Empowering Primary Care Teams: The AI Advantage

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AFHTO Conference 2024

Faculty/Presenter Disclosure

- **Faculty:** Jacqueline Kueper
- **Relationships with financial sponsors:**
  - **Any direct financial relationships including receipt of honoraria:** Speaking honorarium: Alliance for Healthier Communities, Alberta College of Family Physicians, Canadian Medical Association.
  - **Memberships on advisory boards or speakers' bureau:** None.
  - **Patents for drugs or devices**: None.
  - **Other:** Current employee of Scripps Research Translational Institute, past employee of Trillium Health Partners and Western University.

Disclosure of Financial Support

- This program has received financial support from **AFHTO** in the form of **speaking fees.**

- **Potential for conflict(s) of interest:** None

Mitigating Potential Bias

- Session goals were developed in collaboration with the Planning Committee
- Information and/or recommendations in the program are based on evidence and/or guidelines, and opinions of the speaker will be identified
- No specific product recommendations will be made

Outline

01. What is AI?

02. What can AI do for us?

03. Where can AI be applied in primary care?

04. What is needed for AI to work well?

05. Discussion

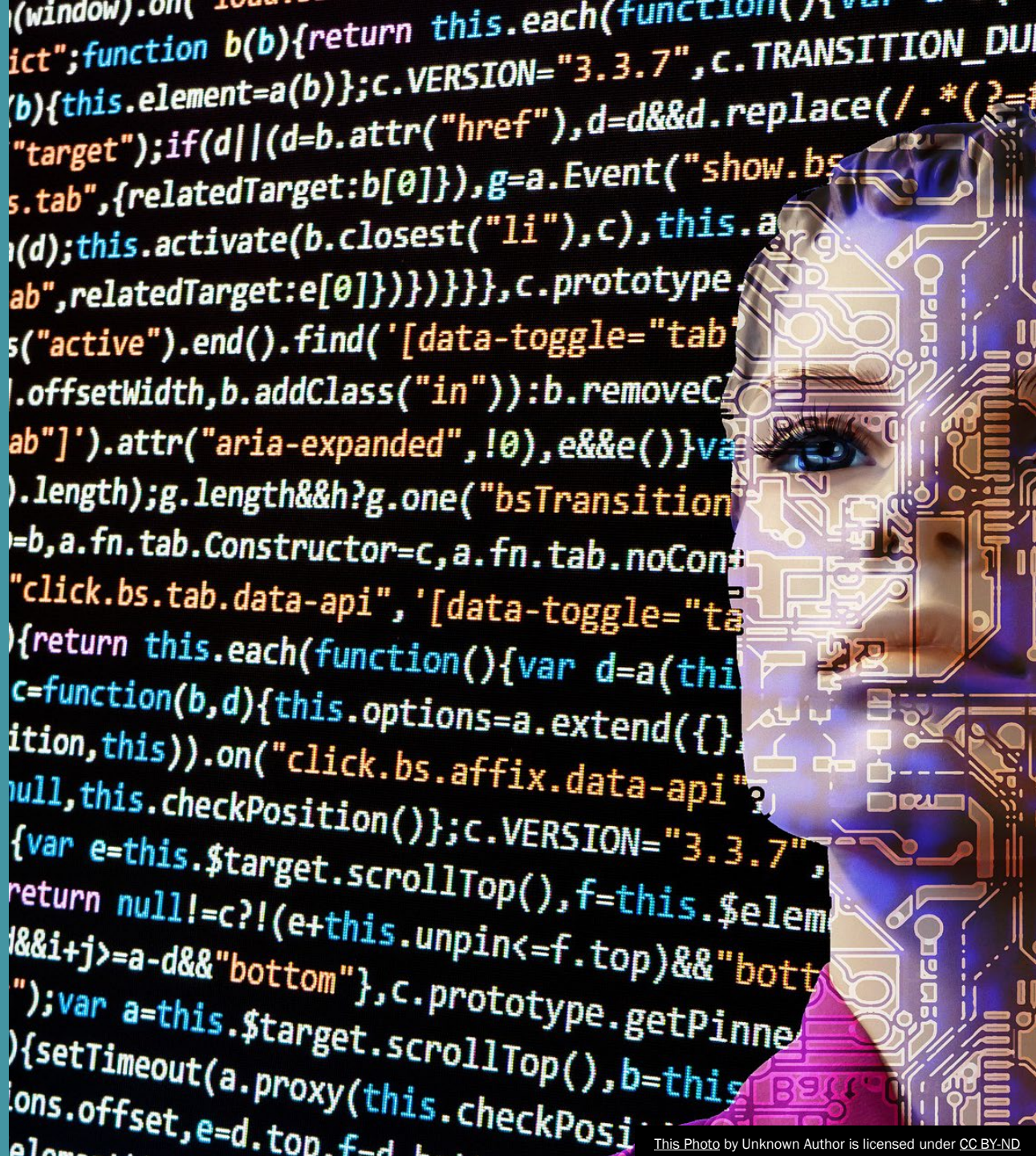
Take Home Points

1. AI relies on (complex) math that is crafted by humans and by data.

2. AI is not one thing, and there is no one size fits all solution. Your input is important.

3. To maximize benefit and minimize harm of technology advancements, teamwork and primary care leadership is needed.

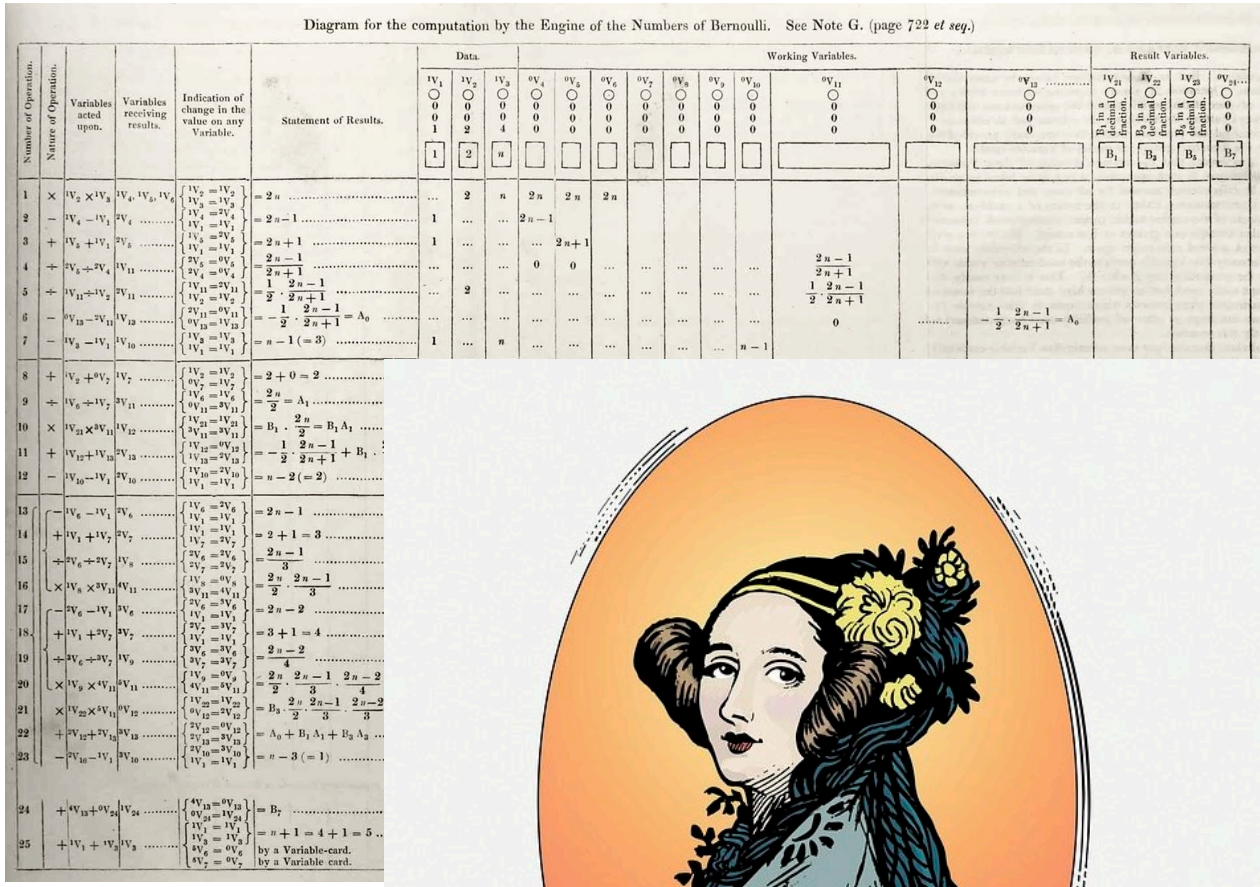
What is AI?



A Brief History

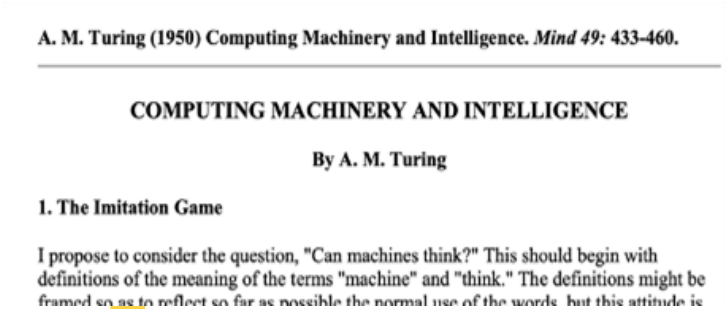
- AI has many **building blocks**
  - Math, Statistics, Psychology, Philosophy, Computer Engineering, etc.

