Introduction to the National Artificial Intelligence Institute (NAII) Cyberseminar

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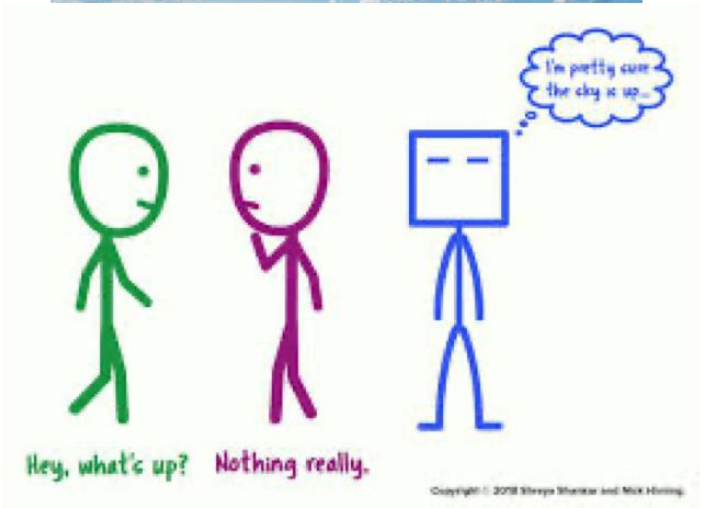
VA

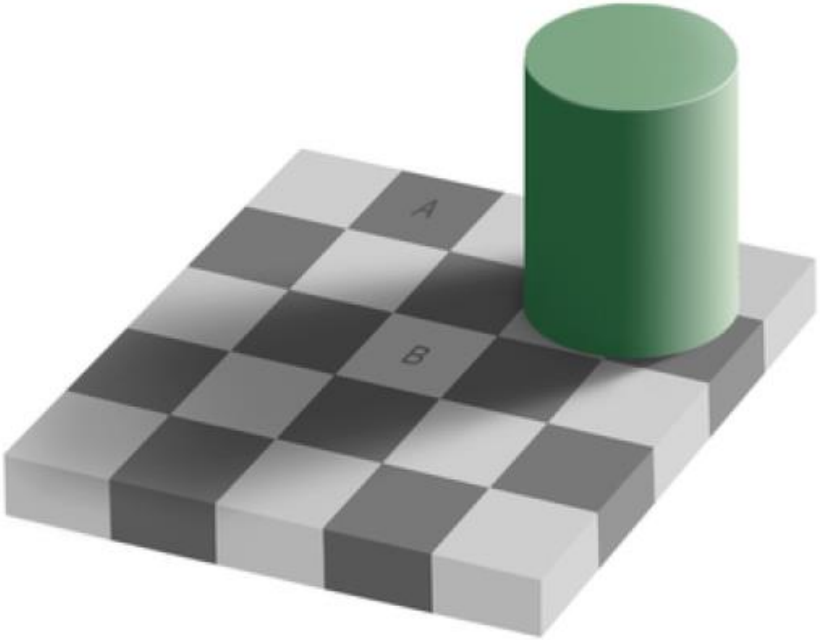
National Artificial Intelligence Institute

