. and China

05/Sponsor: OUSD(R&E) STPE / MTA
USG Champion: Patrick Lee -- Director, Science & Technology Exploitation and Analytics
Faculty Mentor: Prof. Peter Chang, University of Maryland Department of Civil and Environmental Engineering
Interns: Grant Tamrakar, Dale Nche

The U.S. and China have both recently publicly released technologies they have identified as critical to their own respective national security. The goal of this project is to use data visualization to show the overlap and differences between these critical technologies to the U.S. and China and to communicate to senior-level DoD leaders these insights in the most

efficient way possible to inform their decision-making. The potential sources of information may include, but are not limited to:

1) U.S. Critical and Emerging Technologies (C&ET) list [link];
2) The Office of the Undersecretary of Defense for Research and Engineering (OSD(R&E)) critical technology areas [link]; and
3) China's 14th Five-Year Plan [link].

The White House released an updated C&ET list in February of 2022 that identified advanced technologies of potential significance to U.S. national security and is an update to the initial list released in October of 2020. In February of 2022, The Office of the Undersecretary of Defense for Research and Engineering (OSD(R&E)) also identified 14 critical technology areas that are vital to maintain national security. In March of 2021, China released their 14th Five-Year Plan, covering the years 2021-2025, as passed by the Chinese parliament, the National People's Congress. It includes 7 cutting-edge science & technology (S&T) fields related to national security and development, 4 major national S&T infrastructure projects, 8 manufacturing sectors to increase their core competitiveness, and 7 key industries for the development of a digital economy.

Expected outputs include visualizations to integrate these different data sources and determine what types and features of visualization most efficiently convey information associated with critical technologies to the U.S. and China.

CO   Understanding Competitor Efforts in Chemical & Biological Weapons and Defense R&D

18/Sponsor: OUSD (I&S) ISSO
USG Champion: Pelayo Fernandez, SAF/CDMAI
Faculty Mentor: Prof. Michelle Bensi, University of Maryland Department of Civil and Environmental Engineering
Interns: Amelia Whiteley and Melissa Cho
Goals: Learn and apply skills in research, data analysis, Chinese language, visual analytics

Assist in the creation of an interactive, visual representation of the "ecosystem" that describes the PRC efforts in chemical and biological weapons and defense science and technology (S&T) and research and development (R&D). Student activities could include: learning and applying approaches to obtain relevant data; understanding strengths and weaknesses of various publicly available data sources, as they use them; learning and applying data capture and processing techniques; researching specific aspects of the ecosystem; translating foreign language content as needed (with or without machine translation assistance); understanding the dimensions of data to support analytics; and explore visualization techniques and capabilities. Research techniques would be taught and provided. In addition to leveraging their own institution's library services as resources, they may reach out to centers for Chinese studies at other schools and universities in exploring data resources, expertise, and existing tools for visual analytics, such as the UMD Human-Computer Interaction Lab (HCIL).

DE   How Strategic Competitors Use AI/ML

32/Sponsor   U.S. Army Futures Command / Future Force and Concepts
USG Champion: LTC Mark Askew, Future Force Branch Chief
Faculty Mentor: Dr. Elizabeth Radziszewskiy, University of Maryland National Consortium for the Study of Terrorism and Responses to Terrorism (START)
Interns: Chris Lidard, Andrew Liflyandchick, and Winston Li

Competitors' use of AI/ML: Identify differences in how our great power competitors will likely employ AI/ML within their own capabilities and operational approaches, based on their various geopolitical and scientific backgrounds. (How should we expect non-Western militaries to employ AI/ML?)

Problem: How AI/ML will be employed is heavily informed by those developing its algorithms, available data, and methods of testing. As our great power competitors come from non-Western backgrounds and have different geopolitical threats and opportunities, better understanding their AI/ML foundations, development approaches, and expected employment practices will help U.S. forces better prepare our own approaches and counter-approaches – within competition, crisis, and conflict.

