



Tomorrow's Doctors, Tomorrow's Cures®

Leveraging AI for Research and Innovation

Learn

Serve

Lead

August 27, 2024



Association of
American Medical Colleges



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Dean, Carle Illinois College of Medicine
Senior Vice President & Chief Academic Officer, Carle Health



Florence Doo, MD

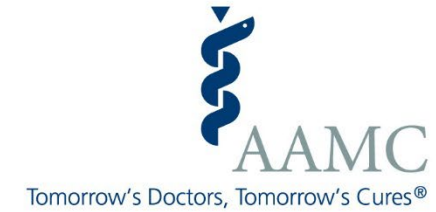
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Leveraging AI for Research & Innovation

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DISCLOSURES:

**Advisory Board for GigXR, Inc.
Advisory Board for WideAwake VR, Inc.**

Advances in AI are currently being used all areas of business, education, and research, and the medical field is a major opportunity!

Unique challenges we face in Medicine with AI:

Health Data Protection

Bad Models/Incomplete Data/Predictions → Poorer Outcomes

Defining the right use-cases for AI tools for:

Education/Training/Research/Innovation

How do we as a medical community help lead this charge instead of having it be given to us and then try to find a purpose?

How does AI address bias in the literature?

How is adoption made scalable?



Will AI Soon Replace Physicians and Other Health Care Workers?



No, but what we are seeing is that physicians and health workers who know how to use AI tools effectively are starting to surpass those who do not.

What are some things medical schools and deans are thinking about when it comes to AI?

What are the *RIGHT* AI Tools to embrace now?

How do we use these tools to better prepare the next generation of physicians?

How will these AI tools be integrated into areas like admissions, research, innovation, curriculum, clinical environment for training of skills and evaluation of performance?

How do we prepare faculty to use these new AI tools in education, research, and in the clinic?

How will our IT infrastructure handle these tools safely?
students/faculty/education/research/clinical enterprise

Some Examples of AI Applications in Research, Innovation, and the Clinic

- **AI tools in Medical Imaging and XR Applications**
- **AI tools in Research Database Investigations:**
 - (1) Data Warehouses**
 - (2) Digital Twin Modeling**
- **Applications in the Clinic :**
 - (1) Documentation**
 - (2) Care Delivery/Risk Assessment Strategies**
 - (3) Precision Interventions/Skills Development**

Expanding Extended Reality With AI Applications

Health-y-Equality

Awareness of one's own bias and strategies to manage it



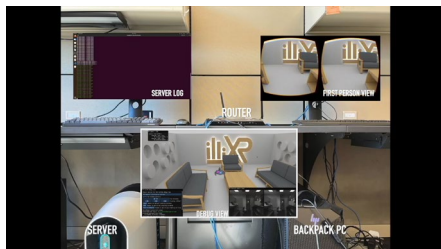
Mixed-reality virtual character "coach" who guides recognition of implicit bias, reflection, and mindfulness activities

Learning and practicing culturally-centered communication skills



Chatbot-based virtual patient, chatbot with whom learners can practice skills

ILLIXR: Illinois Extended Reality Project



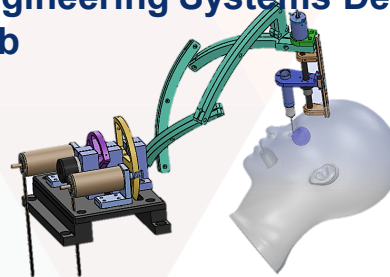
Advanced Imaging and Modeling Lab (AIM) – Jump Simulation

QoE-Aware 360 Video – XR Coordinated Science Laboratory

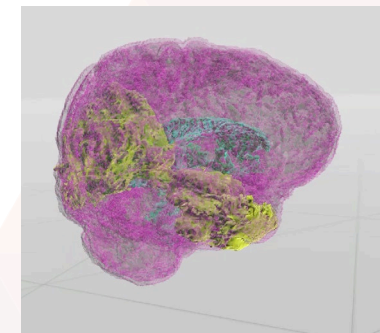
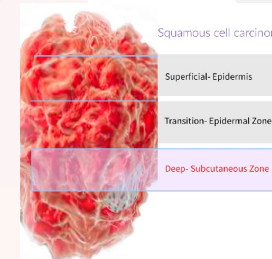
XR in Robotic Medicine



Design Automation / Optimization Engineering Systems Design Lab

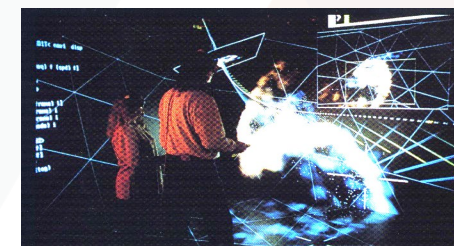


Multi-Modal Skin Lesion Identification



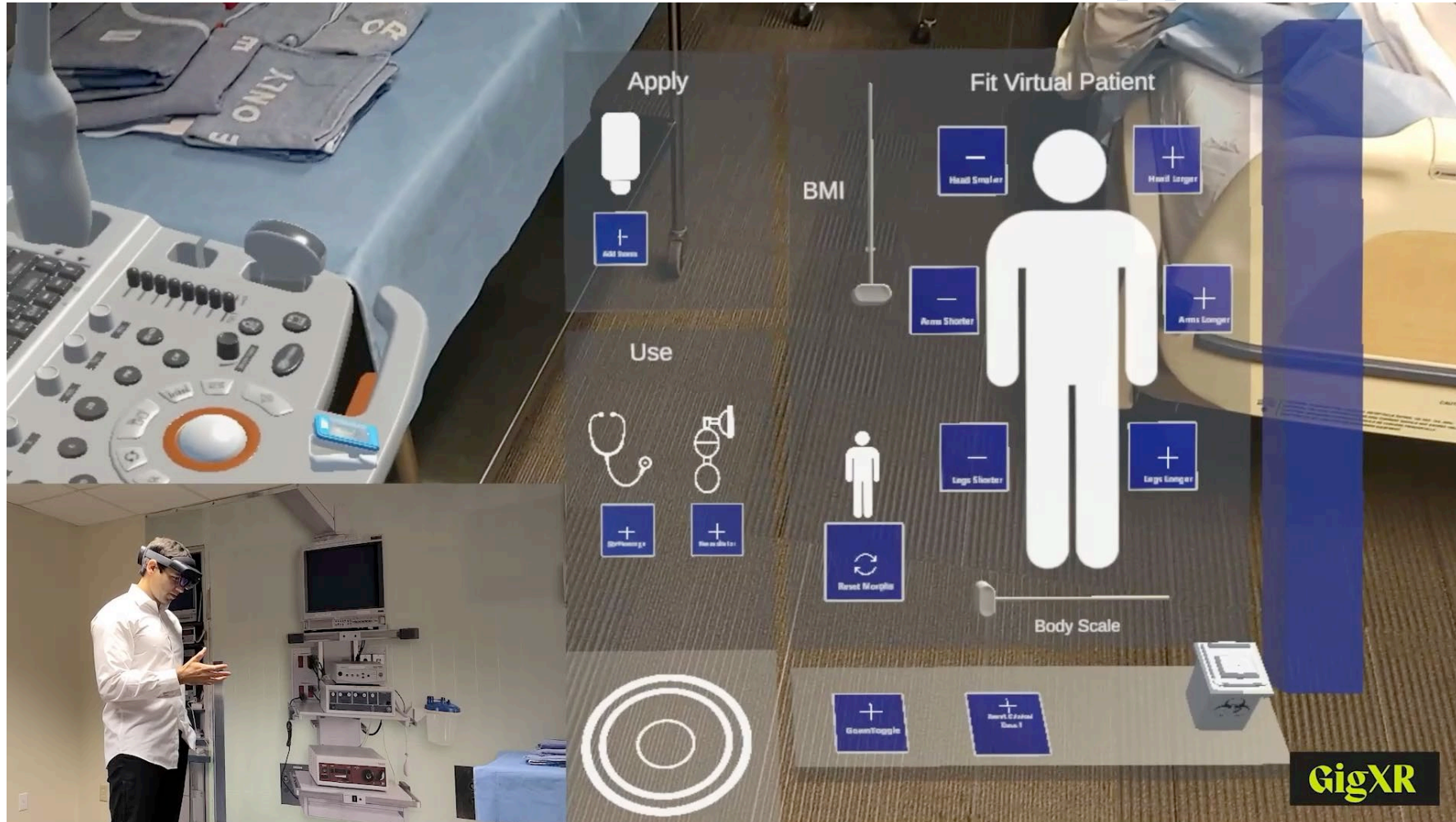
Segmentation from Clinical to VR/XR

AR Medical



XR Visualization, Biomedical, and Clinical Software

RE-Imagining the Future of Medical Simulation and Standardized Pts with AI tools applied to XR



Developing a shared de-identified research data warehouse for AI applications

Define data governance and privacy policies.

Develop infrastructure for data sharing and access control.

Encourage partnering members to contribute data.

Developing a shared de-identified research database

PhysioNet <https://physionet.org/>

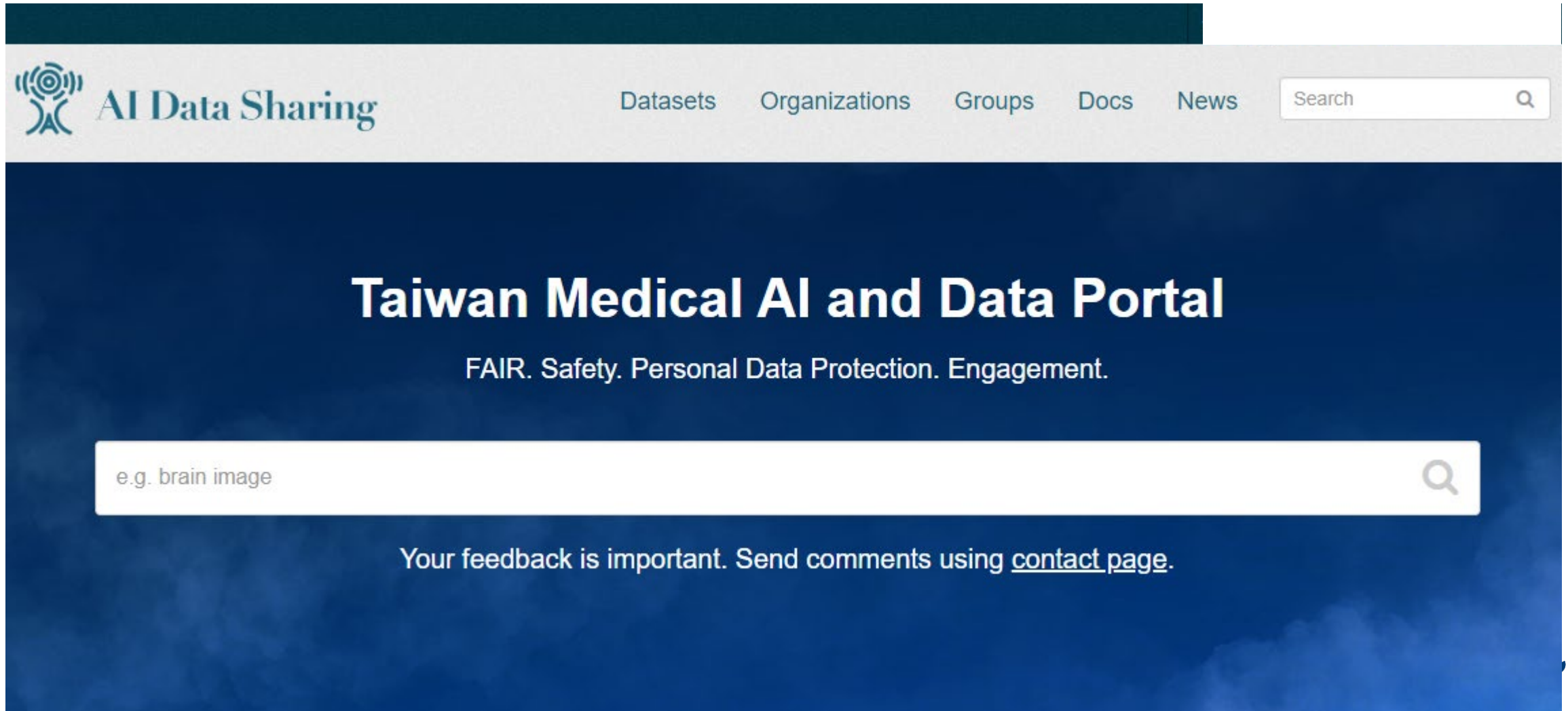
Datasets include various types of physiological signals and images.

Different levels of access: open, restricted, credentialed, contributor review.

Software and tools.

Annual challenges (2000-present).

Medical AI Datasets and Data Sharing Platform





Organizations

Taipei Veterans Gen... **14**

National Yang Ming ... **3**

Groups

Medical Image **5**

Brain Image **4**

Tags

brain **3**

brain image **3**

CT **3**

MRI **2**

bipolar disorder **1**

Dementia **1**

depression **1**

Eye **1**

FDG-PET **1**

hemorrhage **1**



17 datasets found

Order by:

Relevance



Taiwan Aging and Mental Illness Cohort

Overview The Taiwan Aging and Mental Illness Cohort (TAMI) presents a detailed and extensive Magnetic Resonance Imaging (MRI) study dataset, spearheaded by Professor Albert C....

PDF

XLSX

mgz

Dementia Molecular Imaging Clinical Database

Overview This dataset is at the core of a dementia research project focused on the exploration and diagnosis of dementia using advanced imaging technologies. It integrates data...

PDF

NIFTI

Brain FDG-PET/MR Image Database

Fluorodeoxyglucose Positron Emission Tomography (FDG-PET) is currently one of the powerful tools for the clinical diagnosis of dementia (AD). Meanwhile, MR imaging, being...

PDF

ZIP

Brain CT Hemorrhage Public Dataset

Overview This dataset, featured in the RSNA Intracranial Hemorrhage Detection challenge on Kaggle, offers a rich collection of brain CT images. It is meticulously categorized...

CSV

DICOM



Taiwan Aging and Mental Illness Cohort

Followers

0

Views

236

Dataset Application

Apply

Organization



National Yang Ming Chiao Tung University

National Yang Ming Chiao Tung University (NYCU; Chinese: 國立陽明交通大學) is a public research university in Taipei and Hsinchu, Taiwan. It was created in 2021 through the merger of...

Dataset

Groups

Activity Stream

Taiwan Aging and Mental Illness Cohort

Overview

The Taiwan Aging and Mental Illness Cohort (TAMI) presents a detailed and extensive Magnetic Resonance Imaging (MRI) study dataset, spearheaded by Professor Albert C. Yang. This project, initiated in 2012, is a collaboration between Taipei Veterans General Hospital and National Yang Ming Chiao Tung University, Yang Ming campus. It focuses on providing valuable insights into various mental illnesses and their impact on brain structure and function.

Dataset Composition

Participants: The study includes 1,265 participants, encompassing 587 healthy individuals and 678 patients diagnosed with mental illnesses such as schizophrenia, bipolar disorder, and depression.

Imaging Data: Participants have undergone comprehensive brain imaging scans at the MRI facility located at the Yang Ming campus.

Types of MRI Data:

Structural MRI: Includes data from Structural and Diffusion Tensor Imaging.

Functional MRI: Provides data on brain activity and function.

Dataset Scope and Objectives

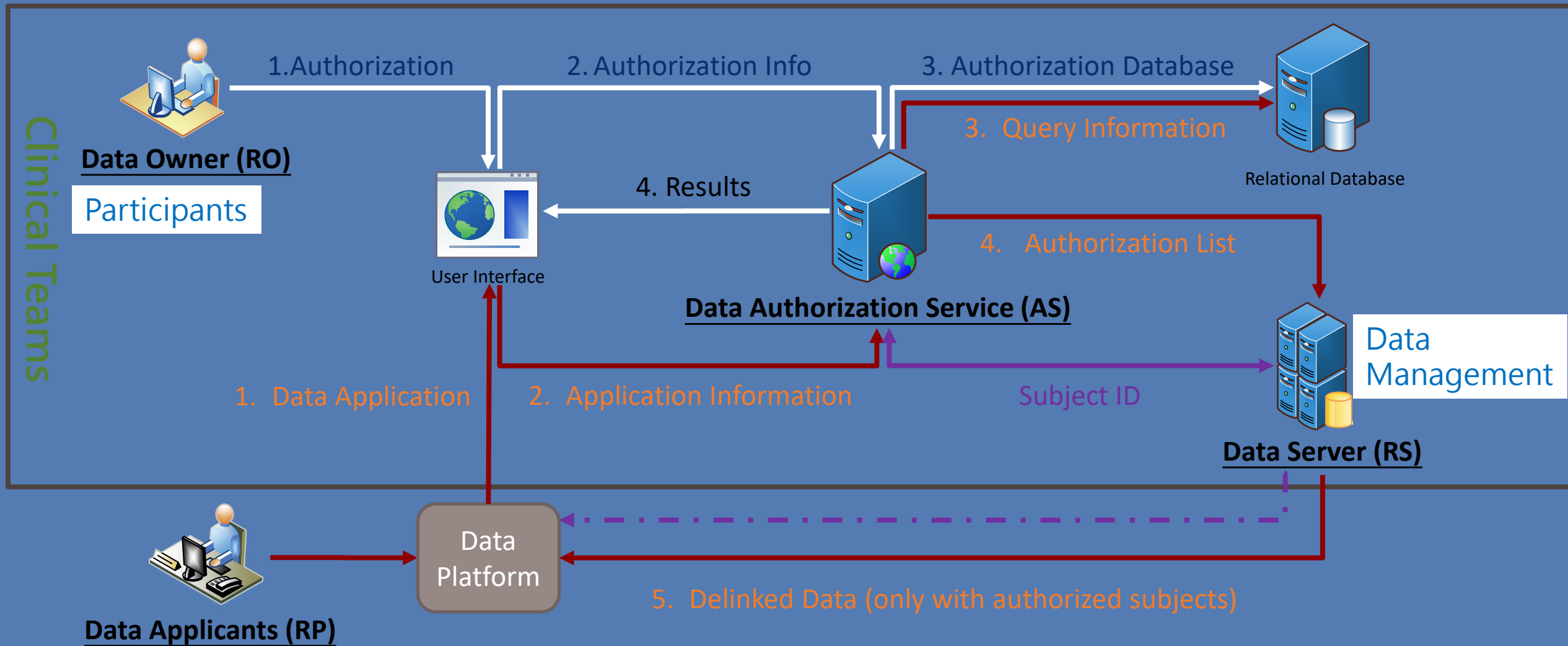
To understand the neurological impacts of aging and mental illnesses.