AI is not perfect

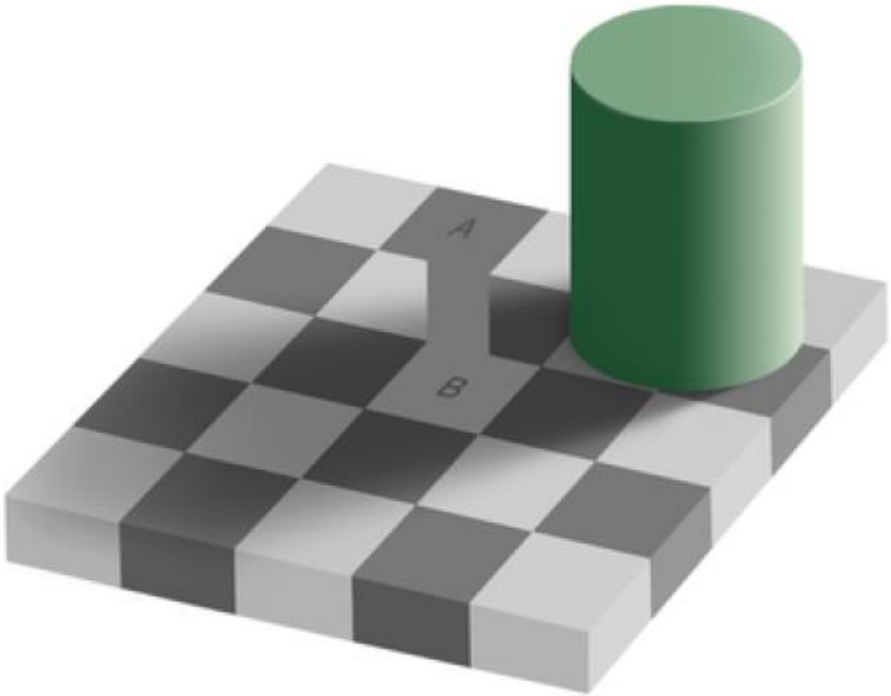


Poll: Which is color is darker?

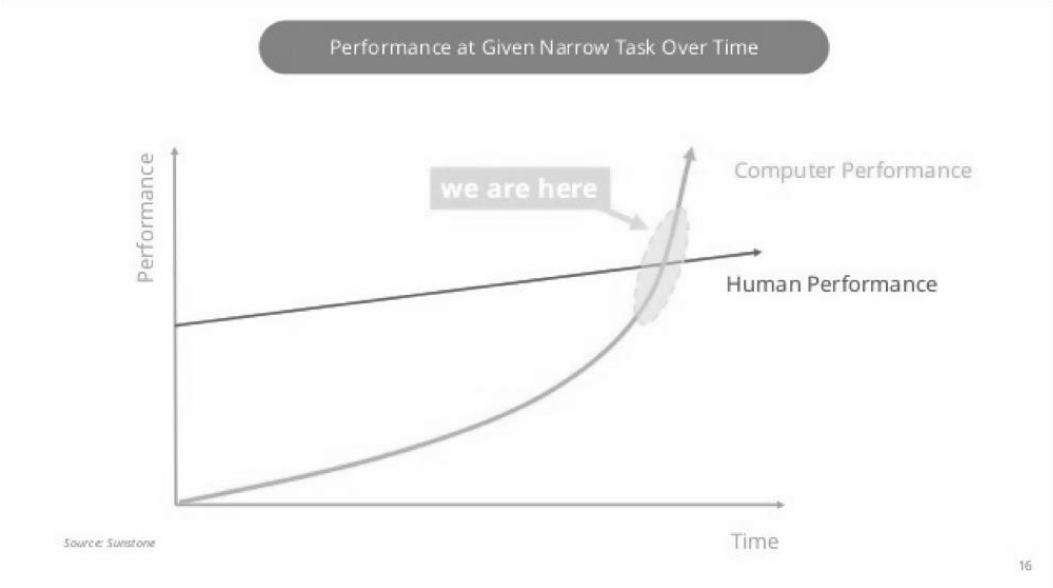
- A
- B
- Same



Neither is “Natural Intelligence”



This is a special time for AI…

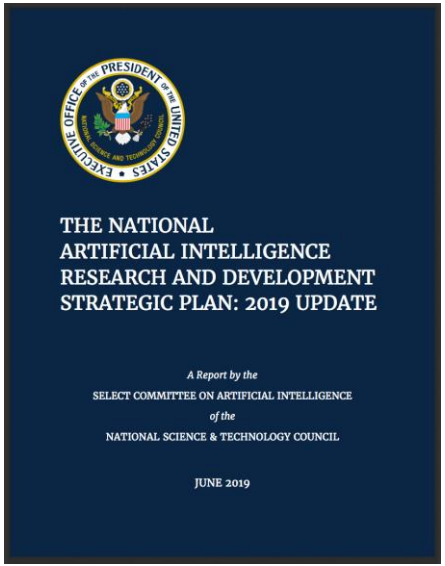


American AI Initiative and National AI R&D Strategic Plan

EXECUTIVE ORDERS

Executive Order on Maintaining American Leadership in Artificial Intelligence

INFRASTRUCTURE & TECHNOLOGY | Issued on: February 11, 2019



Why AI at VA?