Process: Evaluate how Chinese and Russian scientists and national security/defense officials are developing and testing AI/ML, including (as possible) those algorithms included within future warfighting capabilities. Compare these efforts with Western (U.S. and our allies) processes to identify what important differences and similarities exist.

Expected Output:

Output: Identify the inputs and refinements to Chinese and Russian AI/ML developments, and opportunities and challenges for U.S. defensive and offensive operations in competition, crisis, and conflict.

DC   Mitigating AI Bias in the Department of the Air Force

57/Sponsor: Air Force Concepts, Development, and Management (SAF/CDM)
USG Champion: Jeff Starr / TBD
Faculty Mentor: Prof. Onyema Osuagwu, Morgan State University Department of Electrical Engineering
Interns: ArChala Cohens and Nour Ali Ahmed

In February 2020, DoD issued a public release setting forth a set of ethical principles for the use of AI. This research topic proposes to examine whether and how Air Force governance of integration of AI methods into DAF workflows reflects embodiment of these principles.

The issue of AI bias is familiar to anyone who builds and validates AI algorithms and generally describes usually unintended systemic effects on the accuracy and perhaps fidelity of the output of an AI algorithm with respect to its intended use, often due to systemic "bias" in the

training data set used to train an algorithm. The AI field is similarly familiar with how an AI-based automation of any human decision-making process might bake in the biases that could have been previously integrated into the manual, human decision process, again often depending on how training data sets might have been drawn from the manual human decision process. As a result, government and business managers of AI integration efforts have had to address whether AI bias could propagate discriminatory practices in an automated fashion, including against people in areas of protected categories, such as race, ethnicity, religion, gender, sexual preference, etc.

DoD's adoption of ethical principles provides a strategic guidance barrier against such outcomes, requiring the use of AI systems to be responsible, equitable, traceable, reliable, and governable. There have been some early-stage efforts, primarily focused within the Joint AI Center (JAIC), to organize around implementation of these principles, and the Air Force just appointed a DAF AI Ethics Officer. Beyond these steps, little has been done as of yet to identify business practices for how to implement the DoD AI Ethical Principles in DAF workflows, whether those workflows involve benefits decisions, hiring or promotions, programming autonomous vehicle missions, or weapons release. Mapping advances made in business or elsewhere in the USG to consider such ethical principles to DAF requirements and prioritizing a work program also remain under-addressed.

The research project should produce an analytic paper that addresses current thinking related to AI ethics and algorithmic build and training, and should also provide a set of priorities and business practices for guiding the integration of AI ethics into DAF dev-ops processes related to AI.

FL   Modeling Downstream Unintended Consequences of Embedded AI

40/Sponsor: Joint AI Center (JAIC)
USG Champion: Chad Bieber, Director T&E Operations
Highest classification: CUI/NF needed
Faculty Mentor: Dr. Breana Carter-Browne, UMD Applied Research Laboratory for Intelligence and Security
Interns: Austin Cohen, Michael Cocita, and Aidan Kurz

The Smart Sensor ASP Brain provides platform-agile unmanned arial system autonomy in communication-denied environments by sensing targets of interest with multispectral, SAR, and RF sensors and sending out a fused target report. This task will build the endogenous and exogenous reasoning workflow of the Smart Sensor ASP Brain, including inputs to the sensors, the CV AI algorithm, the reasoning system, the target report sent to the user, and the user decision.

GA   Visualizing Forensic Data in OSINT Knowledge Graphs

43/Sponsor: Office of the Director of National Intelligence
Faculty Mentor: TBC
Interns: Joe Lavicka, Arya Basirolomi

RISC interns will develop designs, wireframes, and prototypes for forensic visualizations for large-scale knowledge graphs. Interns will work with existing knowledge graphs, interview prospective end-users, develop user stories, and user models. Results will inform production requirements for forensic visualizations. Interns will work with the larger project team, and other RISC teams in a co-development environment.