To explore the structural and functional brain changes associated with schizophrenia, bipolar disorder, and depression.
Additional Data:

Along with the MRI scans, the dataset also contains:

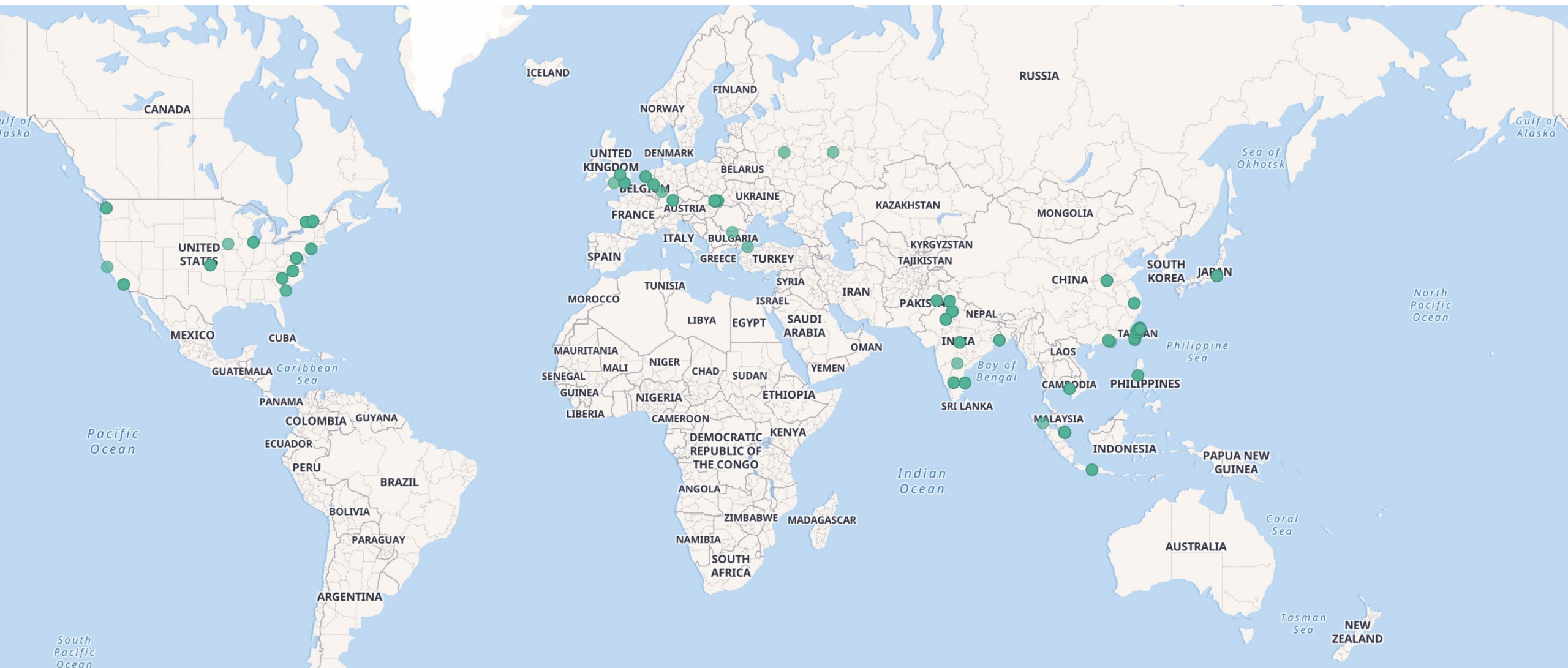
Demographic information of participants. Detailed clinical data for each participant.

Dynamical Consent System



Data User

Worldwide Access



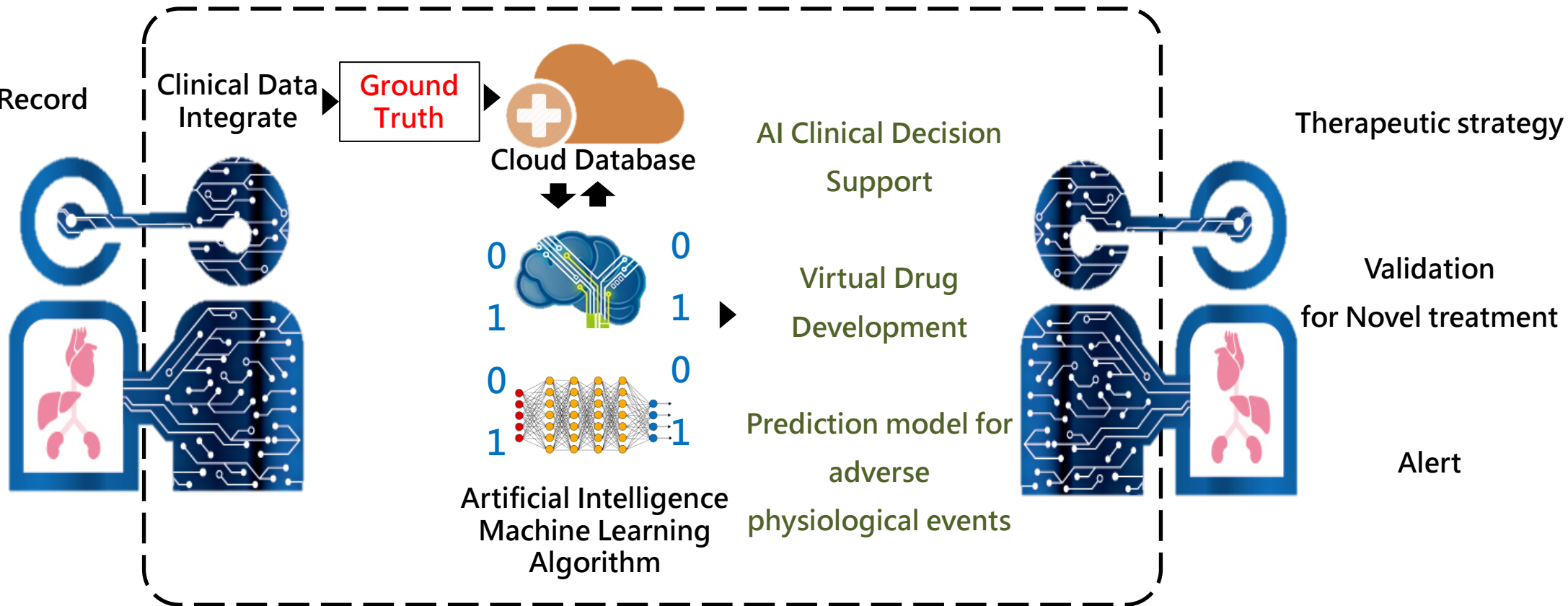
Human Digital Twin as a Research Data Warehouse

Real World

Digital Twin

Real World

Electronic Medical Record
Omics Data
Image Data
Laboratory Data
Sensing/IoT Data



Clinical applications of AI tools to improve efficiencies for health care worker documentation

EMRs like EPIC and other vendors now have several AI-tools (over 100 being launched in the next year) that use generative AI to :

- (1) Help physicians revise message responses, letters and instructions into plain language that patients can understand.
- (2) Use AI to automatically queue up orders for prescriptions and labs
- (3) Summarize verbal conversations between a health care provider and patient into an encounter note with associated billing codes
- (4) Eliminate time consuming tasks like drafting insurance denial appeal letters and reviewing prior authorization requirements

Clinical applications of AI tools to improve efficiencies for health care worker documentation

Additional generative AI tools for medical documentation/diagnosis:

- (5) AI will be able to pull in the results, medications and other details that a practitioner might need when responding to a patient's message
- (6) AI is able to calculate wound measurements from photo images
- (7) Research data-mining AI tools for the Cosmos Database
- (8) Prometheus generative AI tool (Microsoft)



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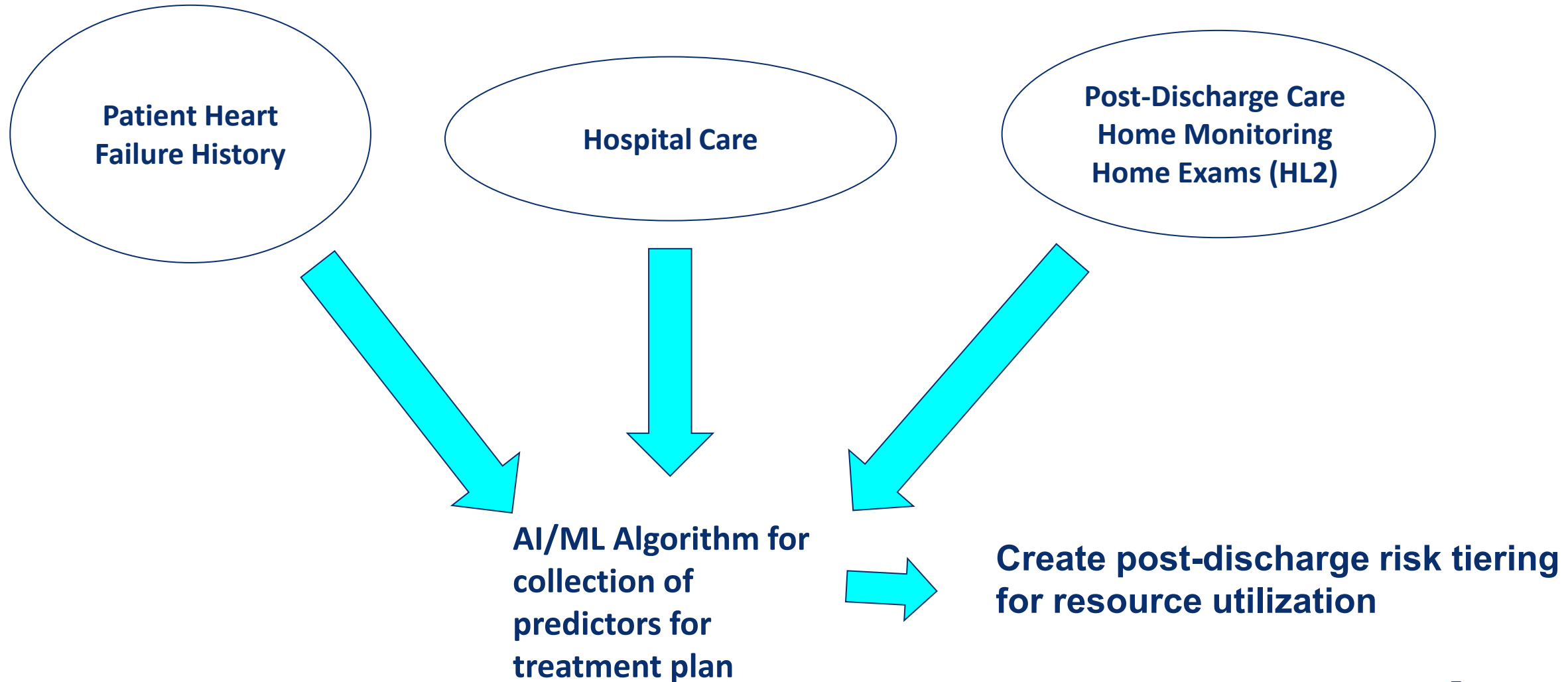
Lead

Using Cloud-Based Data and AI to Advance Medical Decision- Making in Rural Underserved Populations



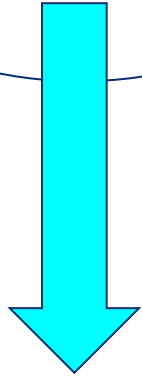
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Data Collection



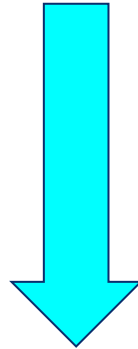
Implementation Post-Discharge Resources by Risk stratification

High risk for Re-admission



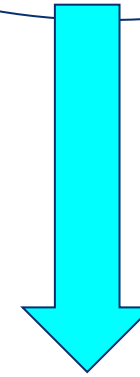
**TID data acquisition with wearables
Phone Bluetooth, HH visit 2x/week
With mixed reality visit with CHF
Specialist weekly or 2x/week**

Moderate risk for Re-admission



**Daily data acquisition with wearables phone Bluetooth,
HH visit weekly with mixed reality visit with CHF specialist**

Low risk for Re-admission



**3x/wk data acquisition with wearables
Phone Bluetooth, HH biweekly**



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AI Tools for Procedural Applications and Precisional Skills



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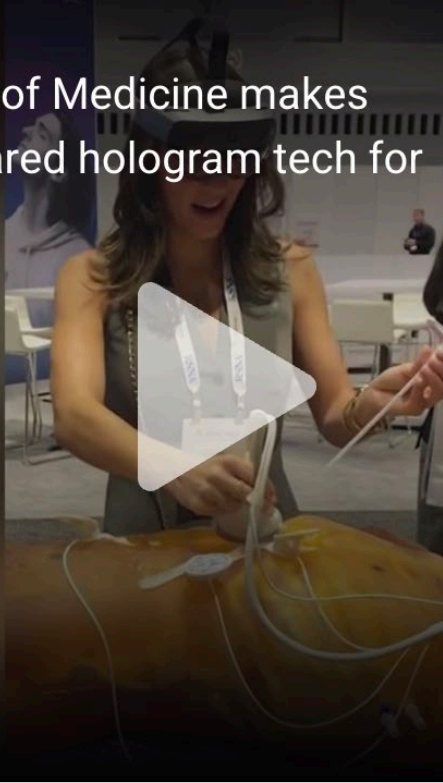


New Approaches to AR Imaging Using 3D Holographic Image Reconstruction with Automated Segmentation



Courtesy of ApoQlar

Carle Illinois College of Medicine makes history with FDA-cleared hologram tech for patient treatment



Carle Illinois College of Medicine makes history with FDA-cleared hologram tech for patient treatment

The Carle Illinois College of Medicine at the University of Illinois Urbana-Champaign is the first in the world to use hologram technology to treat patients. It's called MediView XR and it was just cleared by the Food and Drug Administration.