- **Algorithm** – a process or set of instructions a computer can execute to complete a task or solve a problem
  - *AI algorithm → performs human-like "intelligent tasks"*



1843 - Ada Lovelace developed the first computer program

A Brief History



A. M. Turing (1950) Computing Machinery and Intelligence. *Mind 49:* 433-460.

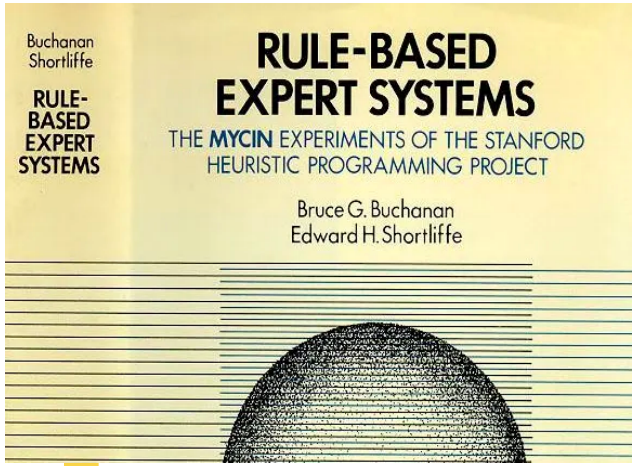
COMPUTING MACHINERY AND INTELLIGENCE

By A. M. Turing

1. The Imitation Game

I propose to consider the question, "Can machines think?" This should begin with definitions of the meaning of the terms "machine" and "think." The definitions might be framed so as to reflect so far as possible the normal use of the words, but this attitude is

1950 - Seminal paper published



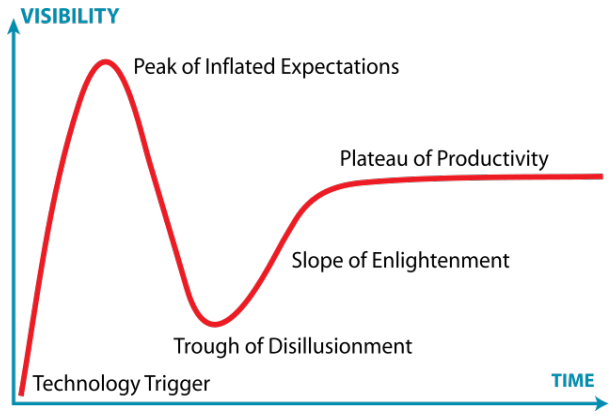
1972 - First medical AI application

[Technology & Data >>>]

1956 - Field of AI formalized

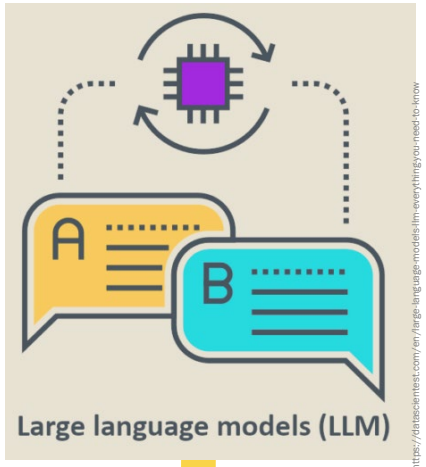
1970s - First "AI winter"

1990s - Second "AI winter"