IA   Training and Testing Text Extraction Utilities on Public Reports

44/Sponsor: Office of the Director of National Intelligence
Faculty Mentor: Dr. Michael Maxwell, UMD Applied Research Laboratory for Intelligence and Security
Interns: Ayushi Saxena, Ujwal Gupta, Marcus Hill

RISC interns will develop a series of Python libraries to support extraction of various linguistic features from English documents. These libraries will be "wrapped" into scripts that may be executed in a production Natural Language Processing (NLP) document processing pipeline. Extraction libraries will support a larger research agenda in processing AI Incident reports. Interns will work with the larger project team, and other RISC teams in a co-development environment.

IL   Modeling Distributed Analysis with Software Instrumentation

45/Sponsor: Office of the Director of National Intelligence
Faculty Mentor: Dr. Joshua Poore, UMD Applied Research Laboratory for Intelligence and Security
Interns: Liam Mc Carthy, Jason Scott, Sanjit Singh

RISC interns will develop a proof-of-concept demonstration illustrating how software instrumentation might be used to identify analysts working on the same topical material on an ad hoc basis. In turn, this work informs how ad hoc distributed, analytical teams might be created through the software tools that support tradecraft. Interns will work with existing, open-source instrumentation libraries, develop (where necessary) new features for instrumentation and data processing, and work with operationally-relevant analytical tools to create this demonstration.

IN   DevSecOps in Distributed Development Teams

46/Sponsor: Office of the Director of National Intelligence
Faculty Mentor: Prof. David Lovell (TBC)
Interns: Mili Gupta and Nicholas Sagun

RISC interns will develop a proof-of-concept demonstration illustrating how software dependency auditing might result in aggregated, prioritized reports summarizing key risk indicators of packages used across projects in larger product portfolios. This work informs how the IC/DoD might make tactical and strategic decisions on addressing open-source vulnerabilities with maximum impact on larger portfolio's security posture. Students will work

with existing open-source libraries in-step with library developers at In-Q-Tel Labs. Interns will evaluate packages used in other ARLIS work.

KS   Human-Interpretable Attribution of Text using Underlying Structure (HIATUS)

29/ARLIS contract with project sponsor IARPA
ARLIS Champion: Dr. Anton Rytting, UMD Applied Research Laboratory for Intelligence and Security
Interns: Kaitlyn DaVisio, Benjamin Nathan

Human-Interpretable Attribution of Text using Underlying Structure (HIATUS).
The HIATUS program seeks to develop novel human-useable AI systems for attributing authorship and protecting author privacy through identification and leveraging of explainable linguistic fingerprints. The program will develop novel techniques to generate representations that capture author-level linguistic variation and will use these representations to build human-interpretable algorithms to perform authorship attribution and ensure author privacy (i.e., via removal of author-identifying characteristics from text). Successful technical approaches will be scalable across diverse topic domains, genres and languages.

KY   Data Development for Project Maven

31/ARLIS contract with project sponsor OUSD(I&S)
ARLIS Champion: Peter Loats, UMD Applied Research Laboratory for Intelligence and Security
Interns: Kate Herrington and Julia Sanderson

The MAVEN interns will be tasked with collecting digital text, audio and video materials from open source for ultimate exploitation. They will be collecting this material as if they were supporting a EUCOM analyst trying to determine order-of-battle/enemy intentions/battle damage assessment in the active Ukraine crisis. Interns will come away with some knowledge of media exploitation - particularly the types of tools and processing that would be used in exploitation (Natural Language Processing, text-to-speech, etc.) and how the outputs could be used to support DoD activities.

Rough types of activities

- Introduction to collected exploitable materials (CEM)
- Identification of media sources (open source), determine collection protocol (where things are stored, how they are categorized)
- Collection and storage of media
- Application of tools (speech to text)
- Report on data collected, how useful it appears to be and tools used and their effectiveness

LA   Machine Learning for Ship Identification

15/Sponsor: NAWCAD, AI and Autonomy Development
USG Champion: Charles Rea   Autonomy and AI Applications Division Head
Faculty Mentor: Prof. Christopher Metzler, University of Maryland Department of Computer Science
Interns: Ethan Adams, Destinie James, Rashil Joshi