New Partnership with MediView XR:
First in the World Education,
Research,
and Clinical partner

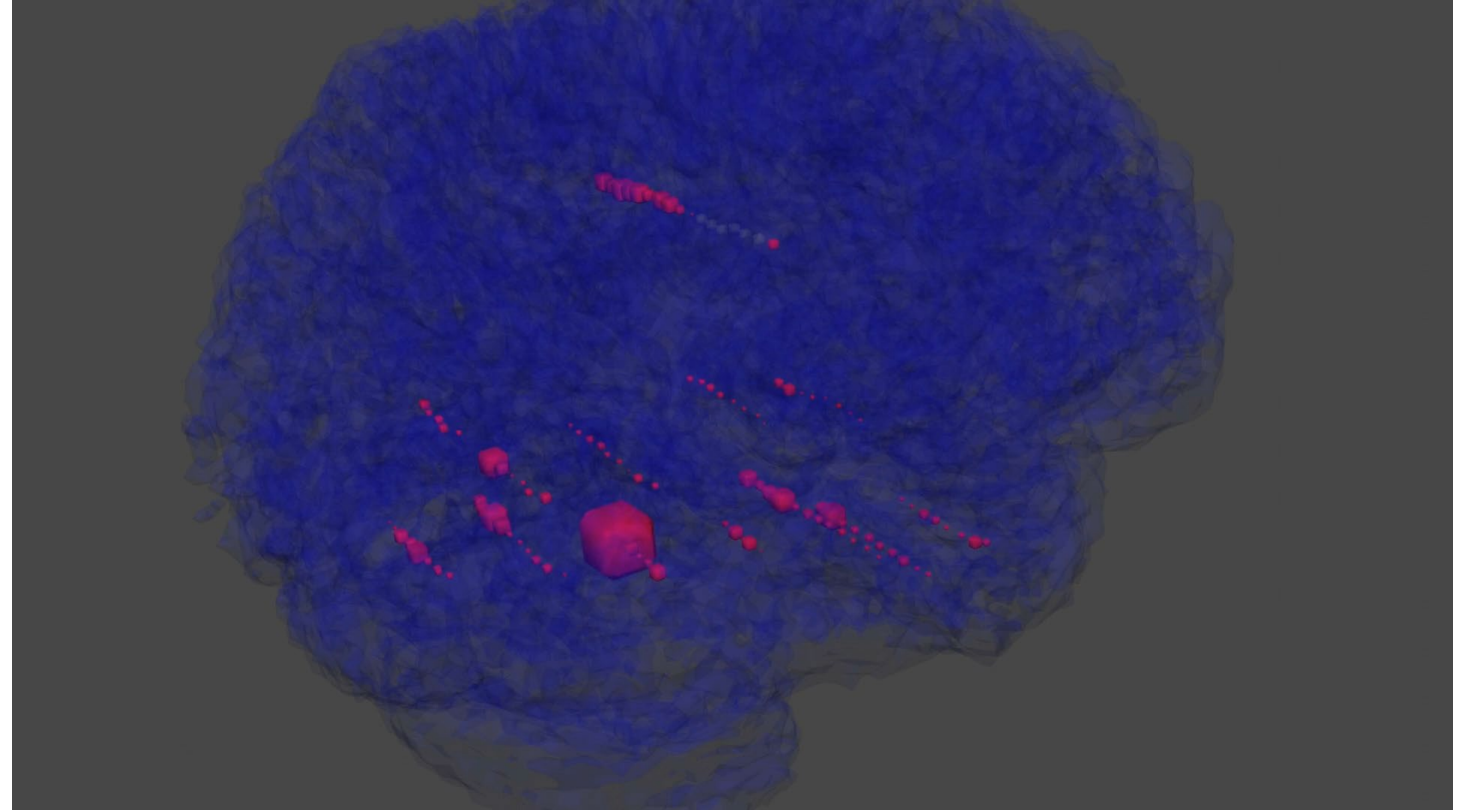


Time Sequential 3D visualization of Seizure

Problem : National shortage of epileptologists (~10 years of training). They must review the multi-modal data separately and convey the location within the brain to the neurosurgeon for excision. This process takes a minimum of 1-2 hours.

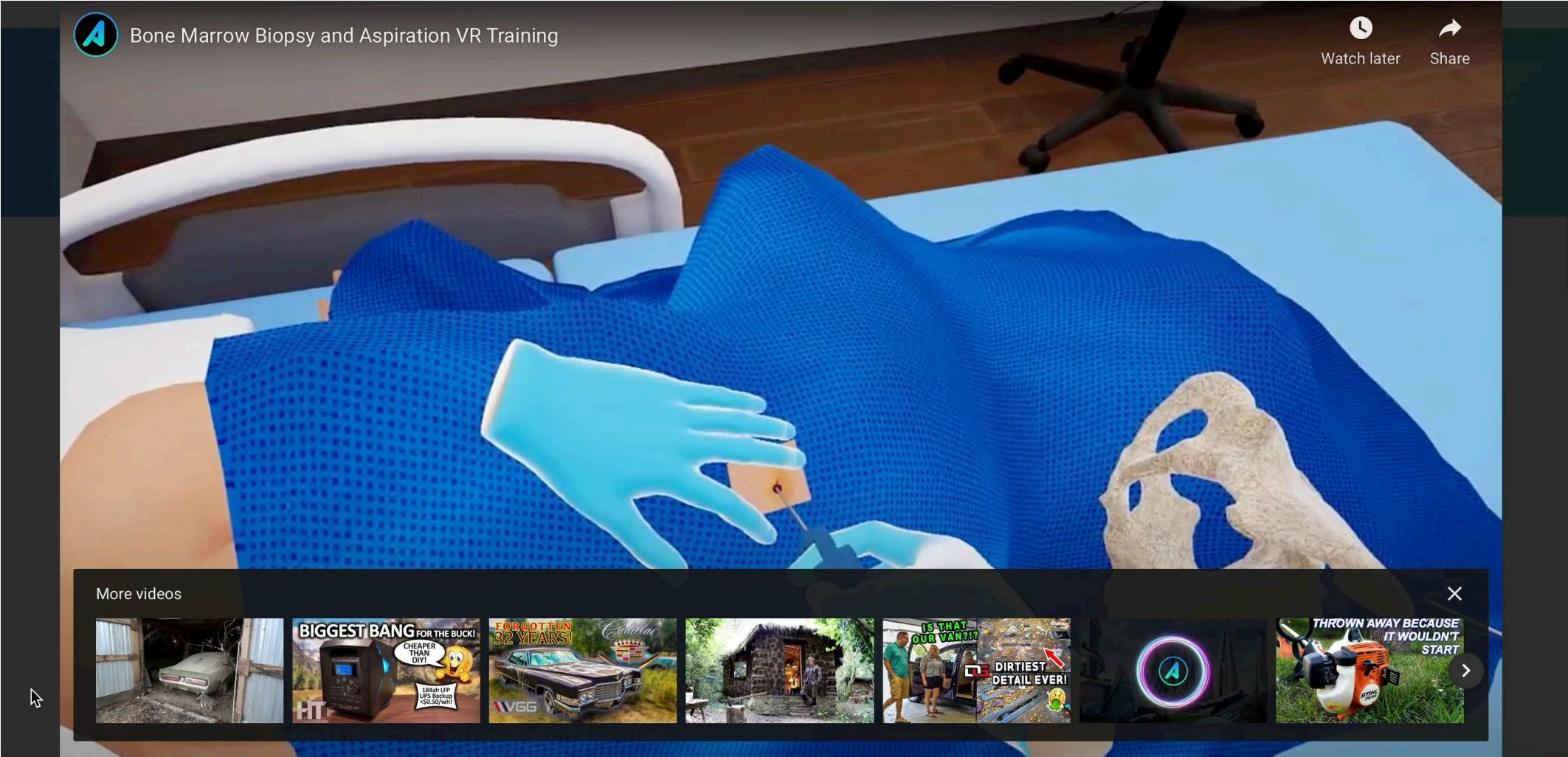
Innovation: Nearly fully automated conversion of multi-modal clinical data (MRI, CT with electrodes, and SEEG waveforms) into an animated 4D model viewable in VR with AI identifying foci of seizure activity for surgical resection.

Impact: Early results are confirming location within minutes of review in VR. This technology can increase access to more patients and improve spatial seizure loci communication between epileptologist and surgeon.



Details of media: this is a 20 second video, a seizure begins at 10 seconds and propagates through the brain as detected by adjacent electrodes (courtesy of Dr. Matthew Bramlet, UIUC).

AI Applications in Dx & Procedural Skills Simulation



AI Applications in Procedural Skills Competency Assessment



Take-home points on AI applications in medical schools and the healthcare environment

What are the *RIGHT* AI Tools to embrace now?

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How do we prepare faculty to use these new AI tools in education, research, and in the clinic?

How will our IT infrastructure handle these tools safely?
students/faculty/education/research/clinical enterprise

The best way to predict the future is to innovate it together!

THANK YOU !

X: @MarkCohenFACS

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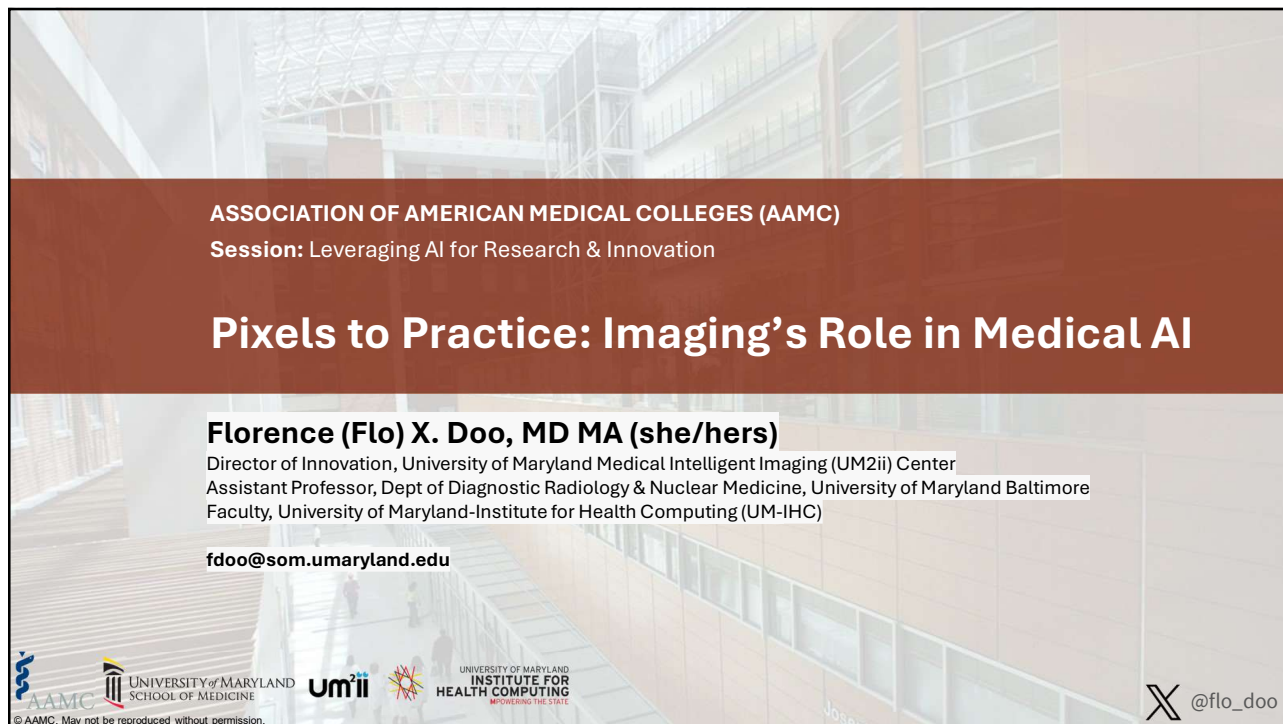
meddean@illinois.edu



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URBANA-CHAMPAIGN






ASSOCIATION OF AMERICAN MEDICAL COLLEGES (AAMC)
Session: Leveraging AI for Research & Innovation

Pixels to Practice: Imaging's Role in Medical AI

Florence (Flo) X. Doo, MD MA (she/hers)
 Director of Innovation, University of Maryland Medical Intelligent Imaging (UM2ii) Center
 Assistant Professor, Dept of Diagnostic Radiology & Nuclear Medicine, University of Maryland Baltimore
 Faculty, University of Maryland-Institute for Health Computing (UM-IHC)

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1

Disclosures

- **University of Maryland Medical Intelligent Imaging Center (UM2ii)**
Cloud credits from Amazon Web Services, Google Cloud, and Microsoft Azure/OpenAI.
- **Association of Academic Radiology Clinical Effectiveness in Radiology Research Academic Fund (AAR CERRAF)**
- **The Johns Hopkins Mid-Atlantic Center for Cardiometabolic Health Equity (MACCHE)**, supported by the **National Institute On Minority Health And Health Disparities of the National Institutes of Health (NIH NMHHD)** under Award Number #P50MD017348. The content is solely the responsibility of the authors and does not necessarily represent the official views of MACCHE or the National Institutes of Health.
- **UMMC Innovation Fund**
- Previously: AAMC Organization of Student Representatives (OSR)
American College of Radiology (ACR) Informatics Fellow

I'm a physician.
I can't predict the future.
This is (probably) already outdated by the time I give this talk.

***All discussed items are for educational purposes only, no specific product is endorsed.**

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2



Question for audience:

→ Is **imaging** part of your medical AI research / strategy?


image credit: Dr. Glaucomflecken (@DGlaumflecken), "Faculty Meeting – Radiology Orders" <https://www.youtube.com/watch?v=cMyV6PsVsXQ>

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3


Faculty



UNIVERSITY of MARYLAND
SCHOOL OF MEDICINE



University of Maryland
Medical Intelligent
Imaging (UM2ii) Center



UNIVERSITY OF MARYLAND
**INSTITUTE FOR
HEALTH COMPUTING**
MPOWERING THE STATE

ABOUT ME

- **Dual Fellowships:** (Body Imaging) Stanford University, Palo Alto, CA
(Informatics) American College of Radiology
- **Radiology Residency:** Mt. Sinai West, Manhattan, New York City, NY
- **Prelim-Medicine:** Yale-Waterbury Hospital, Waterbury, CT
- **Medical School (MD):** Oakland University William Beaumont SOM, Rochester, MI ***OSR :)**
- **Graduate (MA):** Boston University, Boston, MA
- **Undergraduate (BA):** Wellesley College, Wellesley, MA
- **High School:** Huntington Beach High School, Huntington Beach, CA

presented by:
Florence Doo, MD,
PGY-6
Chief Fellow, Stanford
Informatics Fellow, ACR
(fdoos@stanford.edu)

with:
Hani Triandis, MD
Post H. Vi, MD

2022 New
York Academy of Medicine
Fellow

Failures, Biases, and more:
When Good AI Goes Bad


ACR RSNA 2022

“digital native” generation

REVIEW ARTICLE

Building Diversity, Equity, and Inclusion
Within Radiology Artificial
Intelligence: Representation Matters,
From Data to the Workforce

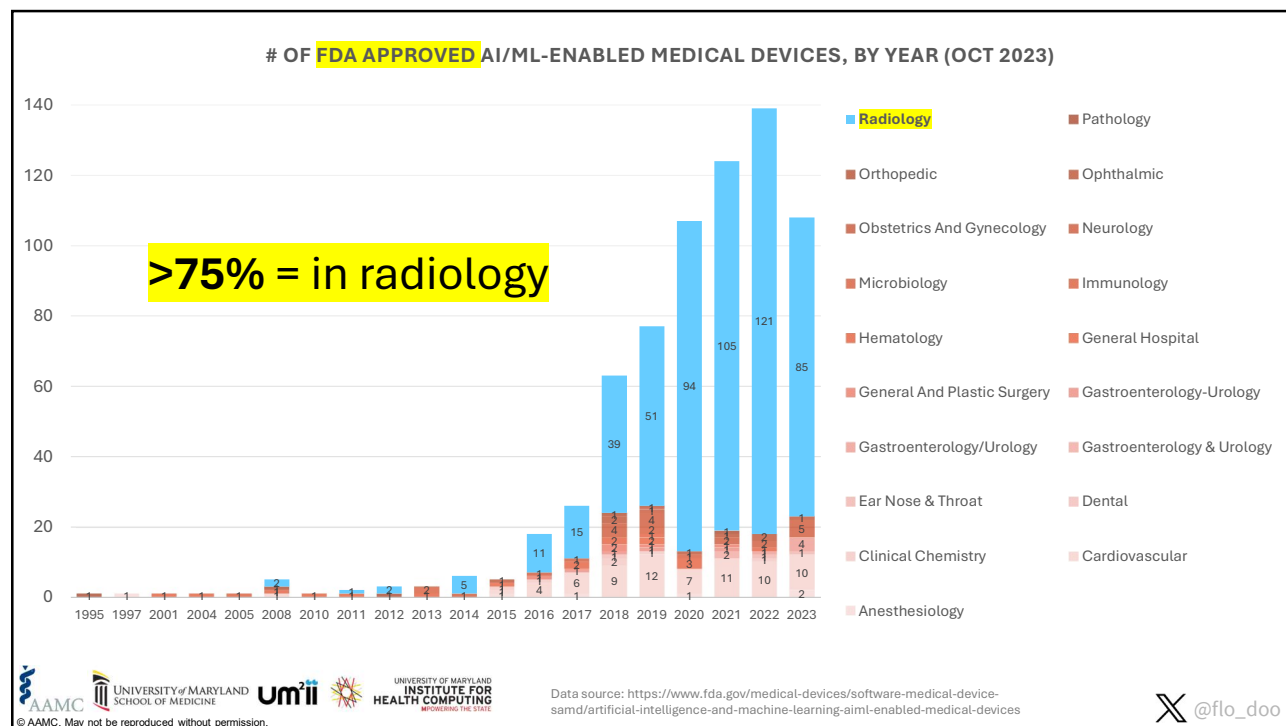
Florence X. Doo, MD, MA^a, Geraldine B. McGinty, MD, MBA^b