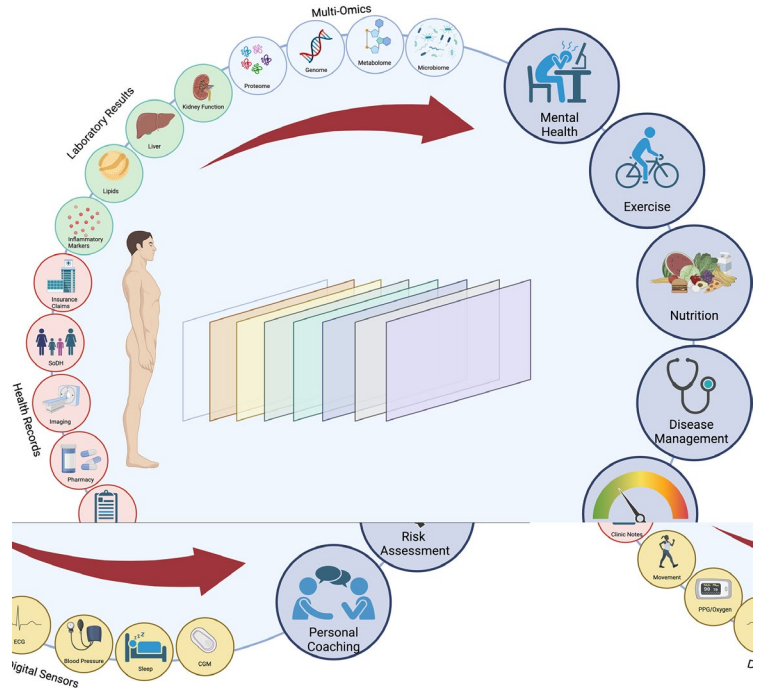


A Brief History

2010s – Deep learning* advances



2022 – LLM rapid adoption



2020s – AI for health research boom

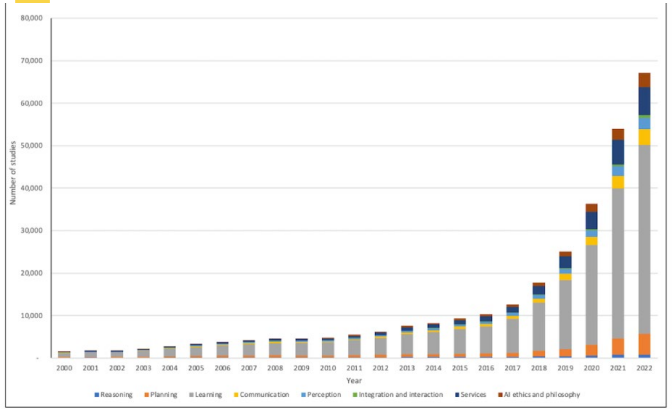


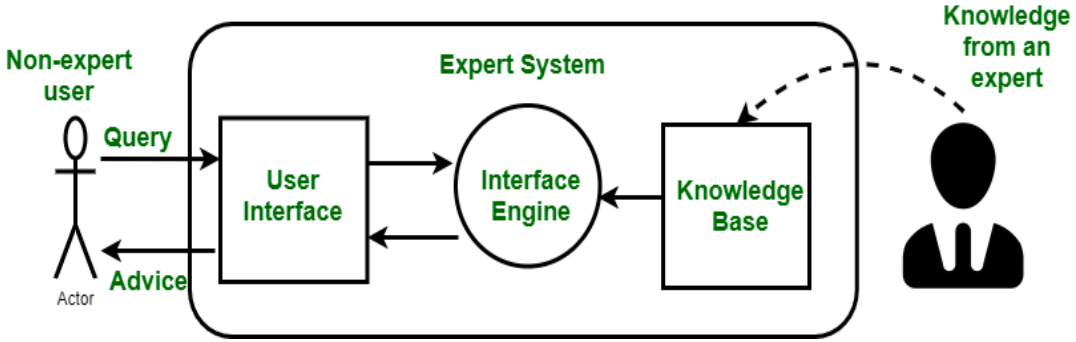
Figure from Shi J et al. Mapping the Bibliometrics Landscape of AI in Medicine: Methodological Study. J Med Internet Res. 2023

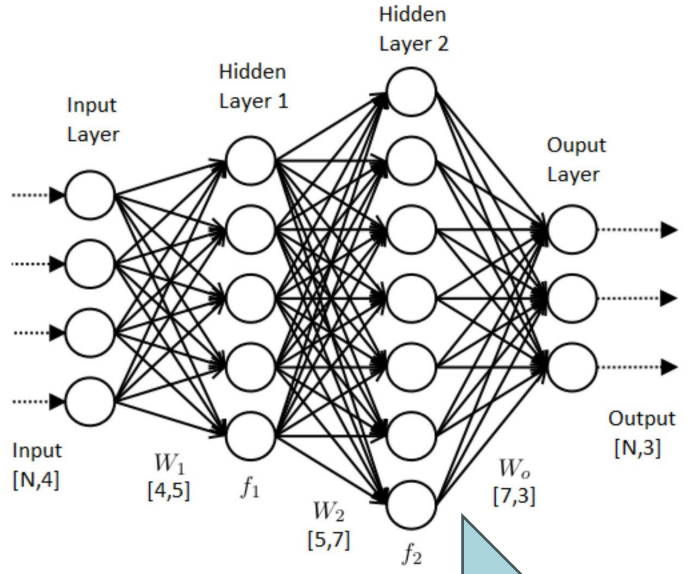
Today – Multi-modal AI advances

Figure from Muse ED, Topol EJ. Transforming the cardiometabolic disease landscape: Multimodal AI-powered approaches in prevention and management. Cell Metab. 2024 Apr 2;36(4):670-683.

*2024 Nobel Prize
John Hopfield &
Geoffrey Hinton
(University of Toronto)