In the SEACOP-21 project. YoLoV4 was used for identification of ships. However, there was a high false positive rate. This was mostly due to lack of data. For example, since most training data were taken from ships in the water, the model would falsely identify a helicopter as a ship. For this project, we aim to augment the identification accuracies of the YoLo model. Namely, the model will be trained to lower the false positive rate. This can be done in multiple ways. First, commercially used datasets such as CoCo can be used in additions to the SEACOPS database. Next, Transfer learning can be used to lower training time of the machine learning model. Lastly, the images can be generated from simulations to serve as augmented data.
- recommended skillsets: computer scientists, Modeling and simulation engineers
- datasets: SEACOP-21 data, open-source datasets, simulation engine such as unity or unreal.

Expected Output:

A comparative study on the effect of multiple approaches listed above on model accuracy, runtime, and hardware requirement. Delivery of the trained model(s), and any computer models from which datasets were generated.

MA   Ground Level Imagery Geolocation

34/Sponsor: National Geospatial-intelligence Agency (NGA)
USG Champion: Chris Mikrut, NGA-Research Image & Video Pod
Faculty Mentor: Prof. Alan McMillan, University of Wisconsin Department of Radiology
Interns: Tyler Houser, Nathan Bickel, Matthew Traver

NGA GLIMPSE is a project that geolocates ground-level social media images that lack metadata. The GLIMPSE pipeline is currently composed of eight modules. One module, called the Interest module, filter images based on content within the image. We are looking for an intern to train the Interest module. This training will use existing test images collected by the GLIMPSE team. The test data does have some images that have been categorized as interesting subjects, but the intern will need to review the categories for positive, near-positive, and negative examples. The intern will need to run the Interest module to understand how the model is performing and make modifications to the model as needed.

Training the Interest module will give GLIMPSE the capability to reduce the throughput of images that will have to be fed through the GLIMPSE pipeline. This could be a great learning task for an intern and will be another step forward for the GLIMPSE team. An intern with a background in computer science could benefit from this summer research experience because they will learn about a complete image processing pipeline and gain machine learning skills.

MD   Mapping Crop Types in Data Sparse Regions

35/Sponsor: National Geospatial-intelligence Agency (NGA)
USG Champion: Dr. Natasha Krell, Office of Sciences and Methodologies (ATS)
Faculty Mentor: Prof. Deb Niemeier, University of Maryland Department of Civil and Environmental Engineering
Interns: Elizabeth Dobbs, Sean Rogers, Lauren Manion

Identifying specific crop types in remotely sensed imagery is a rapidly growing field because of advancements in machine learning. Having accurate and abundant data labels of different crop types is key; however, it is not always available in regions where data is sparse. Possible datasets to explore include NASA Harvest's CropHarvest dataset and USDA Croplands data layer.

Interns will work with scientists at the NGA Analysis Directorate's Office of Sciences & Methodologies on research to map crop types in regions with sparse data. Tasks may include
- Acquiring open-source datasets on crop types for regions of interest.
- Ingesting data into the Google Earth Engine and running random forest models to classify land cover and crop types.
- Running change detection algorithms to determine changes in planting and harvesting.
- Visualizing data in compelling and innovative ways.

MI   Algorithms for Threat Detection

33/Sponsor: National Geospatial-intelligence Agency (NGA)
USG Champion: John T. Chavis, NGA-Research Predictive Analytics Pod
Faculty Mentor: Dr. David Backer, Center for International and Security Studies at Maryland (CISSM)
Interns: Cody Arigo, Shalom Bekele, Casandra Maier, and Courtney Teasdale

In the 2022 Algorithms for Threat Detection (ATD) challenge, participants will create multivariate time series forecasters capable of predicting national-level geopolitical event counts.

Namely, the challenge will utilize the GDELT dataset, which uses the CAMEO coding system to record events and attribute them to organizations or state actors. A subset of the events considered by the dataset include instances of the terms "protests", "threats", "providing aid", "engaging in diplomatic cooperation", and "assaults".