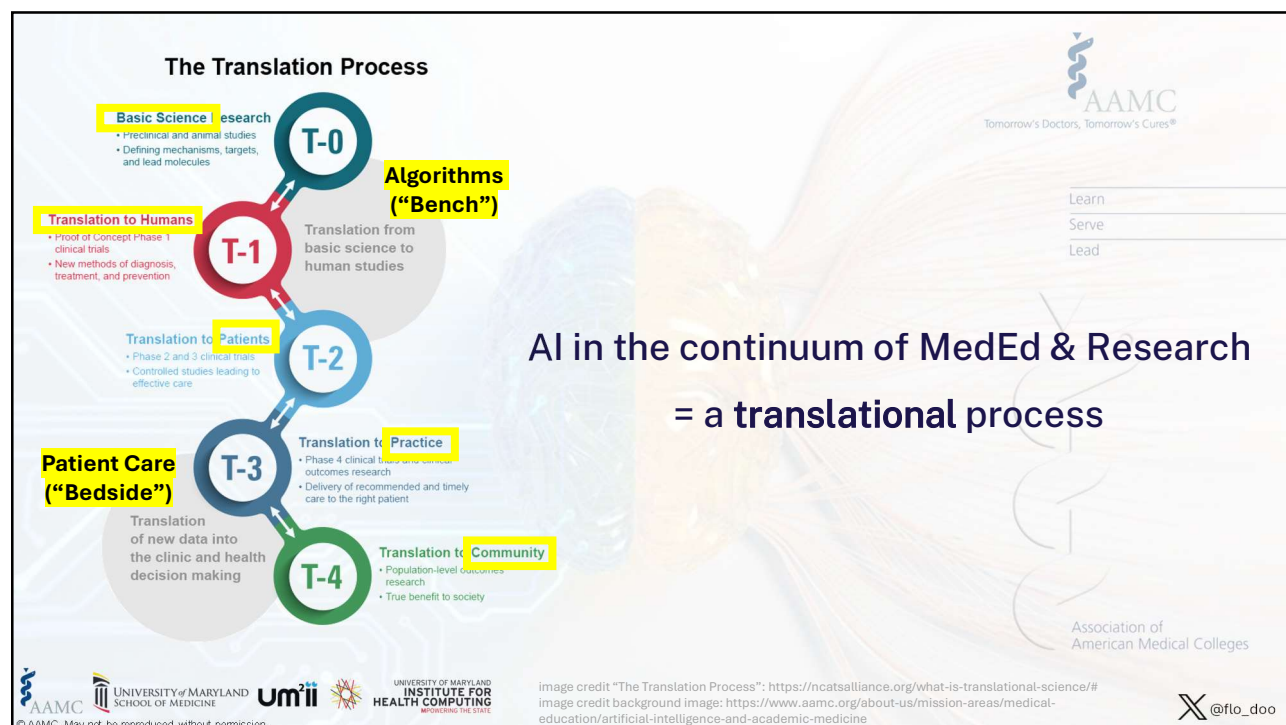
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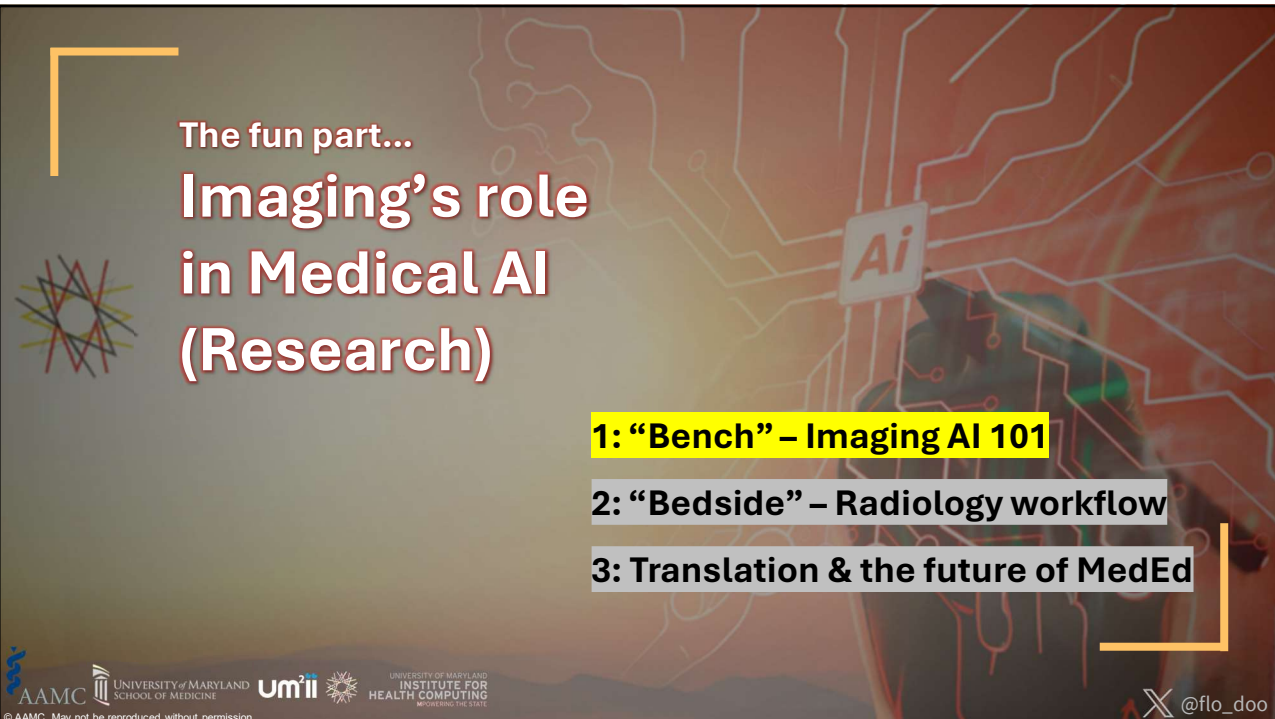
5







6


The fun part...

Imaging's role in Medical AI (Research)



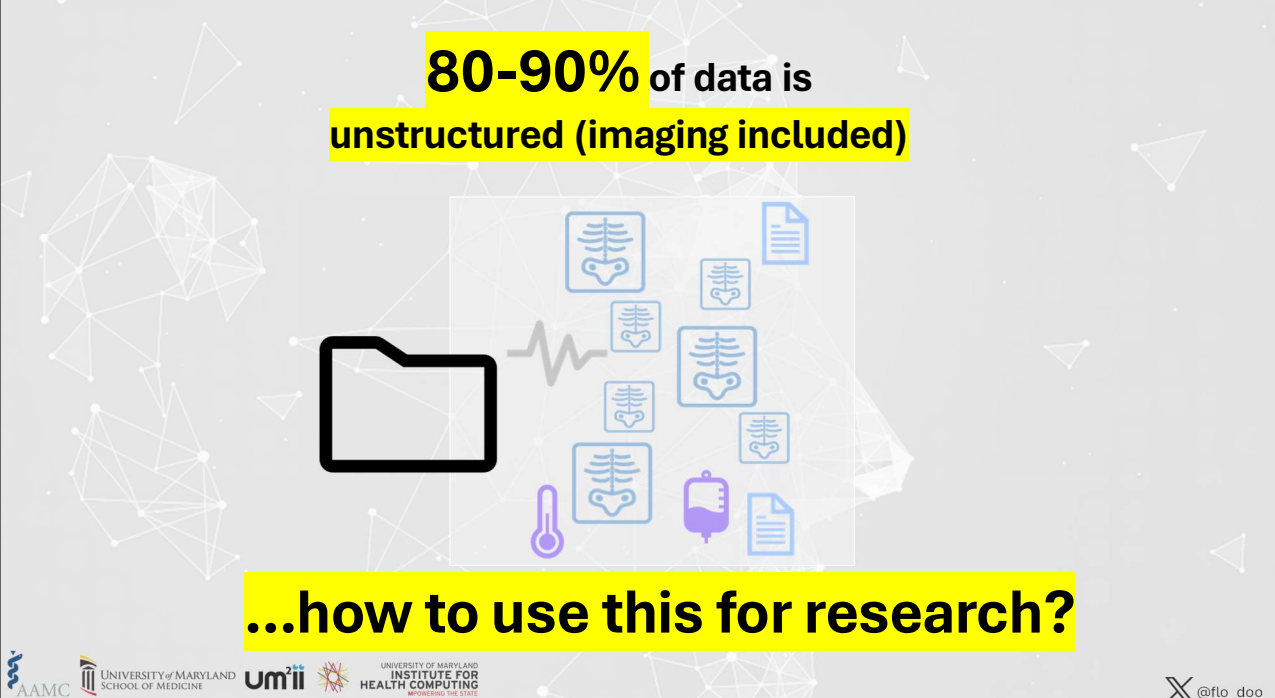
- 1: "Bench" – Imaging AI 101
- 2: "Bedside" – Radiology workflow
- 3: Translation & the future of MedEd





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7

80-90% of data is unstructured (imaging included)



...how to use this for research?

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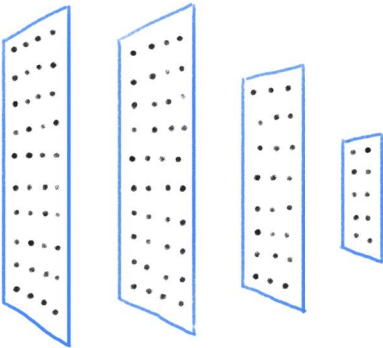
8

AI 101: Image data





CAT

(Labeled
PHOTOS)


DOG



OUTPUT




<https://raihanmj.medium.com/deep-learning-simple-image-classification-using-convolutional-neural-network-dog-and-cat-8c99aef29e8>





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9


AI 101: Image data



	COMPUTED TOMOGRAPHY	MAGNETIC RESONANCE	POSITRON EMISSION	RADIOGRAPHY	ANGIOGRAPHY	ULTRASOUND	FLUOROSCOPY	
ABDOMINAL IMAGING								FINDINGS
BREAST IMAGING								FINDINGS
CARDIAC IMAGING								FINDINGS
EMERGENCY IMAGING								FINDINGS
MUSCULOSKELETAL								FINDINGS
NEURORADIOLOGY								FINDINGS
NUCLEAR MEDICINE								FINDINGS
PEDIATRIC IMAGING								FINDINGS
THORACIC IMAGING								FINDINGS
INTERVENTIONAL								FINDINGS
	ANATOMY	ANATOMY	ANATOMY	ANATOMY	ANATOMY	ANATOMY	ANATOMY	




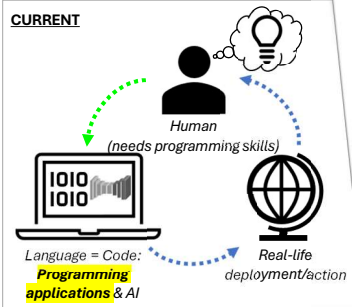
<https://raihanmj.medium.com/deep-learning-simple-image-classification-using-convolutional-neural-network-dog-and-cat-8c99aef29e8>

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10

5



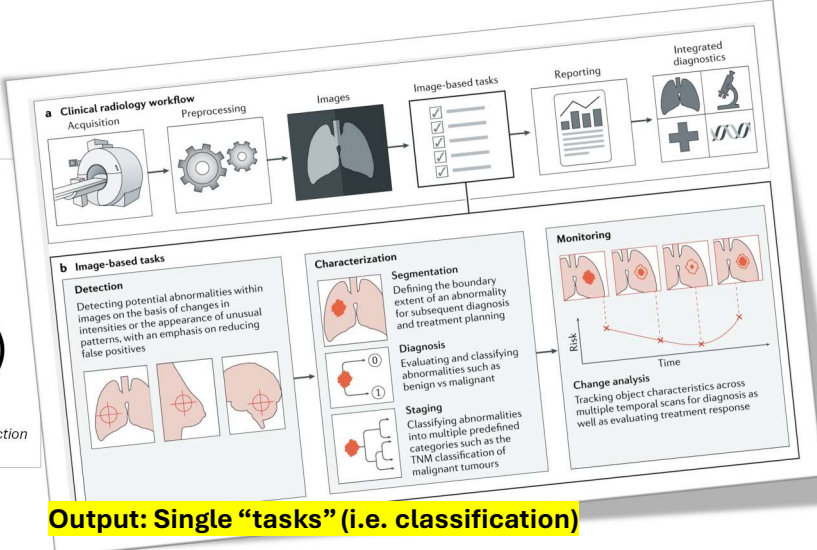


CURRENT

Human (needs programming skills)

Language = Code: Programming applications & AI

Real-life deployment/action



a Clinical radiology workflow

Acquisition → Preprocessing → Images → Image-based tasks → Reporting → Integrated diagnostics

b Image-based tasks

Detection
Detecting potential abnormalities within images on the basis of changes in intensities or the appearance of unusual patterns, with an emphasis on reducing false positives

Characterization
Defining the boundary extent of an abnormality for subsequent diagnosis and treatment planning

Segmentation
Evaluating and classifying abnormalities such as benign vs malignant





Diagnosis
Evaluating and classifying abnormalities such as benign vs malignant

Staging
Classifying abnormalities into multiple predefined categories such as the TNM classification of malignant tumours

Monitoring
Tracking object characteristics across multiple temporal scans for diagnosis as well as evaluating treatment response

Change analysis
Tracking object characteristics across multiple temporal scans for diagnosis as well as evaluating treatment response


Output: Single “tasks” (i.e. classification)




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(left) Doo FX, Cook TS, Siegel EL, Joshi A, Parekh V, Elahi A, Yi PH. Exploring the Clinical Translation of Generative Models Like ChatGPT: Promise and Pitfalls in Radiology, From Patients to Population Health. *J Am Coll Radiol*. 2023 Sep;20(9):877-885. doi: 10.1016/j.jacr.2023.07.007. Epub 2023 Jul 17. PMID: 37467871.

(right) Hosny, A., Parmar, C., Quackenbush, J. et al. Artificial intelligence in radiology. *Nat Rev Cancer* 18, 500–510 (2018). <https://doi.org/10.1038/s41568-018-0016-5>





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
Certainly! Here's a breakdown of the content of each cell in the format of a table:

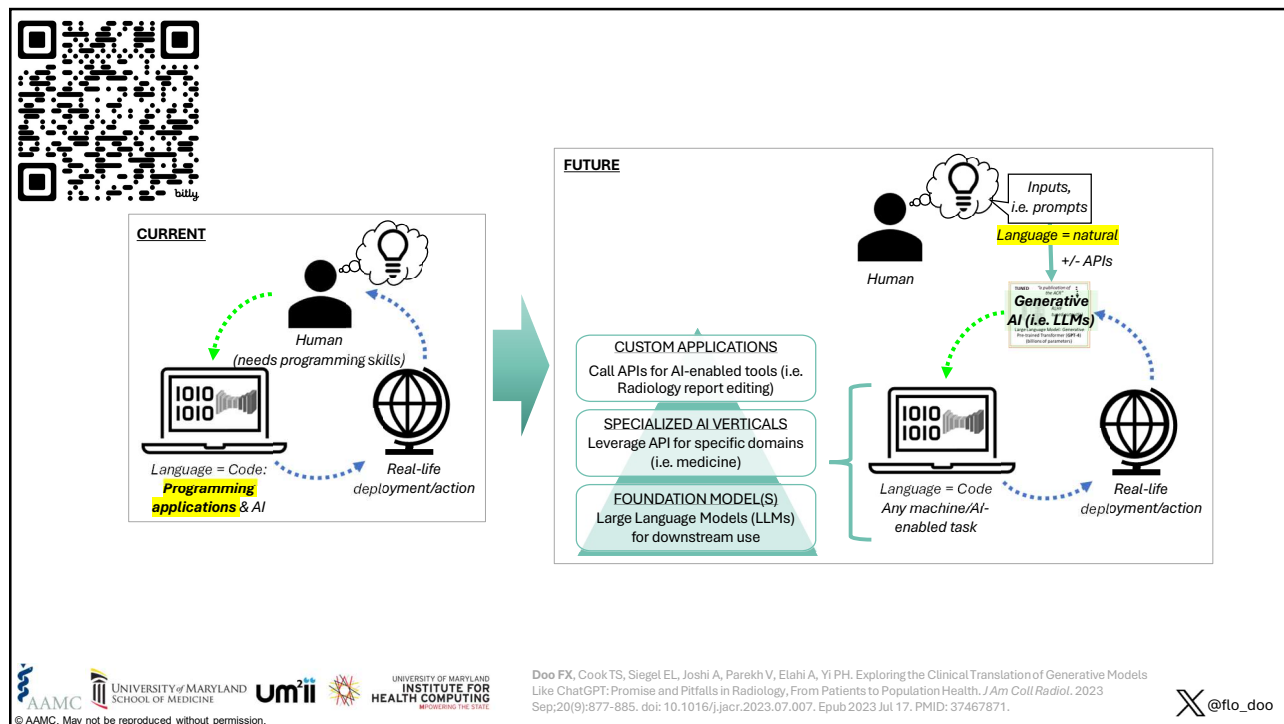
Row	Column 1	Column 2	Column 3	Column 4
1	Muffin with blueberries	Chihuahua (side profile)	Blueberry Muffin	Chihuahua (profile looking up)
2	Chihuahua (frontal face)	Cookie with chocolate chips	Chihuahua (face close-up)	Blueberry Muffin with sugar on top
3	Blueberry Muffin with a smiley face	Chihuahua (frontal face close-up)	Blueberry Muffin with blueberries on top	Chihuahua (slightly showing teeth)
4	Chihuahua (puppy face close-up)	Group of Cookies with chocolate chips	Group of Chihuahua puppies	Muffin with blueberries

Please tell me what is it in each cell in a tabular format aligned with this picture grid.