Spectrum of AI Techniques





Rule-centric ⟷ **Data-centric**

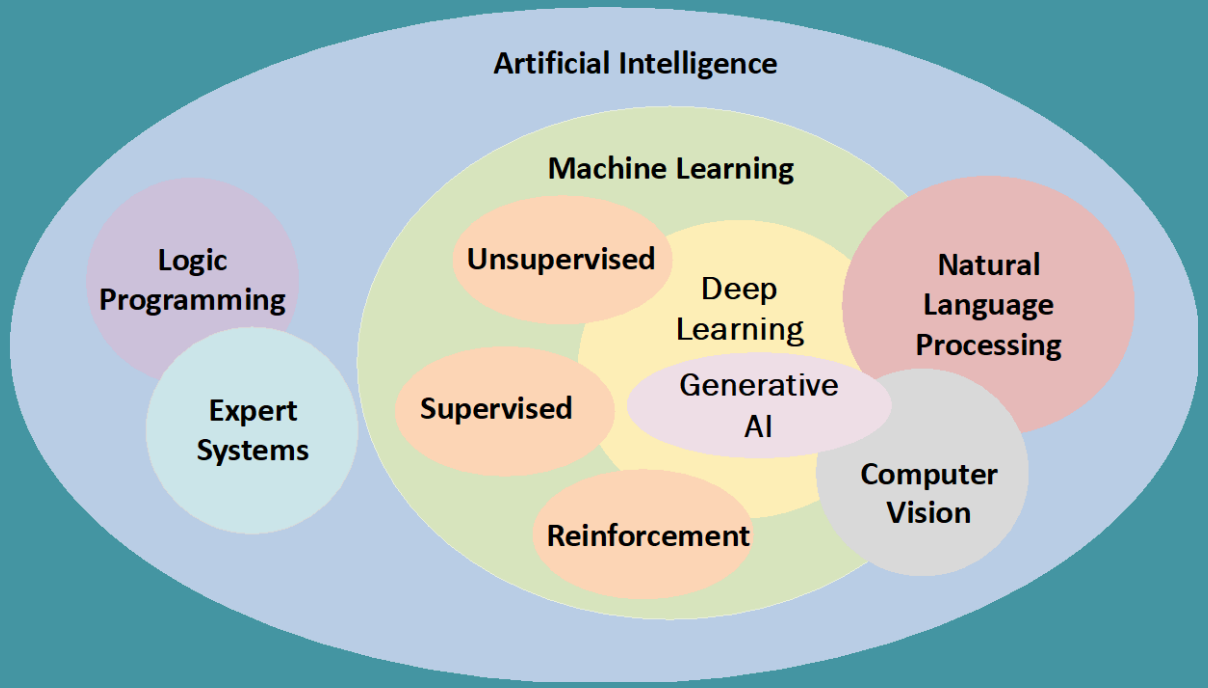
Ex: Expert systems

- Collection of facts & rules
- Logic programming

Ex: Deep neural networks

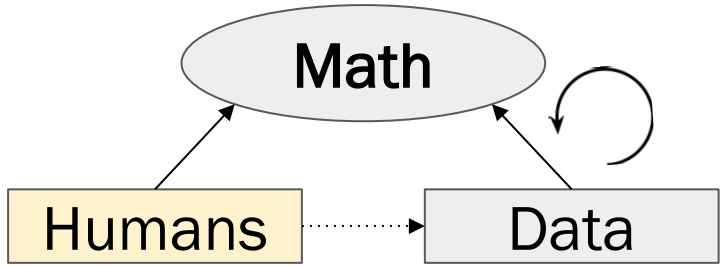
- Learn from experience
- Big data = many examples

What is AI?



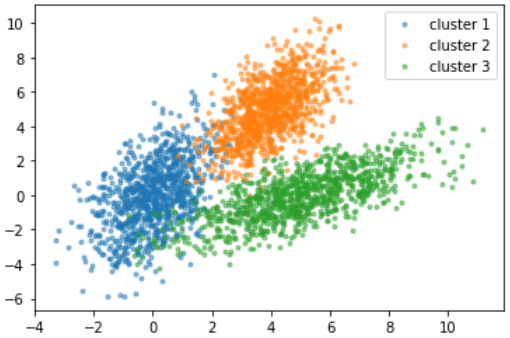
Collection of techniques centered around computers performing "intelligent tasks"

- Overlapping, interdisciplinary subfields
- Most common today: **machine learning**