In this challenge, the GDELT dataset will be aggregated on a weekly basis and at a national level of fidelity. Participants will create multivariate time series forecasters that, given the history of event counts over all countries in the dataset, predict the number of events for each event type and for each country for the following week. Models will be evaluated by back-testing the model on historical data and then using standard time series metrics, after which they will be compared against baseline algorithms and the algorithms developed as part of the ATD challenge.

MN   Secure Computing and How to Break It: Blue Team
54/Sponsor: Strategic Capabilities Office (SCO)
ARLIS Champion: Bridget Rogers, UMD Applied Research Laboratory for Intelligence and Security
Interns: Shreyas Srinivasan and Kaleb Schmucki

SCO is exploring security vulnerabilities in container platforms such as Kubernetes, Azure, and Amazon Web Services. This summer interns will participate in a vulnerability analysis of at least one of these platforms configured to support an example application. In the process, we will better understand the security mechanisms provided by these platforms, and the interns will learn different ways a device or system vulnerability assessment can be accomplished.

(Blue Team) Create and defend a secure web site
      This team will create and instrument a secure website using Kubernetes (or similar containers system). It will have at least three secure topics (financial, PII, deliverables).

MO   Secure Computing and How to Break It: Red Team
55/Sponsor: Strategic Capabilities Office (SCO)
ARLIS Champion: Bridget Rogers, UMD Applied Research Laboratory for Intelligence and Security
Interns: Arienbelle Aguila, Krehl Kasayan, and Kevin Knapp

SCO is exploring security vulnerabilities in container platforms such as Kubernetes, Azure, and Amazon Web Services. This summer interns will participate in a vulnerability analysis of at least one of these platforms configured to support an example application. In the process, we will better understand the security mechanisms provided by these platforms, and the interns will learn different ways a device or system vulnerability assessment can be accomplished.

(Red Team) Find vulnerabilities in a secure web site.
      This team will perform a vulnerability assessment on a containerized website.

NC   Impact of Cyber Events on Supply Chain and Business Operations
19/Sponsor: OUSD(A&S)
USG Champion: John Garstka, Director for Cyber within the Office of the Chief Information Security Officer, A&S
Faculty Mentor: Dr. Charles Harry, University of Maryland School of Public Policy
Interns: Avery Borens, Emily Klomparens, and Ryan Thenhaus

Interns will research publicly available data sets on impacts of cyber events on supply chain and business operations, and then structure this data for use with UMD's Tapestry platform for risk analysis. Results will inform DoD on how cyber events can impact mission resilience.

NH   America's Supply Chains
12/Sponsor: OUSD(I&S) CL&S
USG Champion: Stephanie Andrews, DCSA LNO
Faculty Mentor: Prof. Meredith Gore, University of Maryland Department of Geographical Sciences

Interns: Abigail Kassel, James Venslauskas

DoD is prioritizing developing a plan to implement recommendations in the Executive Order (EO) 14017 One-year Report and will begin implementation over the summer. To inform one line of effort is research of EOs, DoD Directives, Instructions, and policies and provide substantive input into an Enterprise-level Supply Chain Resilience Strategy to protect critical and emerging technologies. This includes FOCI threat and vulnerability information sharing and data sets, and refining a risk taxonomy to leverage at a strategic level.

Expected Output will include input into Implementation Plans, risk taxonomy development, and identifying FOCI threat and vulnerability information sharing impediments and ways to overcome these to increase supply chain resilience within the Department.

NJ   Project Blue
53/ARLIS contract with project sponsor Navy
ARLIS Champion: Dr. Moneer Helu, UMD Applied Research Laboratory for Intelligence and Security
Interns: Anita Falade and Andew Xie

Project Description: TBC

NM   Growing and Protecting the STEM Pipeline
06/Sponsor: OUSD(R&E) Strategic Technology Protection & Exploitation
USG Champion: Robert Irie, Deputy Director, Strategic Technology Protection & Exploitation
Faculty Mentor: Prof. Allison Reilly, University of Maryland Department of Civil and Environmental Engineering
Interns: Lavanya Upadhyaya and TBC

R&E is developing a systems dynamic model of the STEM talent pipeline flow. This project will leverage the model to identify and develop strategic insights and recommendations on how to strengthen the STEM pipeline and make it resilient to unwanted external influences. There will be opportunities to identify/incorporate new open-source information, test hypotheses against the model, modify/extend the model for other applications and flows, and apply the model in a game theoretic context.