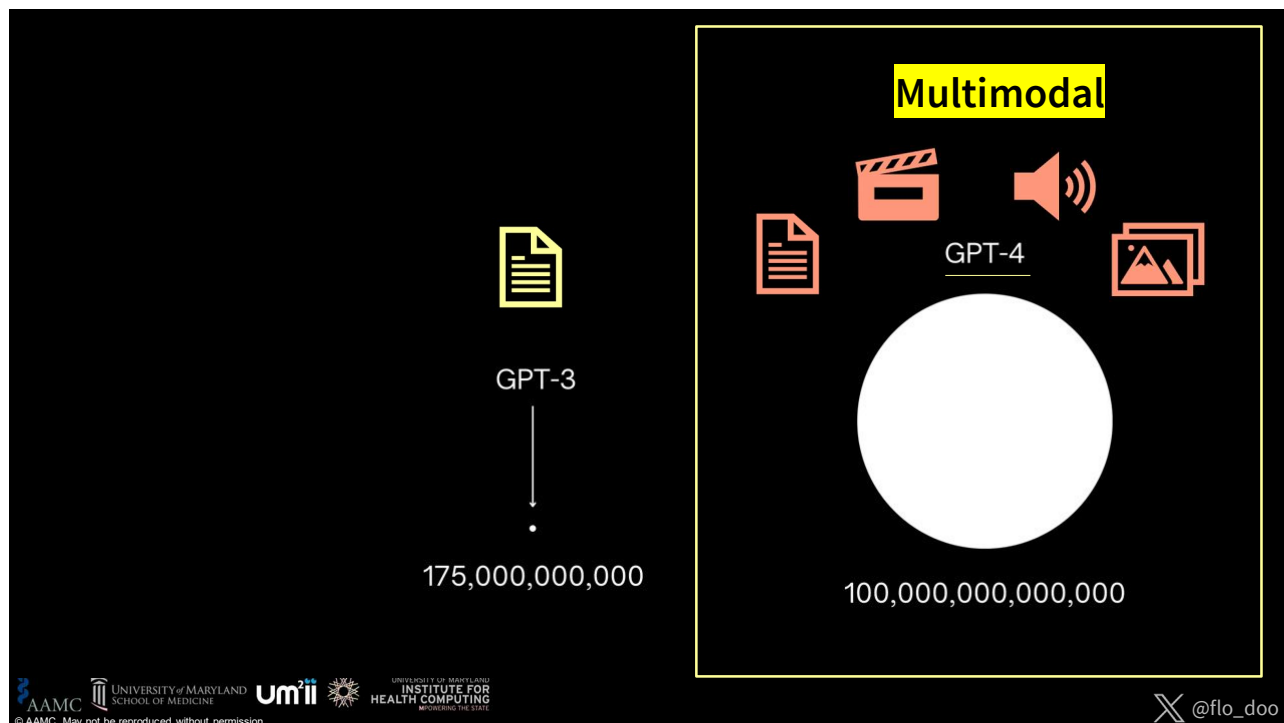


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Science Current Issue First release papers Archive About  Submit manu

HOME > SCIENCE > VOL. 381, NO. 6663 > AS ARTIFICIAL INTELLIGENCE GOES MULTIMODAL, MEDICAL APPLICATIONS MULTIPLY

 | EXPERT VOICES      

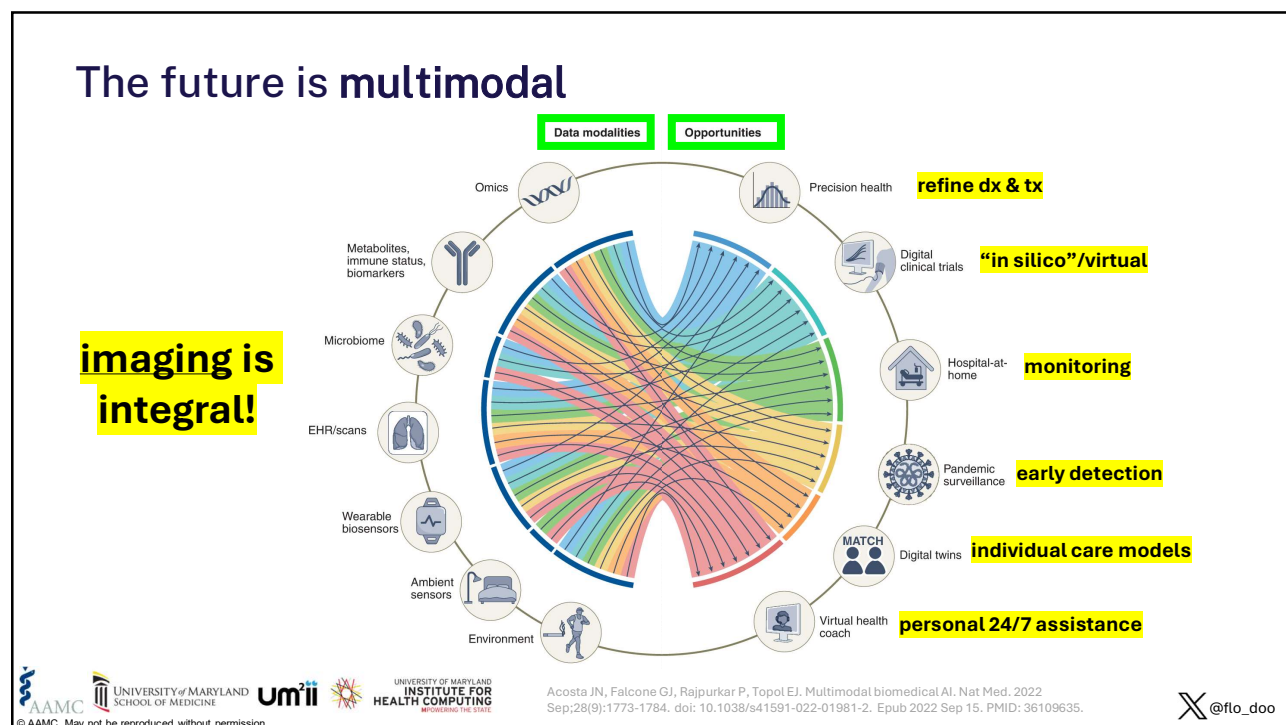
As artificial intelligence goes multimodal, medical applications multiply

ERIC J. TOPOL  [Authors Info & Affiliations](#)

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The fun part...

Imaging's role in Medical AI (Research)

- 1: "Bench" – Imaging AI 101
- 2: "Bedside" – Radiology workflow
- 3: Translation & the future of MedEd





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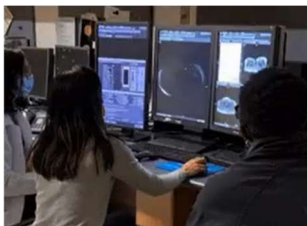

Radiologists

What society thinks I do

What my family thinks I do What other depts think I do

What I thought I'd do (in R1) What I actually do

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Radiologists: Medicine's earliest (and best known) data scientists

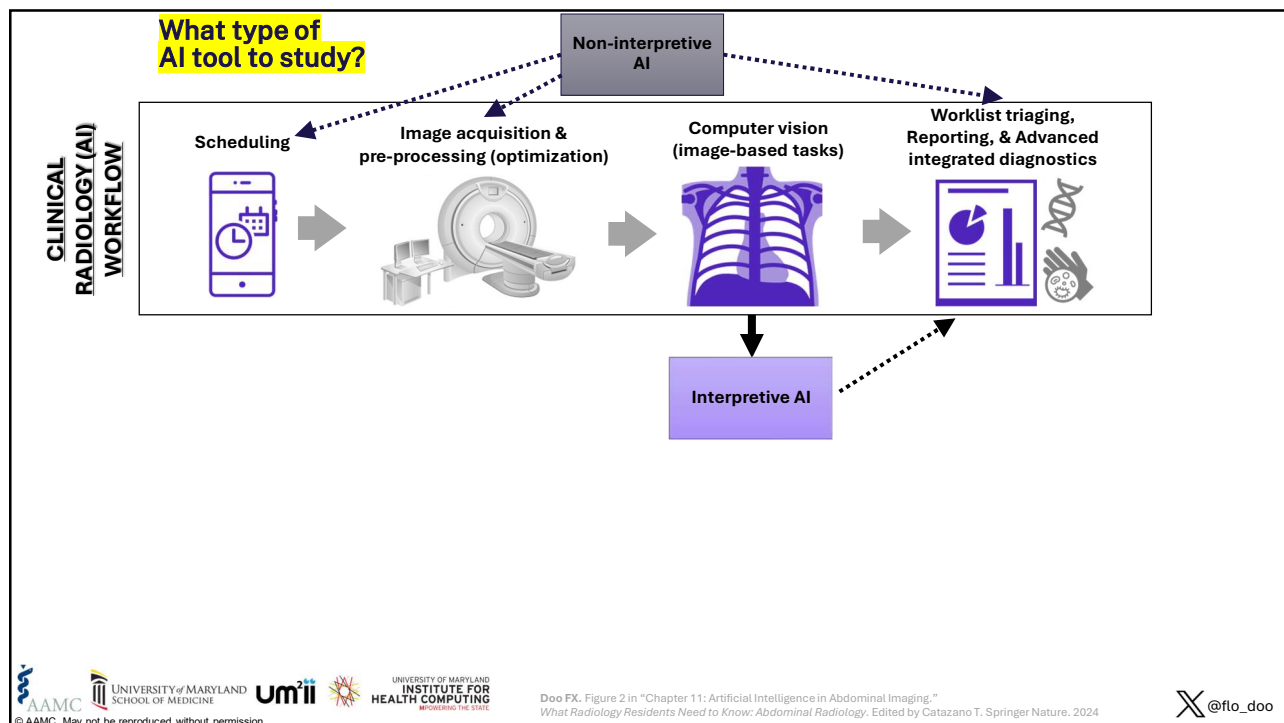
Improving care for 100+ years by embracing new technologies and approaches to medicine.

Since 1895, to name just a few innovations we've adopted...

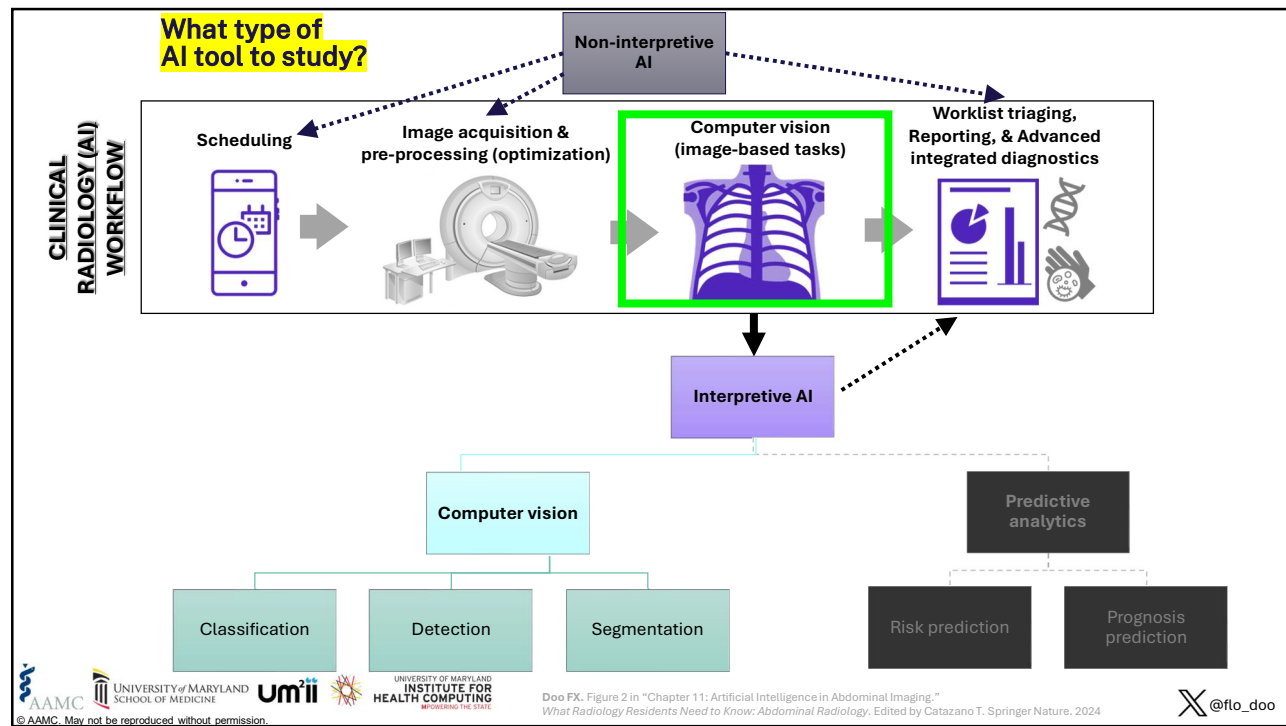
- X-Ray
- Contrast Agents
- Ultrasound
- Nuclear Medicine
- Computed Tomography (CT)
- Magnetic Resonance Imaging (MRI)
- Interventional Radiology (IR)
- Evidence-Based Clinical Guidelines
- Picture Archiving and Communications Systems (PACS)
- Computerized Voice Recognition and Transcription
- Electronic Health Records
- Value-Based Medicine
- **Artificial Intelligence & Data Science**

Slide credit: Dr. Geraldine McGinty, Imaging Informatics Summit 2022

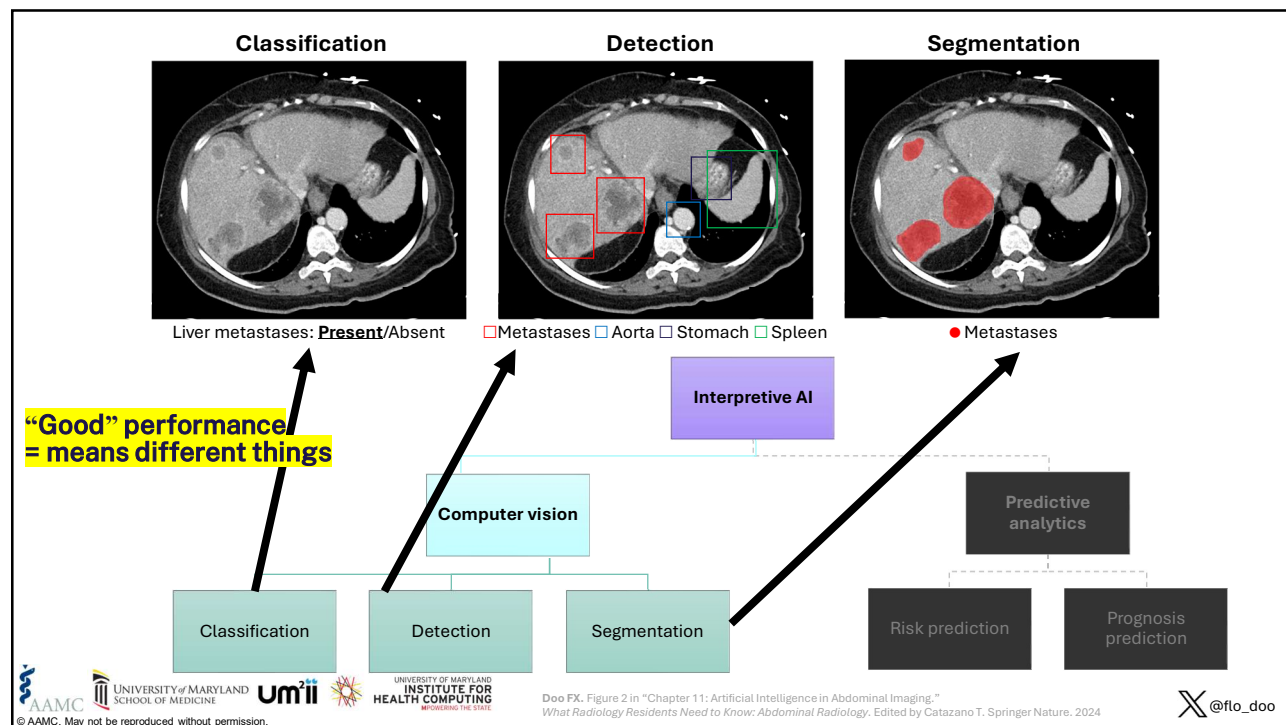
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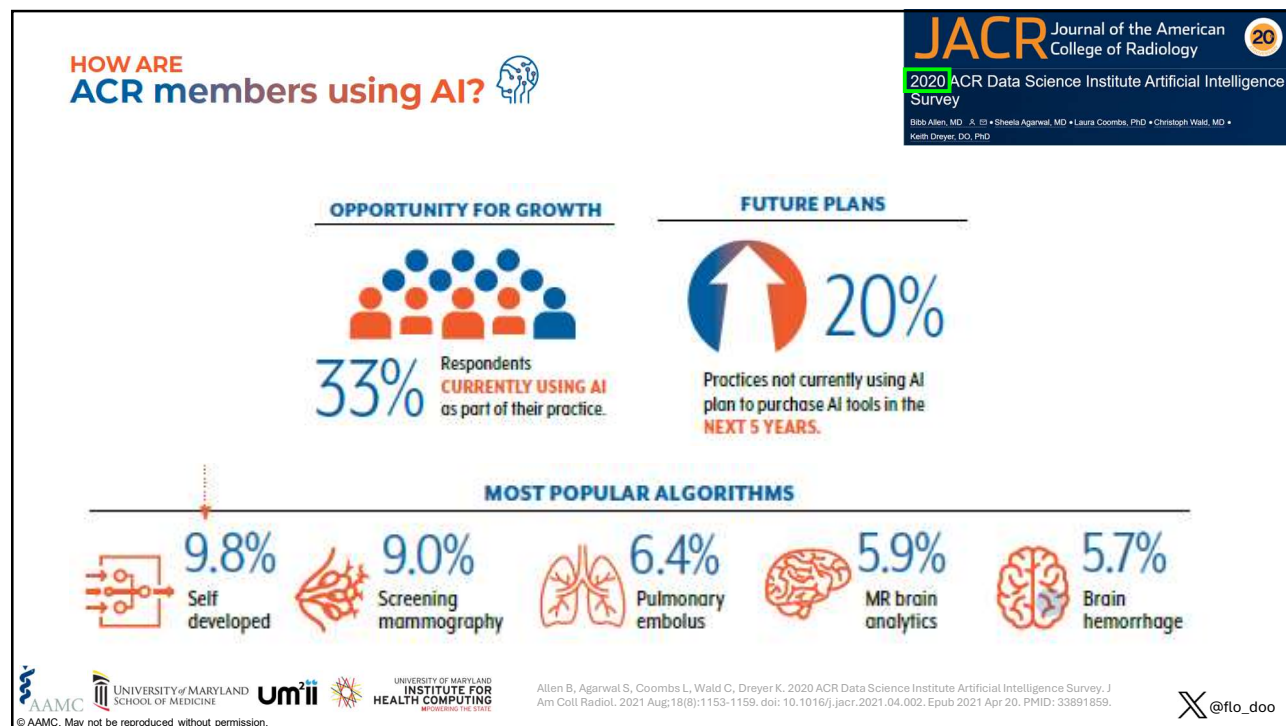
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#MedEd: What AI results are important for... Clinical care? Research?