9.1 million +
patients, making VA the largest integrated healthcare system in the United States

800 thousand
genomic donations tied to medical records, the largest such database in the US

1200 +
medical facilities across all 50 states and US territories

120 thousand +
doctors and nurses in VA, with nearly 75% of all US doctors trained in VA hospitals

2.18 million +
telehealth episodes of care per year

1 billion +
Images per year in electronic health record

Our Mission and Charter

Establish the Department of Veterans Affairs as the preeminent organization for research, development, and training of Artificial Intelligence with impact on a global scale, ensuring the health and well-being of our Veterans.

Veteran Engagement Board

- **We are looking for volunteers to:**
  - **Engage in collaborative discussions to aid in the understanding the assumptions and perceptions of Artificial Intelligence research and development.**
  - **Assist in the development of research and development pilots related to improving the health and well-being of Veterans through Artificial Intelligence.**
  - **Assist in the dissemination of research and best practices**
- **If you are an interested Veteran, please contact george.chewning@va.gov**

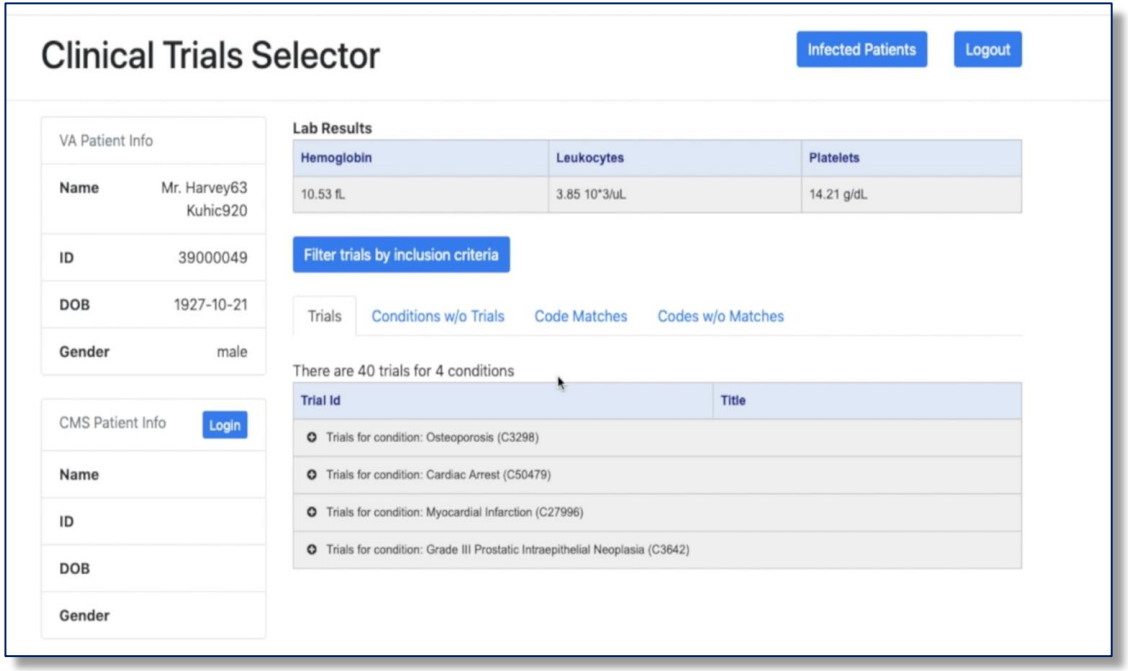
Pilots to test what flies

- **This year, we are learning about the challenges we face for AI at VA.**
- **We aim to rapidly prototype AI R&D in Veteran health and well-being to show what's possible.**