NV   US Allies and Partners Intelligence and Security Modernization
13/Sponsor: OUSD(I&S) (potentially DA G2, FORSCOM, INSCOM, or Army Futures Command)
USG Champion: COL Darius Ervin, MILDEP to DDI Cl&S
Faculty Mentor: Dr. Samuel Henkin, University of Maryland National Consortium for the Study of Terrorism and Responses to Terrorism (START)
Interns: Stephanie Lizzo, Jasmine Phillips, David Winter

As we move forward, is there a time in which our Allies and Partners will outpace us in executing transformational change that the US will be disadvantage or no longer viewed as the partner of choice?

US Allies and Partners are in the midst of modernization at various intervals of their Intelligence Infrastructure (Collection, Analysis, Production and Dissemination). Our Allies and Partners are essential to operations in competition and conflict. We will continue to engage with them via exchanges of liaison officers, collaborating in modernization forums, and exchanging perspectives to better understand one-another in service-to-service talks. We are seeking ways to share information and establish relationship and networks to support our combined needs in competition and conflict.

NY   Measuring the Quality of Learning from Simulations

47/Sponsor   U.S. Army Futures Command / Future Force and Concepts
USG Champion: LTC Mark Askew, Future Force Branch Chief
Faculty Mentor: Dr. Angie Mallory, UMD Applied Research Laboratory for Intelligence and Security
Interns: Ethan Morrow, Lillian Stout

Learning within futures experimentation: Developing metrics for measuring the confidence levels of learning when experimenting - including in wargames - with future technologies, capabilities, and concepts (How do we increase our confidence in wargame results and validate our future concepts with experimentation)

Problem: The Army lacks metrics to determine the quality of learning derived from experimentation (to include wargaming, modeling, and simulations) with respect to future technologies, capabilities, and concepts (how we could be equipped, organized, or operate)

Process: Evaluate the current Army futures-focused wargames and simulations that are testing future technologies, capabilities, and concepts to identify additional and/or better ways (whether new or pulling from civilian best practices) for how the Army can improve our experimentation methodological rigor and make more informed investment decisions.

Expected Output: Develop refined methods and new metrics for determining learning confidence levels for new technologies, capabilities, and concepts that the Army could incorporate within

OH   Unauthorized disclosures and the 24-hour news cycle

20/Sponsor: OUSD(I&S) CL&S PHYSEC&OPSEC
USG Champion: Erica S. McLennan, Chief DoD OPSEC
Highest classification: CUI
Faculty Mentor: Prof. Natalie Scala, Towson University Dept of Business Analytics & Technology Management
Interns: Katie Fenton, James Raymond, and Taylor Seaman

The 24-hour media, largely driven by profits based on commercial sponsorship for increased viewership, there has been a noticeable decline in journalistic veracity focused on National Security best interests. Network and cable news competition is encouraging the broadcasting of more sensational news stories, including those based on anonymous sources with potentially

dubious intentions. This development has proven detrimental to the relationship between the media and DoD, and appears to coincide with increased unauthorized disclosures. At minimum, personnel are required to take initial OPSEC training and annually thereafter. Despite the training, UDs (whether deliberate or not) continue to be an issue. This calls into question the content and method of the training, and if there are more effective methods to deter UDs.

What are the links, motivations, causes, and preventative recommendations associated with the 24-hour news cycle's impact on unauthorized disclosures (UDs) and what impact does DoD OPSEC training have on preventing UDs? Are there more effective ways to prevent UDs?

Expected Output includes a report that provides insight into UD motivations and recommendations for better preventative actions and training.