2021 - INITIAL PILOT

1934 consecutive CTPA studies over 3-month period before go live

	phase			
	Overall, N = 245 ¹	1, N = 116 ¹	2, N = 129 ¹	p-value
PHASE 1 JUL - SEP 2021 No AI assisted reads				
PHASE 2 JAN - MAR 2022 Reads with AI assistance				
Positive cases missed by radiologists	20 (8.2%)	14 (12%)	6 (4.7%)	0.034²

¹Frequency (%) for Sex and Status

²Pearson's Chi-squared test

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AI during residency training

human-AI interfaces as part of learning

INTRAVENOUS Contrast Media
dlp
WHY
None available
Normal.
Diagnostic quality
No pulmonary embolus.
Diagnostic quality
Normal.
Normal in caliber and course.
No
free text
Normal heart size.
Pick List Choices
AI positive. Concordant.
AI positive. Discordant due to
AI negative. Concordant.
AI negative. Discordant due to
AI unavailable.

FINDINGS:
CARDIOVASCULAR, MEDIASTINUM, THYROID:
Visualized thyroid gland: [Normal.]
Vasculature:
- Diagnostic quality: [Adequate]
- Pulmonary arteries: [No pulmonary embolus]
- Artificial intelligence: []
- Pulmonary artery caliber: []
Thoracic aorta: [Normal in caliber and course] [No atherosclerosis]
Heart and pericardium: [Normal heart size] [No pericardial effusion]
Esophagus: [Normally decompressed] []

No PE findings detected

How (or if) to record when AI was used?

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1. Setup
2. Findings
3. Review Reports

Series 1 of 1
Image size: 512x512
Slice 119 of 283
Thickness: 2.5mm Location: -346.1mm
WL: 60 WW: 350
826 mA 120 kVp

64y Male
CAP AX V2N, Dose (4) / ABDOMEN
Pancreatic Cancer

Localize target lesion

Mass
Lymph Node

Head
Neck
Chest
Abdomen
Pelvis
Arm
Leg

Liver
Biliary
Pancreas
Spleen
Adrenal
Kidney
Bowel
Peritoneal
Mesenteric
Retroperitoneal
Musculoskeletal
Lumbar Cord
Abd Wall
Other

Right
Left
Anterior
Posterior
Segments

Major: 4.3 cm
Minor: 3.7 cm

Oncologic Provider Report
1040 Pancreatic Cancer Metastatic Demo
Unknown DOB

Response: Partial Response (PR)
Criteria: Metastatic Disease

Target Lesion Burden

19.4 cm (Baseline)
SD 15.8 cm -18.6%
PR 13.5 cm -30.4% (Lowest)

Study Date
1/6/18 3/7/18 6/27/18

Tumor Burden
Current Sum 13.5 cm
% Change from Baseline -30.4%
% Change from Lowest N/A
% Change from Prior -14.6%

New Sites of Disease

Target Lesions
Liver Left Lobe 2.8 x 2.6 cm
LN Peritoneal 2.0 x 0.8 cm
Liver Right Lobe 4.1 x 3.5 cm
Pancreas Body 4.6 x 3.6 cm
LN Peritoneal 3.6 x 1.3 cm

Non-Target Lesions
Liver Multiple Present

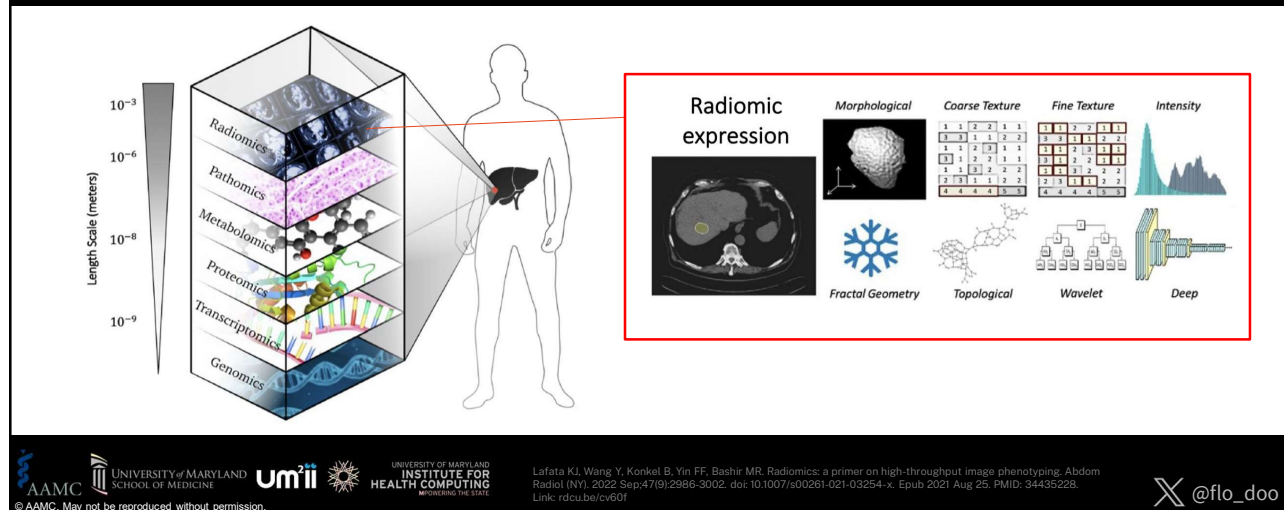
Other Findings
No Other Findings

Reader:
Status: Draft

Notes
Image quality satisfactory.
Report not signed off

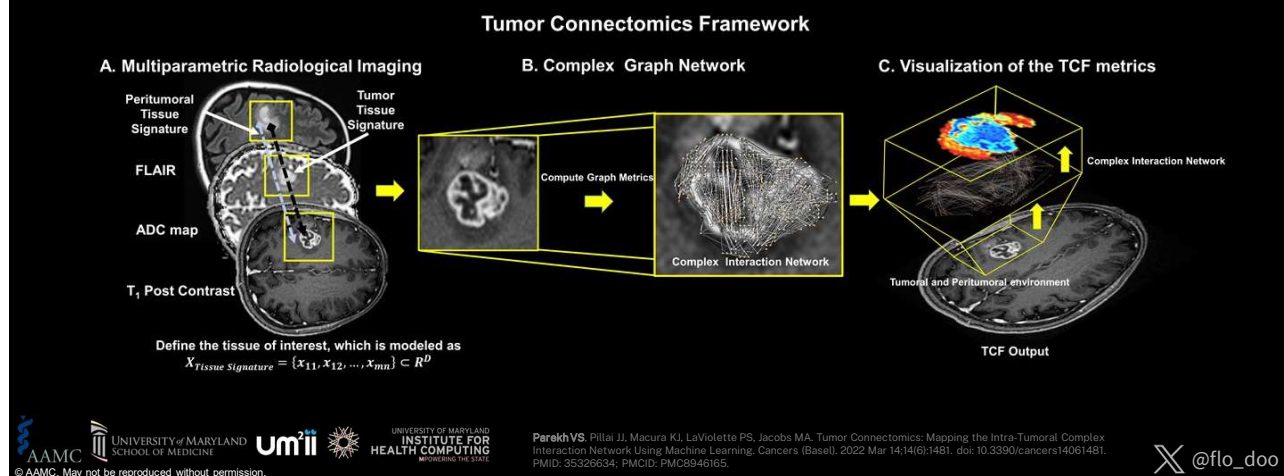
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think of imaging → One pillar of integrated diagnostics
(quantitative) imaging-based biomarkers
“omics”



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think of imaging → One pillar of integrated diagnostics
(quantitative) imaging-based biomarkers
“omics”



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The fun part...

Imaging's role in Medical AI (Research)

- 1: "Bench" – Imaging AI 101
- 2: "Bedside" – Radiology workflow
- 3: Translation & the future of MedEd

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The Translation Process

Basic Science research (T-0)

- Preclinical and animal studies
- Defining mechanisms, targets, and lead molecules

Translation to Humans (T-1)

- Proof of Concept Phase 1 clinical trials
- New methods of diagnosis, treatment, and prevention

Translation to Patients (T-2)

- Phase 2 and 3 clinical trials
- Controlled studies leading to effective care

Patient Care ("Bedside") (T-3)

- Phase 4 clinical trials, outcomes research
- Delivery of recommended and timely care to the right patient

Translation to Community (T-4)

- Population-level outcomes research
- True benefit to society

Algorithms ("Bench")

Translation from basic science to human studies

Translation to Practice

Translation of new data into the clinic and health decision making

AI in the continuum of MedEd & Research = a translational process

think: leadership, faculty, & trainee roles?

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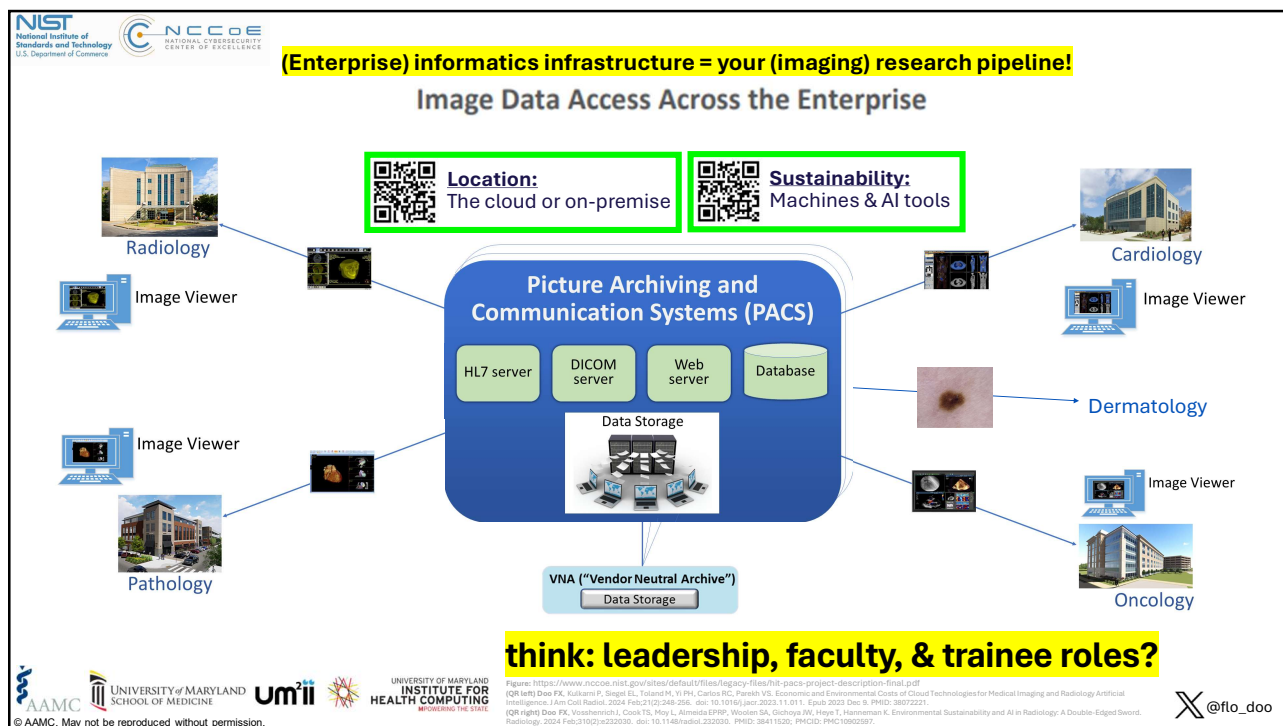
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image credit "The Translation Process": <https://ncatsalliance.org/what-is-translational-science/#>
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For #MedEd & AI research: Be AI (imaging) literate – understand limitations

Hypo Reality

No, you cannot generate a "radiology report" using a single image of an MRI exam.

"expert" radiologist as opposed to...???
Or do you mean "MSK radiologist"?

No, you cannot assess joint effusion on this image, as even a small joint effusion can give this appearance here.

No, you can't come to this conclusion based on a single image.

No, an "expert radiologist" would describe the type of meniscal tear AND its location. You also can't conclude this using a single image, as there may be additional tears.

No, these structures are NOT visible in this image.

Where did this "right" side come from???

Prompt:
Write a radiology report as an "expert radiologist" for the following case.

GPT-4V:
Report: MRI of the right knee demonstrates a large joint effusion, which is most pronounced in the suprapatellar region. There is also evidence of a tear in the medial meniscus, as well as mild degenerative changes in the articular cartilage. The anterior cruciate ligament and posterior cruciate ligament are intact. The extensor mechanism is also intact. No other significant abnormalities are seen.
Impression: Large joint effusion and medial meniscal tear in the right knee, with mild degenerative changes in the articular cartilage.

Evaluation from Professionals:
Correct study identification, correct diagnosis (effusion and meniscal tear).

Were they radiologists? No radiologist I know would have accepted this output as is. Clinical domain expertise is crucial. Details matter.

If you had just asked for a description of this image or an image caption, this would have been OK (minus the "large" and "right").

credit: Woojin Kim MD, <https://twitter.com/wojinrad>

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For #MedEd & AI research: Be AI (imaging) literate – bias

Automation Bias

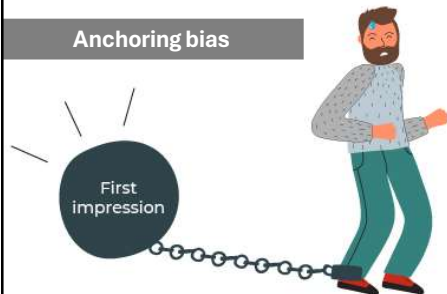
“autopilot” = Trust AI result, more than yourself

WE LOVE IT MORE IF WE MADE IT



The IKEA effect

Anchoring bias



The Google (AI) effect

(trainees?)



i forgot, because i can Google it

think: leadership, faculty, & trainee roles?