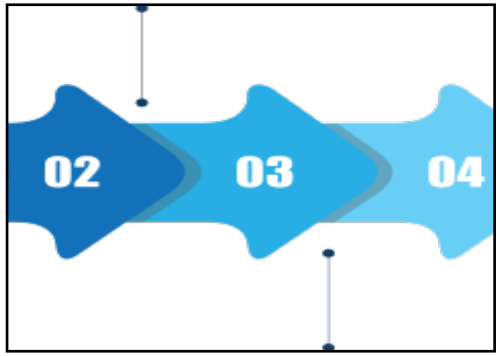
Intelligent Tasks that AI can Perform

1) Exploring and Describing Data



2) Predicting Prespecified Outcomes

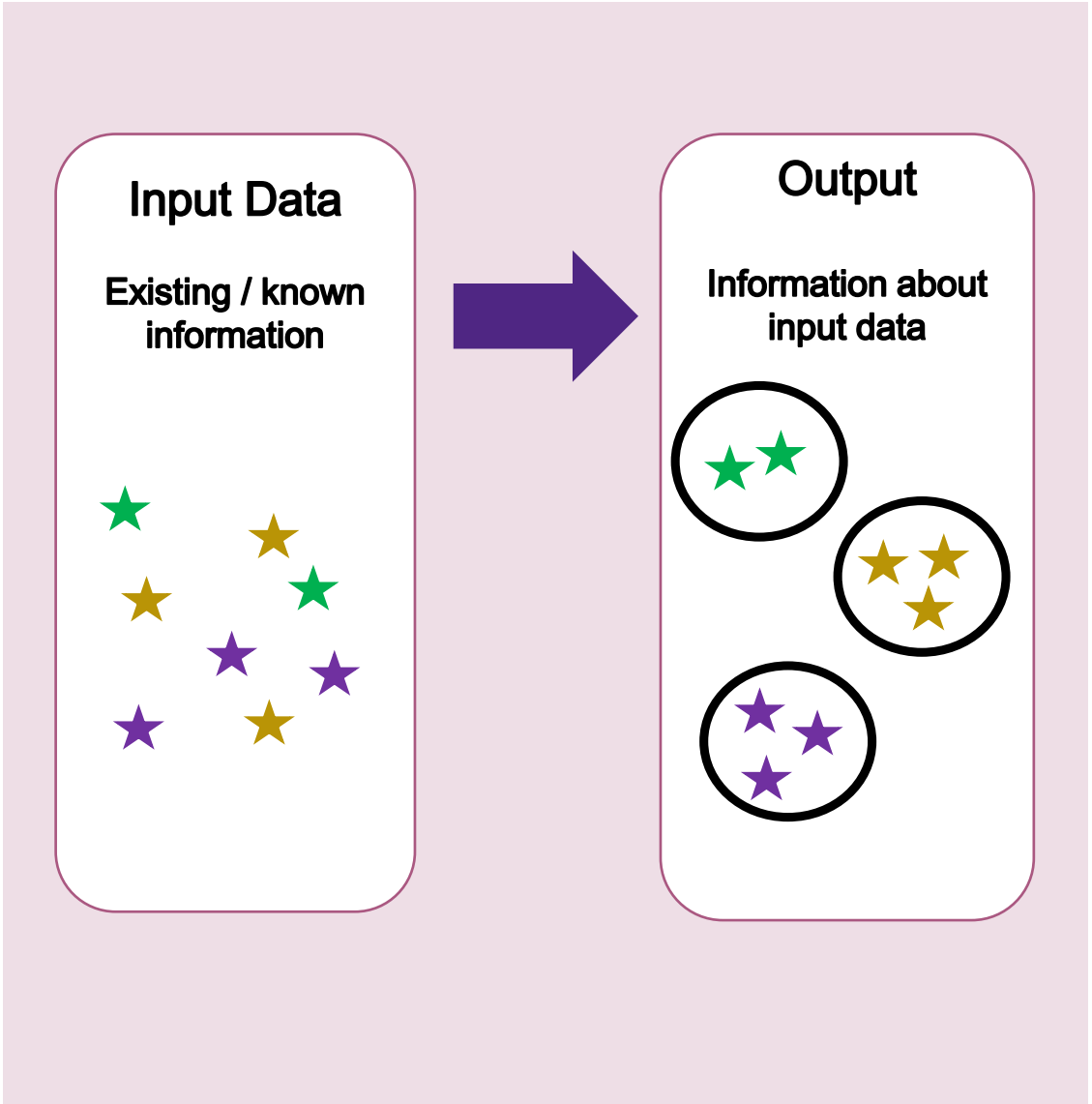
3) Supporting Sequences of Decisions



Kueper JK. Primer for artificial intelligence in primary care. *CFP*. 2021;67:889-893. doi:10.46747/cfp.6712889