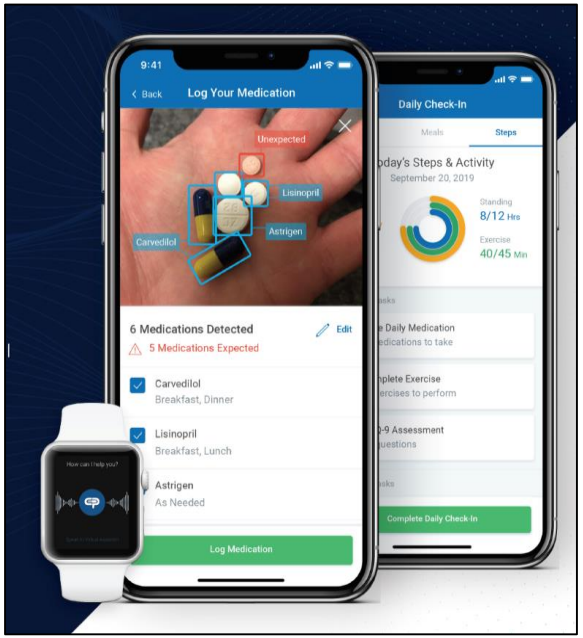
AI Tech Sprints

- Time-limited engagements designed to foster collaboration with potential industry, academic and non-profit partners by iteratively designing an AI-enabled tool that leverages federal data to address a need for Veterans
- Designs and leverages Government Innovation Award-winning framework for empowering an AI-able Ecosystem through voluntary incentives

AI Tech Sprints



Courtesy: Girls Computing League



Courtesy: Composite Apps

Collaborative AI across agencies

TECHNOLOGY

National AI Research Institutes launches with $200M in grants for societal benefit

NSF, USDA, DHS, VA, DOT PARTNER TO FOSTER AI RESEARCH

The National Science Foundation (NSF) has announced a program that aims to pursue artificial intelligence research projects with partnering institutes. NSF said that it partnered with the departments of Agriculture, Homeland Security, Veterans Affairs and Transportation to solicit for work under the National AI Research Institutes program.

The joint program would engage with research institutes on two tracks. The first, known as the planning track, would cover study areas that involve applications needed by NSF and its partners. The second, known as the institute track, would focus on projects that tackle AI trustworthiness, machine learning foundations and AI applications in agriculture, food, education, molecular synthesis, manufacturing and physics.

VA and DeepMind

- **Predict Acute Kidney Injury (AKI) 48 hours in advance**
- **Early warning enables time to take preemptive action**
- **Helps prevent kidney injury**

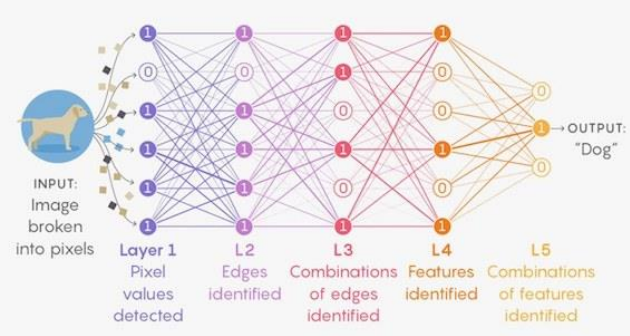
Enabling VA Leadership for AI Use Cases by Building AI R&D Capacity

1. Deep Learning
2. Trustworthy AI
3. Privacy Preserving AI
4. Explainable AI
5. Multiscale AI Analysis

Delivering on Veteran use cases by building AI R&D capabilities

1. Deep Learning

- Artificial neural network architectures with specialized architectures (e.g., multiple hidden layers).
- Example: useful for learning from large, noisy, and related pieces of information including: imaging, language processing, etc.