<https://www.datasciencecentral.com/23-types-of-bias-in-data-for-machinelearning-and-deeplearning/>
<https://openclassrooms.com/en/courses/7035961-make-effective-decisions/7121041-deal-with-your-cognitive-biases>

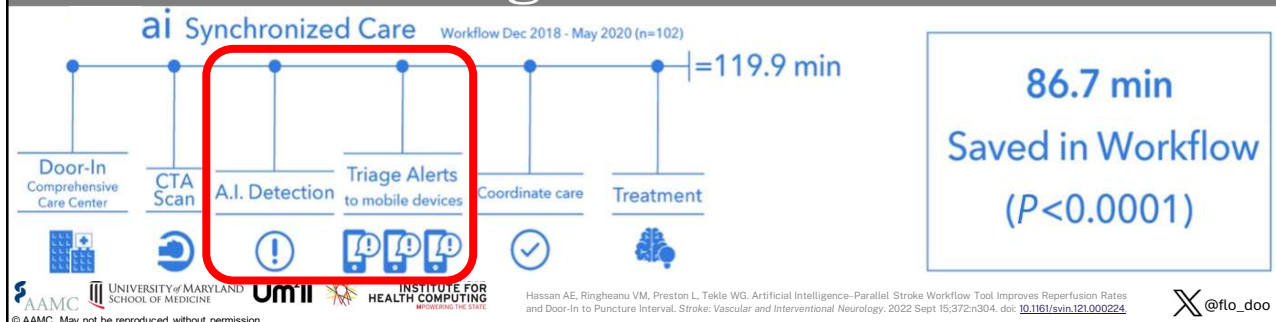
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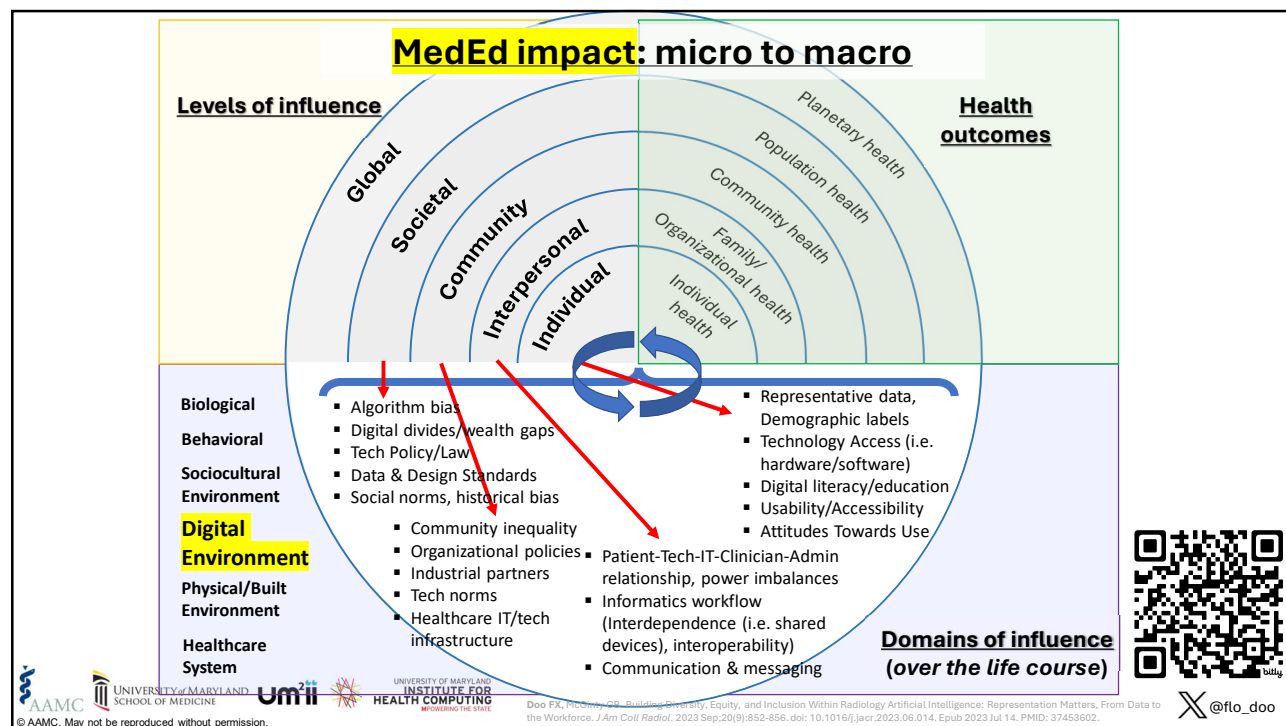
For #MedEd & AI research: Be AI (imaging) literate – physician involvement in AI research



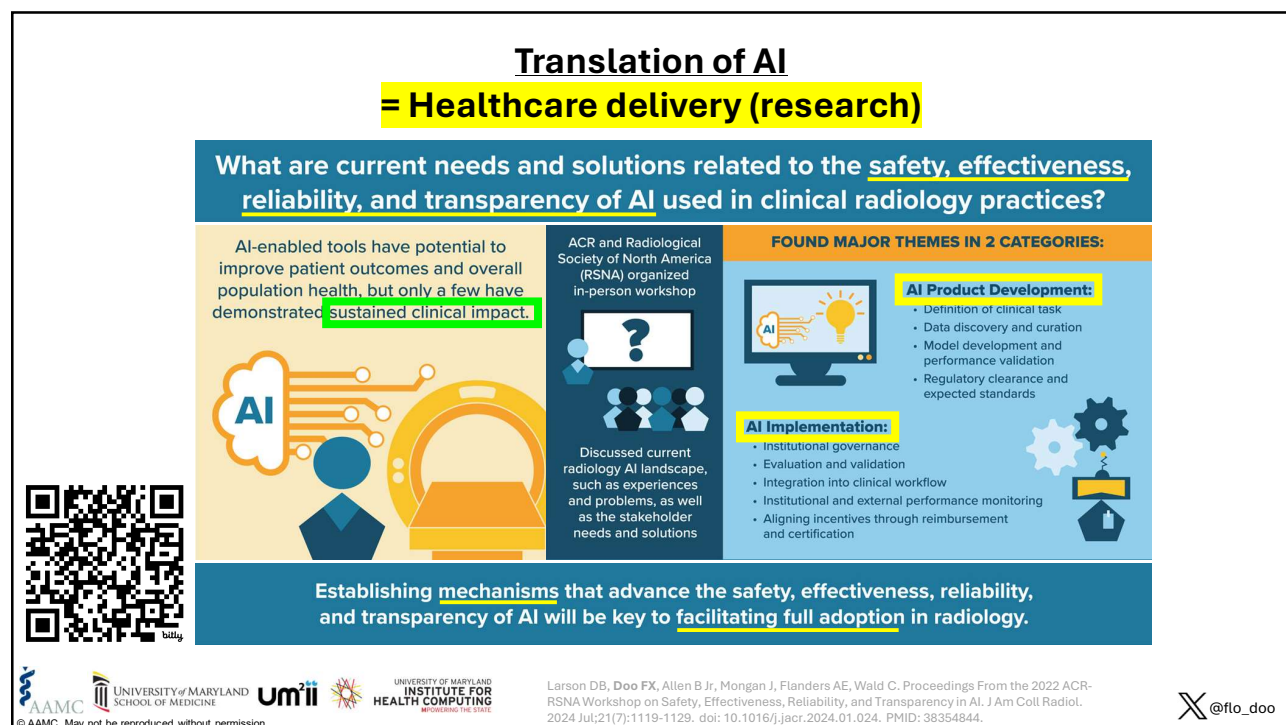
Who is missing from new workflow?



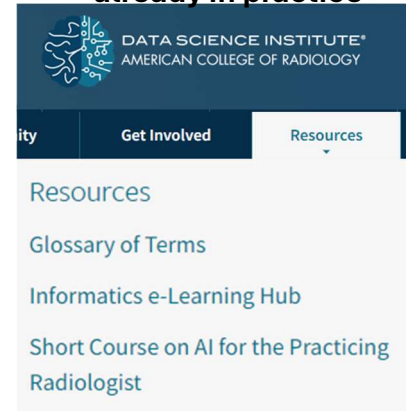
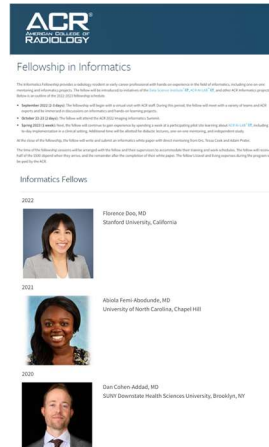
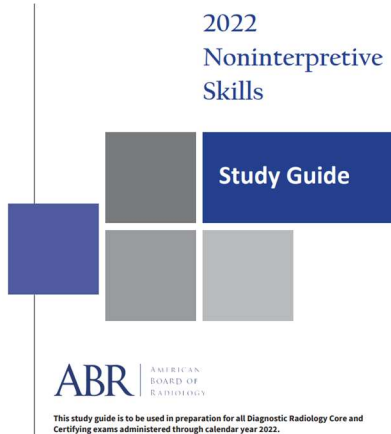
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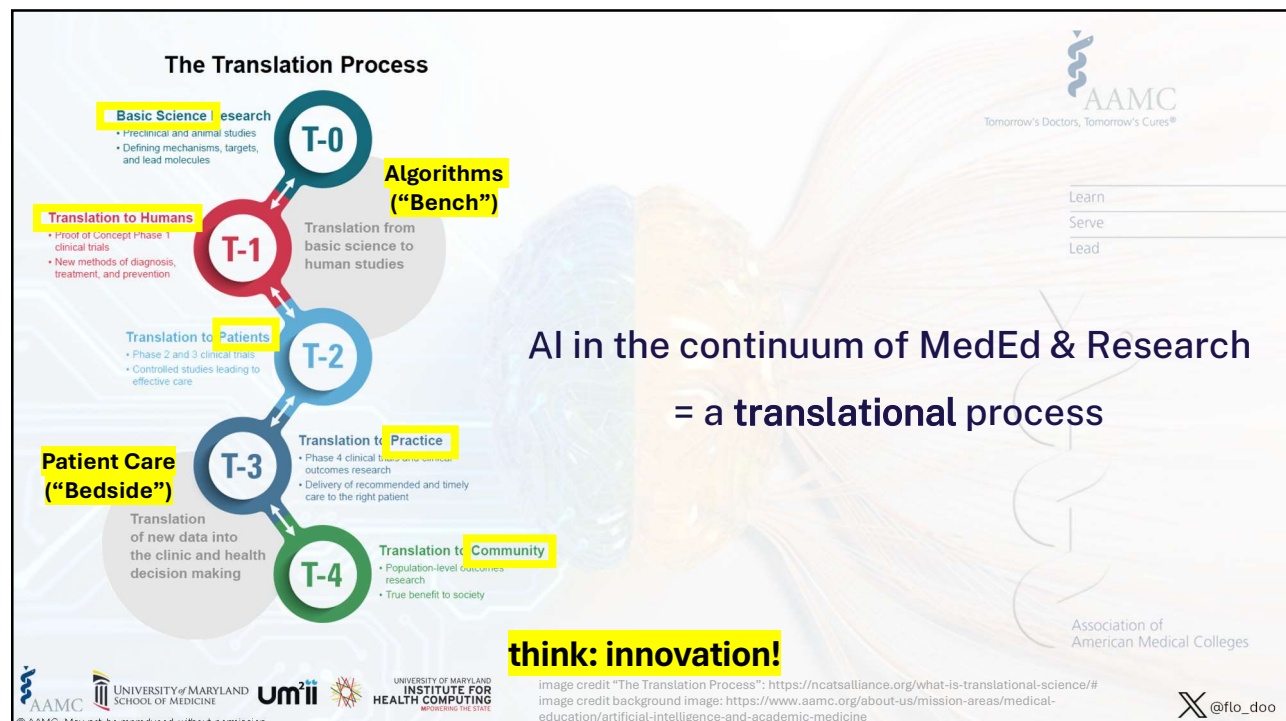
38

Needed: More #MedEd research & application**Board exams****Fellowships****Society CME, for those
already in practice**

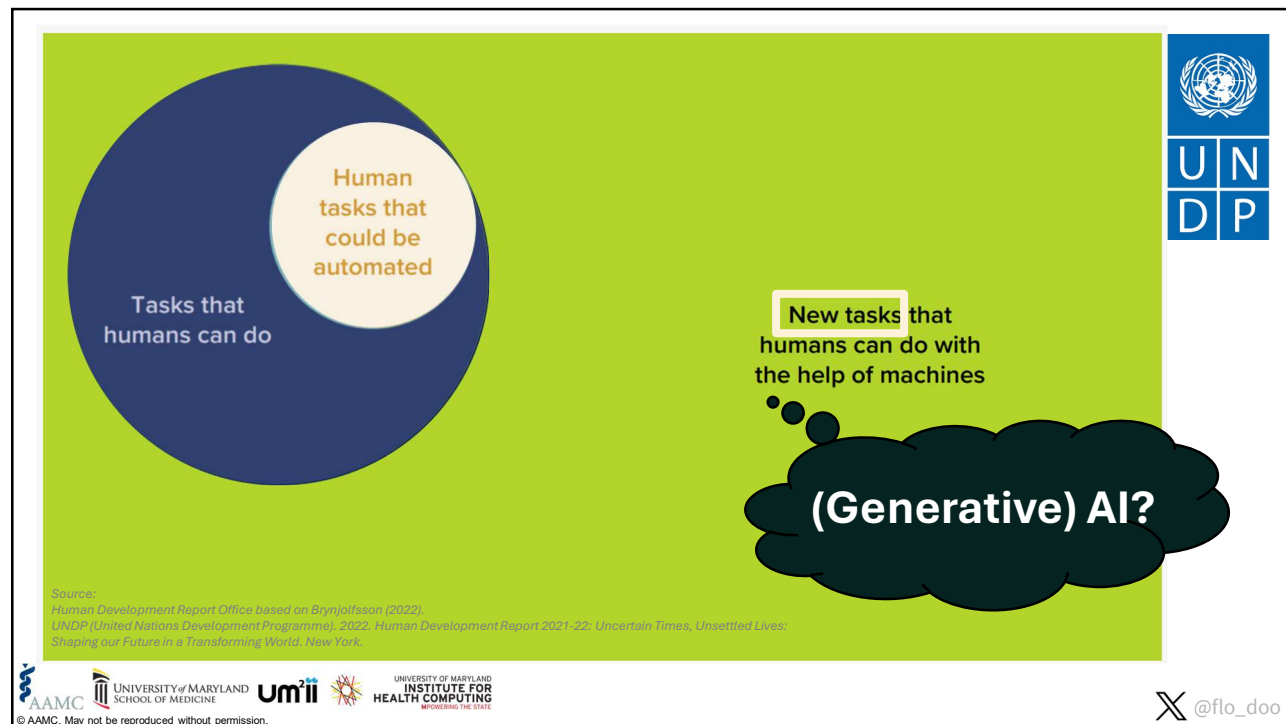
We will all use AI someday.
How will we make sure **all of us** use it safely, and ethically?

**research = continuum of bench to bedside**

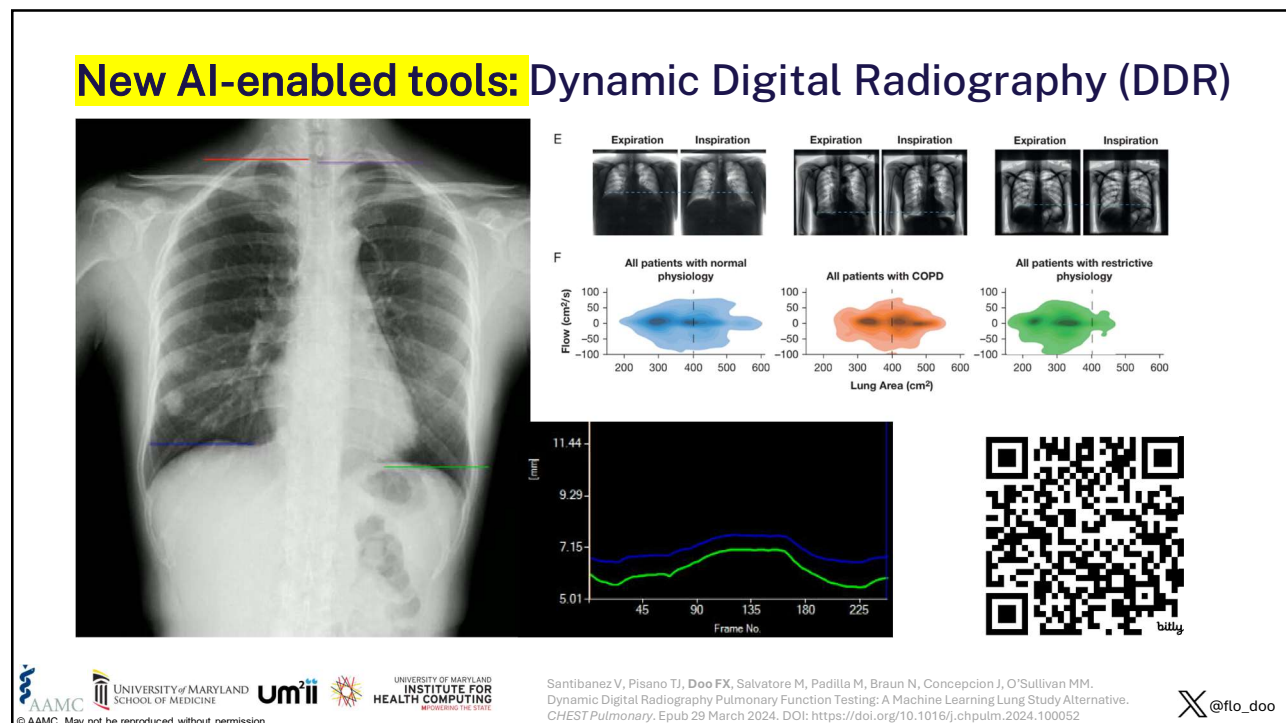
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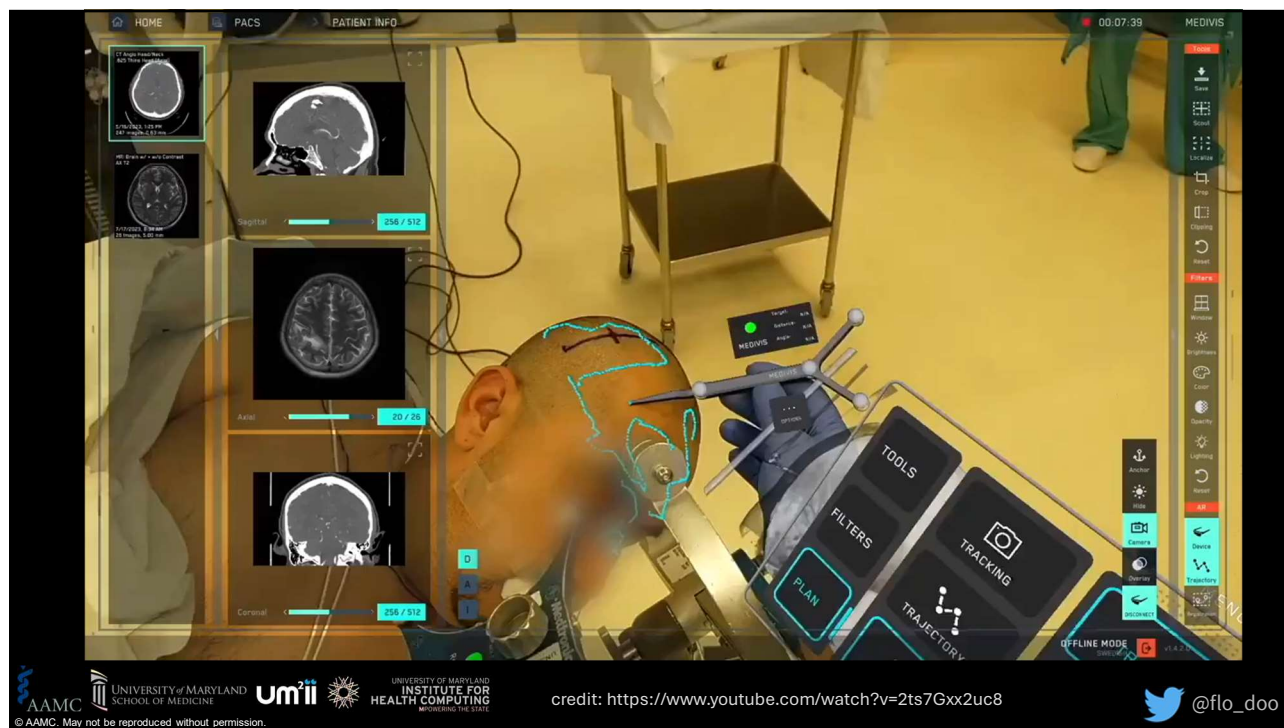
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Be part of the innovation. What applications can you imagine?