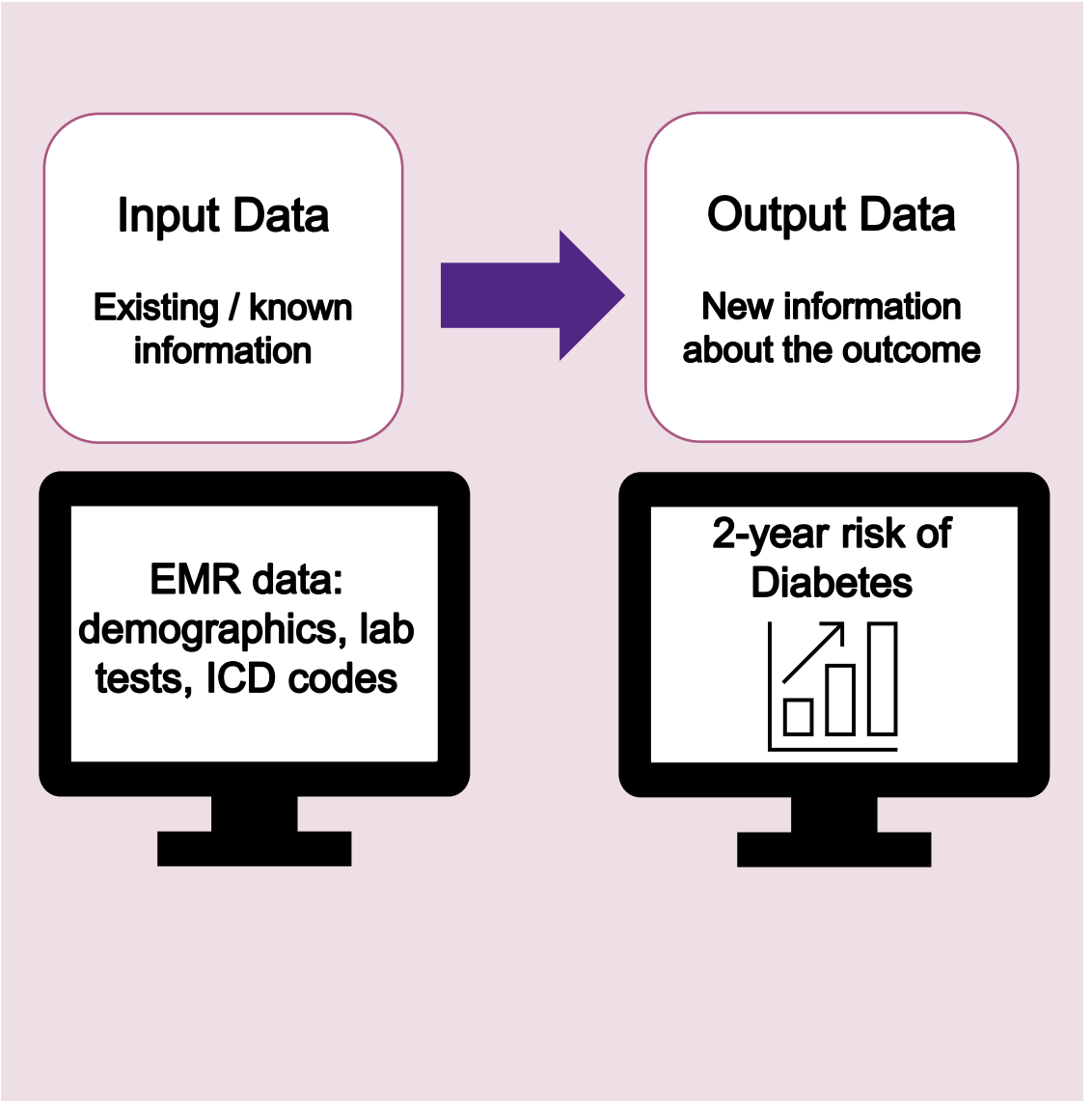
1) Exploring and Describing Data

- Identify complex patterns in data
  - Cluster similar groups
  - Identify trends
  - Detect outliers
- Human interpretation of outputs is common
- Often performed by *unsupervised machine learning* techniques



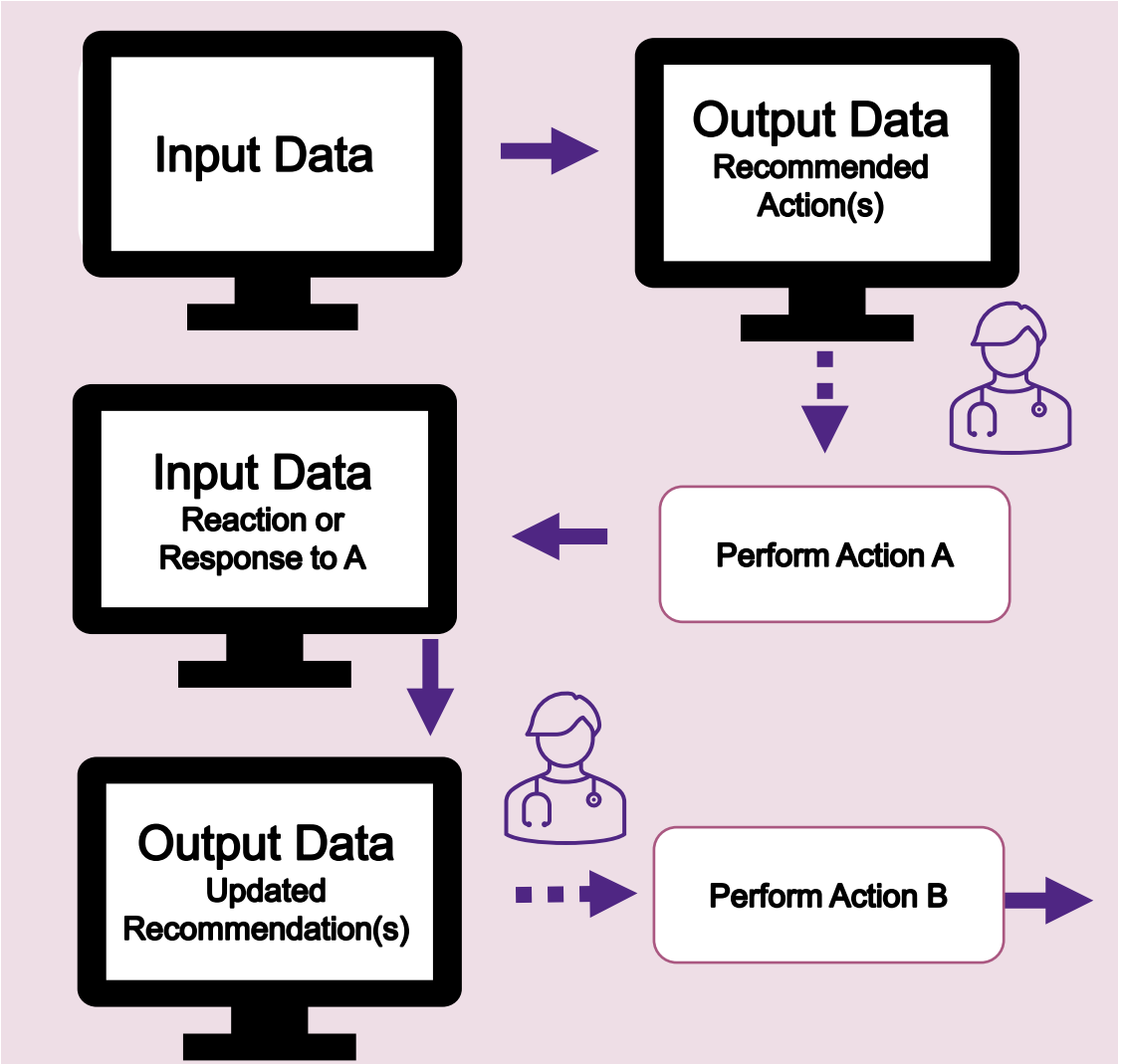
2) Predicting Prespecified Outcomes

- Predict current (diagnostic) or future (prognostic) events
  - One outcome (set) per model
- Prominent task in health applications
- Often performed by *supervised machine learning* techniques



3) Supporting Sequences of Decisions

- Recommend actions based on short- and/or long-term predictive outcomes
- Iterative feedback process over time
- Often performed by *reinforcement learning* techniques