OK   Changing Motivations in Insider Threats

50/Sponsor: OUSD (I&S) CL&S InT
USG Champion: Brad Millick, Director, DoD Insider Threat Program
Faculty Mentor: Prof. Cody Buntain, University of Maryland School of Information Studies
Interns: Marley Carroll, Miriam Franklin-Grinkorn, Sara Freedman, and Madeline Grasso

How have the primary motivations for insider threats changed over time? How do political climates or other social factors play a role in insider threat actions? How can we apply these observations to better detect and mitigate insider threat risk in the future?
- Research insider threat/espionage case studies over the past ~50 years. The comparison of the stated motivations of the individuals may reveal a change in motivations of time.
- Money, Ideology, Coercion, and Ego (MICE) have previously been argued to be the four prime motivators for espionage. Are these motivations consistent in all forms of insider threat or are there other categories to be considered? Have new motivators developed over time? "

OR   Insider Threat - Extremism vs Foreign Terrorism

51/Sponsor: OUSD (I&S) CL&S InT
USG Champion: Brad Millick, Director, DoD Insider Threat Program
Faculty Mentor: Dr. Thomas Guarrieri, University of Maryland National Consortium for the Study of Terrorism and Responses to Terrorism (START)
Interns: Maverick Clemmer, Jamie Horowitz, and Mouhamadou Hoyeck

What lessons can we learn from the past two decades of fighting foreign terrorism that we can apply at home to combat radicalization towards extremism within the workforce?

Literature review focusing on poste 9/11 studies into the nature of foreign terrorism and recruiting efforts. Examine similarities between those efforts and current recruiting conducted by extremist organizations.

PA   Auditing Insider Risk

49/Sponsor: OUSD (I&S) CL&S InT
USG Champion: Brad Millick, Director, DoD Insider Threat Program
Faculty Mentor: Dr. Steve Sin, University of Maryland National Consortium for the Study of Terrorism and Responses to Terrorism (START)
Interns: Kaley Bronson, Hatsiry Mendez-Jimenez, and Aethiopia Joseph-Salmon

What non-obvious measures/data/models exist for "Insider Risk Audits"? Interns will conduct a survey of different commercial sectors to see what is used for measuring risk, to enable a fresh look at understanding risk.

RI   Safeguarding Controlled Unclassified Information

10/Sponsor: OUSD(I&S) Information Security Support Office
USG Champion: Michael Russo
Faculty Mentor: TBC
Interns: Adams Awasum, Kendall Snyder

Description: TBC

SC   Investigating Approaches to Modernize Classified Information Management --- Declassification Program in DoD

28/ARLIS contract with project sponsor OUSD(I&S)
ARLIS Champion: Dr. Michael Brundage, UMD Applied Research Laboratory for Intelligence and Security
Interns: Samuel Mahowald and Jennifer Proctor

Interns will identify and evaluate best of breed tools that could be leveraged now, and in the future, which could mitigate chokepoints or process inefficiencies identified in the current process workflows. This work will inform the design of pilot project(s) and a validation testbed.

SD   Automation of Declassification and Foreign Disclosure

56/Sponsor: Air Force Concepts, Development, and Management (SAF/CDM)
USG Champion: Jeff Starr / TBD
Faculty Mentor: Dr. Michael Brundage, UMD Applied Research Laboratory for Intelligence and Security
Interns: Calla Hughes and Aquia Richburg

One serious challenge involving the disposition of classified information involves human review of decisions to release this information. Release can refer to declassification in accordance with legislated or other requirements, or foreign disclosure, even if the information disclosed is to remain classified albeit perhaps at a lower level of classification. Some projects have examined the application of AI or NLP methods, or other emerging technologies, perhaps to machine-read documents or otherwise to categorize the content of documents to provide a scalable process to review documents for declassification, particularly considering the crushing backlog of documents awaiting such review. Still, one key obstacle for such AI- or NLP-driven reviews is reconciling such content reviews with a myriad of classification guides that govern the classification, downgrading, and declassification of documents. Establishing what information is classified, or declassifiable, by reference to classification guides, the original source authority for classification in the first place, could add an objective and rapidly categorizable reference to determining any basis for continued classification of information.