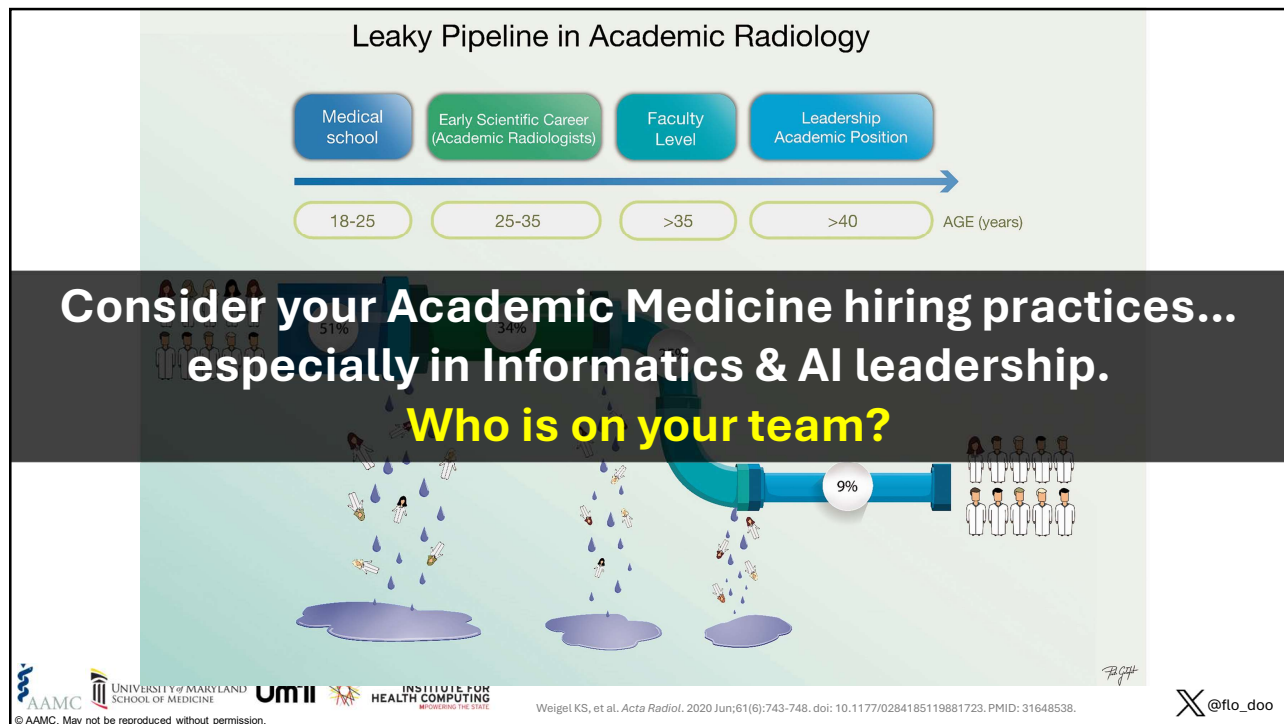
JAMA. doi:10.1001/jama.2023.14217
Published online August 7, 2023.

JAMA | Special Communication | AI IN MEDICINE **Creation and Adoption of Large Language Models in Medicine**

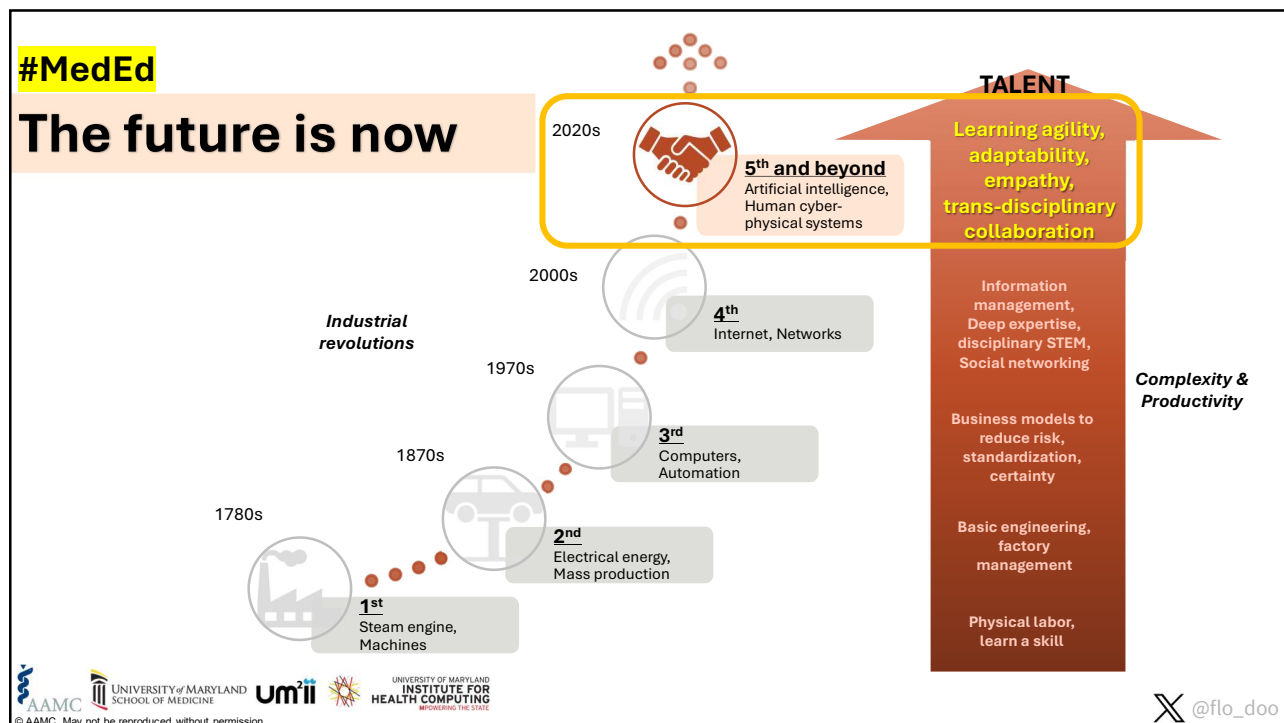
Nigam H. Shah, MBBS, PhD; David Entwistle, BS, MHSA; Michael A. Pfeffer, MD

“ The medical profession has made a mistake in not shaping the creation, design, and adoption of most information technology systems in health care... the same mistake cannot be repeated. ”


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The radiologist here has informed me of the situation

Ok let's remember to be respectful of our dark adapted colleagues

What do you think of the **role of imaging** in **medical AI** now?

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Thank you for listening!

For any questions or comments, please contact:
Florence (Flo) X. Doo, MD MA (she/hers)
 (fdoo@som.umaryland.edu)

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Leveraging AI for Research & Innovation

Common pitfalls in project design

Gustavo A. Patino, MD PhD
Associate Dean for UME, Western Michigan
University Homer Stryker M.D. School of
Medicine

August 27, 2024

Learn

Serve

Lead



Association of
American Medical Colleges

Disclosures

Assistant editor for *Academic Medicine*

Technical reviewer and LiveProject mentor for Manning Publications

All opinions are my own and do not represent those of any of my affiliated organizations

What do we mean when we say AI?

Limit this discussion to:

Machine learning (ML)

Generative AI, especially large language models (LLMs)

Common pitfalls using AI in research

AI is the focus of the project and not a tool to answer a question

Not sharing enough details to allow replicability and assessing external validity

Focusing exclusively on AI performance, failing to engage with the model

Endowing the AI models with human qualities

Is AI the right tool for the research question?

ML and LLM aim to make predictions

Is there something to be gained from AI predictions:

- Are they better than those done by humans?

- Are they more cost effective than those done by humans?

Use AI methods only if predictions with those conditions are needed

Use the same standards as for other experimental approaches

Need to allow for replicability and assessment of external validity

Provide thorough description of the dataset, including the split between training and testing subsets and any processing

It is not enough to mention the programming language and libraries used

Consider sharing the scripts

Use same evaluation standards as for human users

Engage with the AI model

Performance is important, but is not the only important aspect

Report performance using applied measures (e.g. sensitivity) instead of loss functions (e.g. log-likelihood)

What independent variables proved important to make the predictions?

Do the misclassified samples have something in common?

Is there any evidence of bias?

AI is just a tool

The fact that these are mathematical techniques doesn't mean the results are infallible

- Can be biased

- Still need quality data for data development

Results are heavily dependent on the human user

- Importance of prompt quality for LLM output

The model can find correlations between variables, but doesn't care what those variables are

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Thank you!

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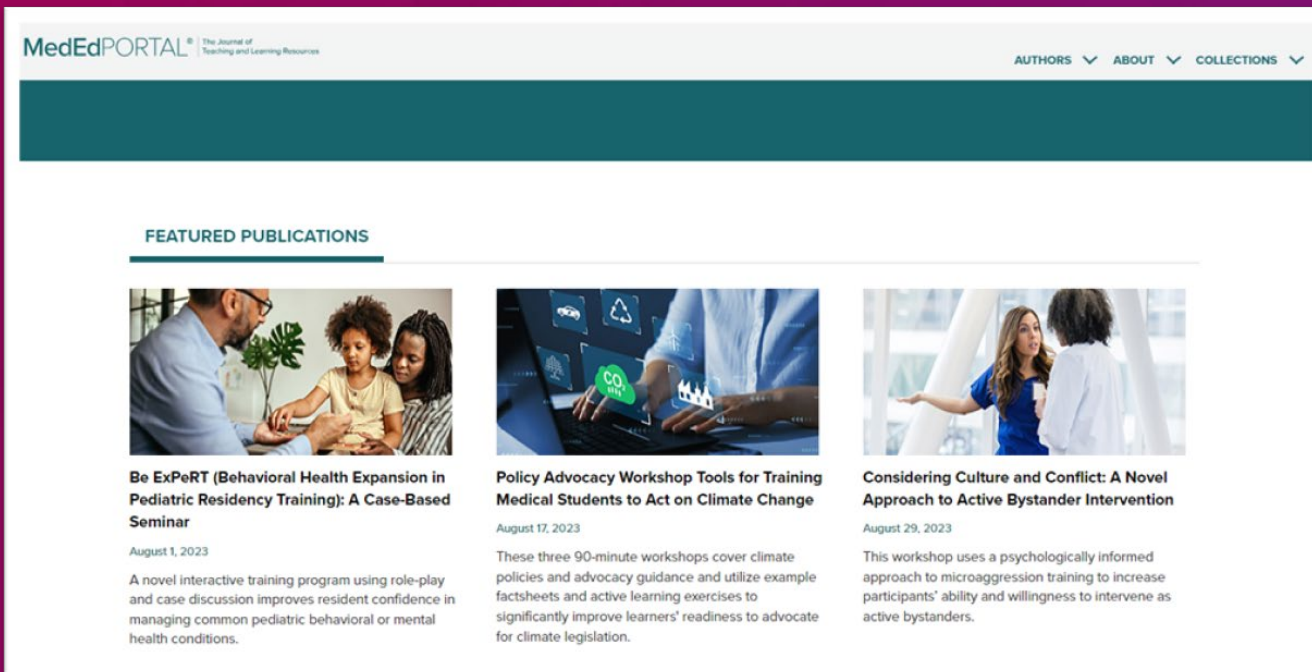
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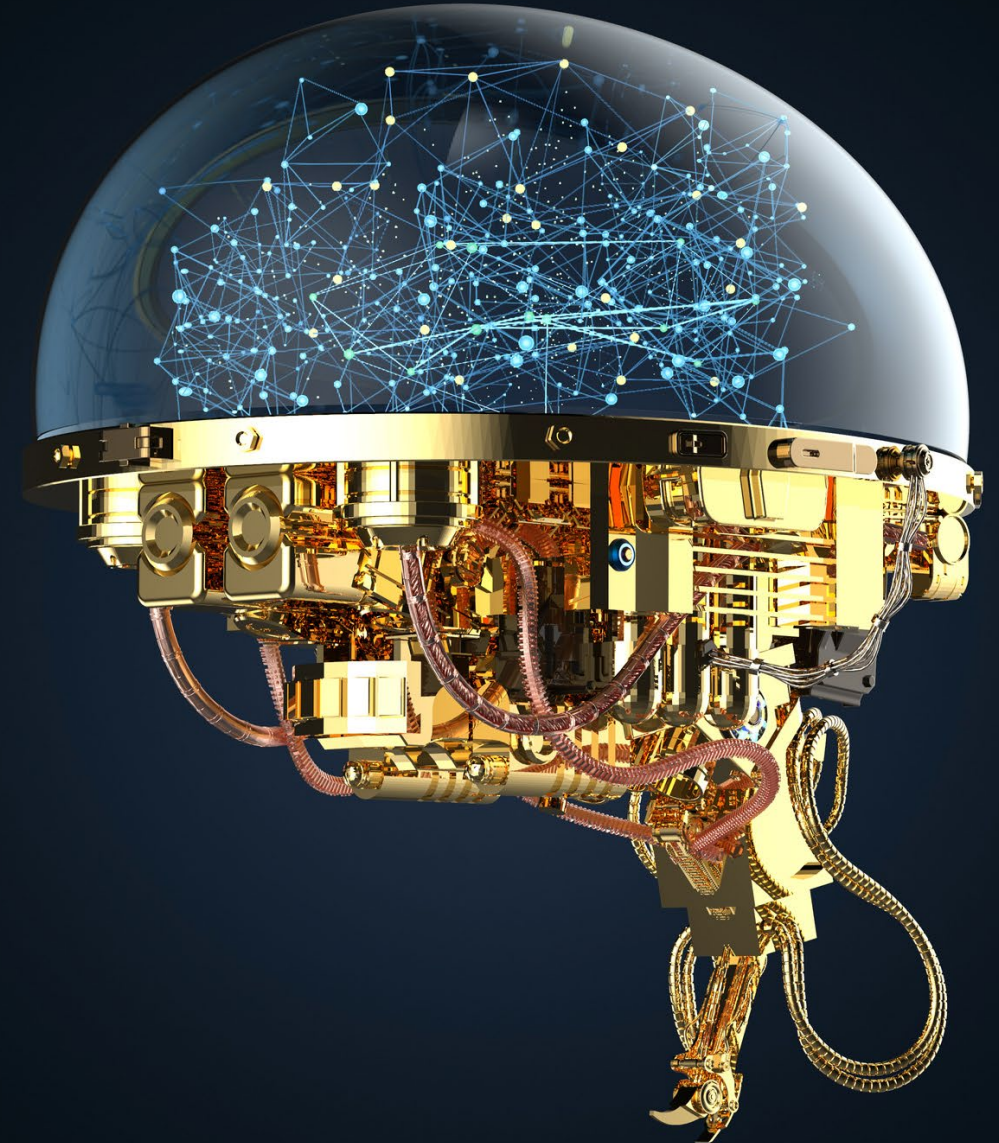
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