https://www.wired.com/story/new-theory-deep-learning/

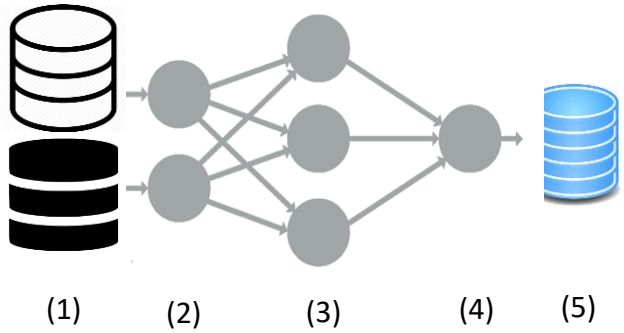
2. Trustworthy AI

- Definition (per EU framework):
  - Lawful - respecting all applicable laws and regulations
  - Ethical - respecting ethical principles and values
  - Robust - both from a technical perspective while taking into account its social environment
- Example: Trustworthy AI methods useful in establishing and removing biases (e.g. subpopulations) in AI-based analysis

https://hub.packtpub.com/the-eu-commission-introduces-guidelines-for-achieving-a-trustworthy-ai/
https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=60419

3. Privacy-Preserving AI

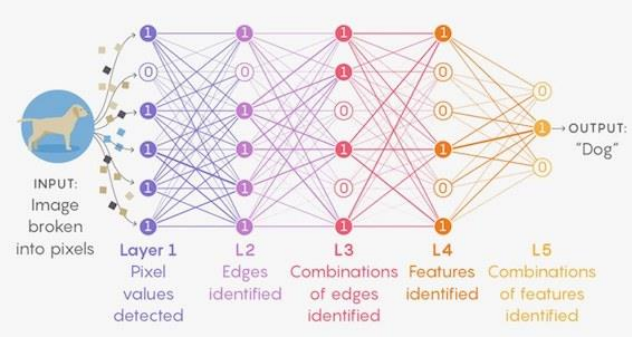
- AI analysis that can obtain results without exposing the underlying data.
- Example: Homomorphic encryption enables AI-based results to be obtained without exposing underlying data at cost of order of magnitude or more of computation time.



1. **Source Information/Database Privacy**
2. **AI Model Input Privacy**
3. **AI Model Privacy**
4. **AI Model Output Privacy**
5. **Destination Information/Database Privacy**

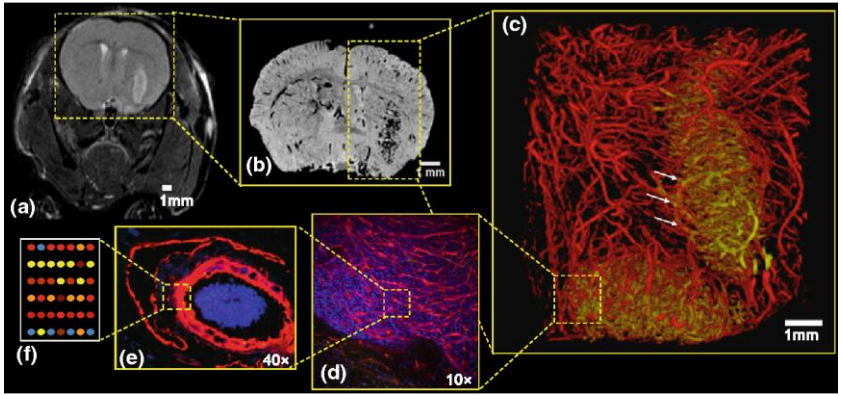
4. Explainable AI

- AI approaches that seek to enable the capability to look inside a model's "black box" to understand and interpret how the model came up with a particular solution.
- Example: Deep learning is traditionally not thought of as explainable AI, but new approaches are beginning to enable some understanding of the underlying processes.



5. Multiscale AI Analysis

- AI that can efficiently analyze at systems at different scales.
- Example: AI methods that can integrate deep learning models across cancer images from MRI scans, CT, histology, and other imaging modalities. Another example is time series: using AI to make predictions for different time scales.