This research project should examine how classification guides can be synthesized as a consolidated "data lake" of principles and guidelines which, in turn, can be used to ascertain the appropriate continued classification of information. Advanced methodologies should be explored, to include AI and NLP, and developed as tools to create such data lakes by consolidating the information of all classification guides. Tool development should be capable

of comparing information that has been classified with classification guidelines to build a set of decision algorithms to support decisions ranging from declassification, to downgraded classification, to foreign disclosure and other forms of release. The study should evaluate system requirements to identify parameters related to decision accuracy, scope, and scale, which in turn could be used to define the parameters of a pilot project to assess the feasibility of this approach.

SAF/CDM will assist in locating and gaining access to classification guides to support this work (e.g., DTIC repositories).

TX   Applying Language Expertise for Situational Awareness and Counterintelligence
58/Sponsor: National Counterintelligence Task Force (NCITF)
USG Champion: Timothy Clifton
Faculty Mentor: Prof. Stanley Dubinsky, University of South Carolina College of Arts and Sciences
Interns: Yemlibike Fatkulin, Harrison Murray, and Nathalie McGinn

Assist with social media reporting on topics of significance across a span of languages.

UT   Characterizing Identity in a Digital World (TS/SCI)
21/Sponsor: Defense Intelligence Agency (DIA)
USG Champion: MAJ Nathalie Dunlop
Highest classification: TS/SCI
Faculty Mentor: Judy Philipson+Valerie Novak (TBC), UMD Applied Research Laboratory for Intelligence & Security
Interns: Noah Hibbler and Rebecca Horst

VA   Information Competition Simulator
24/ARLIS contract with project sponsor U.S. Special Operations Command
ARLIS Champions: Matt Venhaus + Dr. Angie Mallory, UMD Applied Research Laboratory for Intelligence & Security
Interns: Taylor Gordon, Nurul Haya, Autumn Perkey, and Anna Prince

The ARLIS Information Competition Simulator project aims to develop a training, experimentation, and wargaming environment that accurately reflects human behavior and adapts for specific target audiences based on their group affiliations and media consumption patterns. The simulator will aid in sensitizing SOF operators and leaders to the non-linearities, complexities, and differences from other kinetic domains/operations that the information environment presents. It would provide realistic and rapid feedback to users unable to access target audiences directly before deployment.

Intern tasks may include:
-   Translate polling results into statistical distributions to feed the creation of software-based agents,
-   Design and implement a user interface for the Simulation system,

- Develop API to transfer results of media processing to Agent factory,
- Research foreign populations' media consumption patterns,
- work with modelers and programmers to develop software documentation and User's guide,
- Conduct background social science research to ensure that computer models are consistent with the state of the practice social science understanding of human behavior, assist in the development of a WBS for a complicated project with participants drawn from several universities and locations.

WI   Computational Cultural Understanding
26/ARLIS contract with project sponsor DARPA
ARLIS Champion: Dr. Victor Frank, UMD Applied Research Laboratory for Intelligence and Security
Interns: Jaime Cantwell and Claude Su

To assist negotiations and aid critical interactions, DARPA developed the Computational Cultural Understanding (CCU) program. The goal of CCU is to create a cross-cultural language understanding service to improve a DoD operator's situational awareness and ability to effectively interact with diverse international audiences. The program seeks to develop natural language processing (NLP) technologies that recognize, adapt to, and recommend how to operate within the emotional, social, and cultural norms that differ across societies, languages, and communities.

Interns will work with ARLIS researchers to support test and evaluation for this CCU program.

WY   INtegrated Forecasting and Estimates of Risk (INFER)
30/ARLIS contract with project sponsor Open Philanthropy
ARLIS Champion: Aki Peritz, UMD Applied Research Laboratory for Intelligence and Security
Interns: Alan Luo and Ashley Thompson

INtegrated Forecasting and Estimates of Risk (INFER) is a forecasting program designed to generate valuable signals and early warning about the future of critical science and technology trends and events for U.S. Government policymakers.