Poll: Which of these may be of further interest to you or someone you work with?

(Check all that apply)

- **Deep Learning**
- **Trustworthy AI**
- **Privacy Preserving AI**
- **Explainable AI**
- **Multiscale AI Analysis**
- **None**

Building AI R&D Capacity

Identify challenges and iterate on building AI R&D capacity, processes, and policy at VA, especially ones that can gain from inter-office collaborations.

Pilot topic	AI-able data with	AI Impact	Policy areas
Brain Health	Apple and/or Fitbit	Personalize + Triage	Informatics-as-a-Service
Connected Health	Devices + Clinical data	Risk Evaluation	Compute color of money
In Silico Testing into Therapeutics Repositioning	Patients + Clinical data	Targeted Trials	Hiring authority

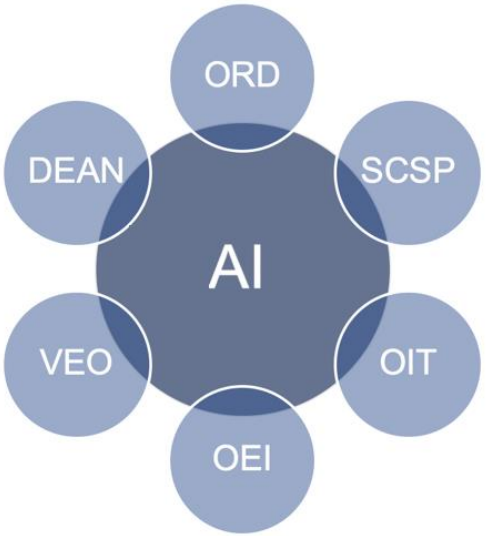
Facilitating Interdisciplinary AI R&D Capacity and Policy Implications

- **How can we work across VA, universities, and other organizations to build AI R&D capacity?**
- **What policies and processes can be changed to facilitate?**
- **Useful to explore means to leverage other data/AI expertise in such cases and capture lessons learned.**
- **Example: NAII affiliate and now core member Christos Makridis, PhD worked with a computer scientist at Stanford, David Zhao and Gallup to quantify the role of socio-economic factors on physical well-being among veterans.**

Together building AI at VA

Leveraging VA information to advance AI across VA medical centers by overcoming barriers in policy and processes to provide best-in-class care to our Nation's Veterans.

A sample of offices working on AI at VA:



Join the AI Community

- **AI@VA**
- **Bringing together people and labs around cutting edge AI for Veteran health and well-being.**
- **Mailing list, surveys, and website to spotlight leading edge AI efforts across VA offices and centers**
- **Join now! research.va.gov/naii/join.cfm**

Poll: Which of the following describes you?

- **Interested in cutting-edge AI, but never used AI**
- **Interested in cutting-edge AI, and have leveraged some AI in your work in the past**
- **Interested in cutting-edge AI, and currently actively working on and leveraging cutting-edge AI**
- **None of the above**

Prospective Members

- Interested in cutting-edge AI
- Not necessarily active in projects

- Interested in cutting-edge AI
- Actively working on AI projects

- Interested in cutting-edge AI
- Researchers are working on AI
- Want to work on national/policy issues

NAII Member Model

Benefits	Community	Affiliate	Associate	Core
First access to VA AI news & highlights				
Officially affiliated with NAII in publications				
Listed on NAII website as an affiliate				
First access & ability to shape NAII materials				
Work in primary NAII initiatives				
Primarily paid or sponsored by NAII				
Clinics and Labs can also be affiliated with NAII and apply to be a Consortium member				

Poll: Which of these may be of interest to you?

(Check all that apply)

- Community
- Affiliate
- Associate
- Core
- Consortium
- None

Benefits	Community	Affiliate	Associate	Core
First access to VA AI news & highlights				
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Work in primary NAII initiatives				
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Developing AI@VA

What are our biggest challenges?

How can we leverage AI together for all VA?

Thank you

research.va.gov/NAII

NAII@va.gov