Intelligent Tasks that AI can Perform

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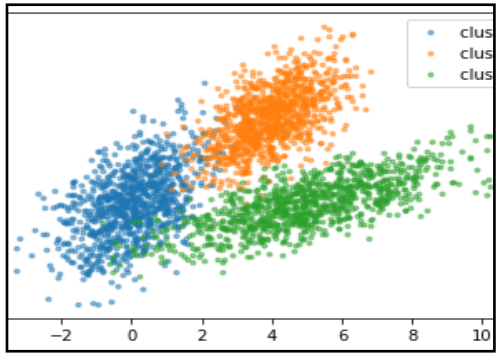
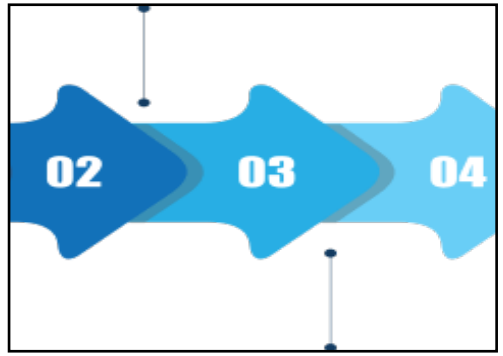


2) Predicting Prespecified Outcomes

3) Supporting Sequences of Decisions



AI includes Specialized Methods for

Language Data Processing & Production

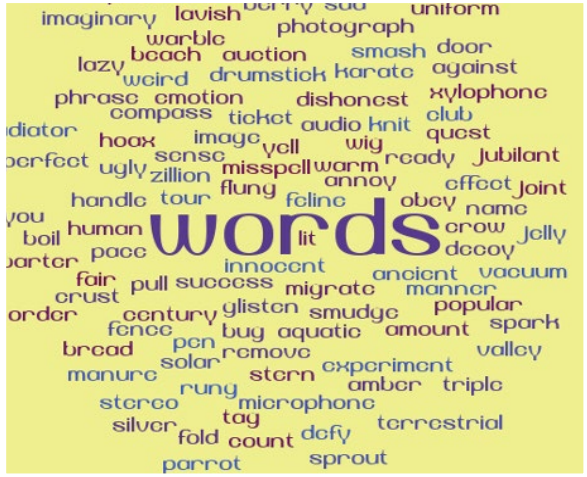


Image Data Processing & Production

Large Language Models (LLMs)

- Recognize, process, and generate text
  - Summarize documents
  - Language translation
  - Q & A functions

- Can be incorporated with other data types (Multimodal platforms)

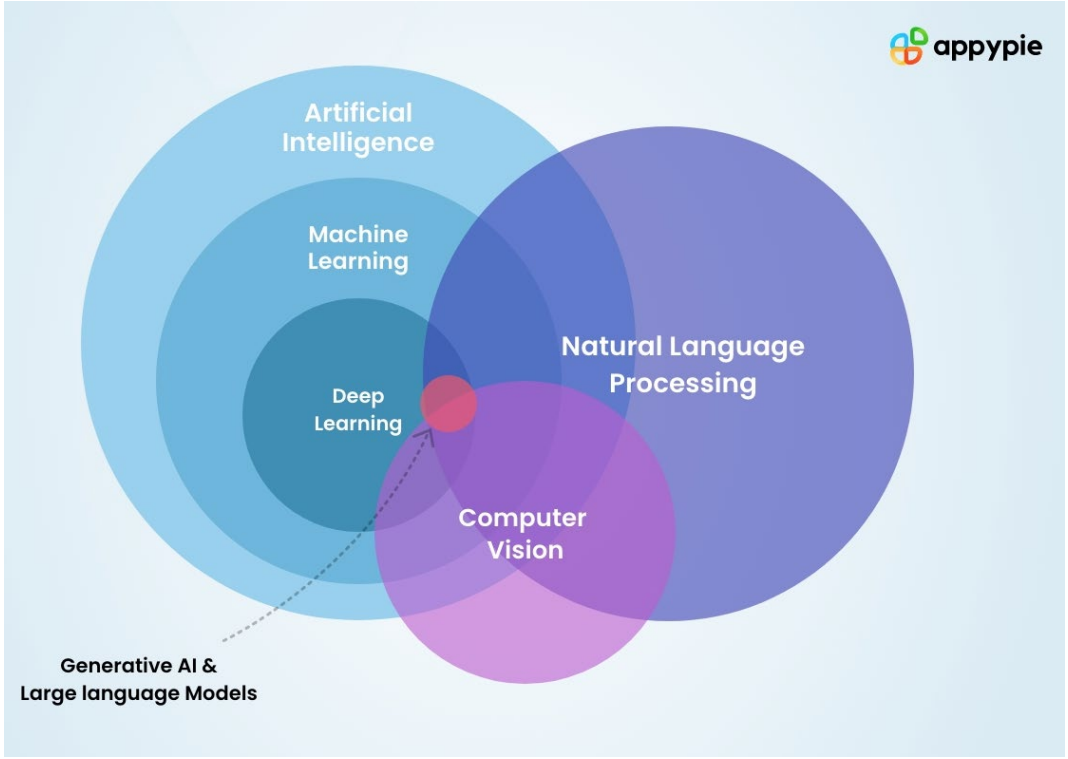


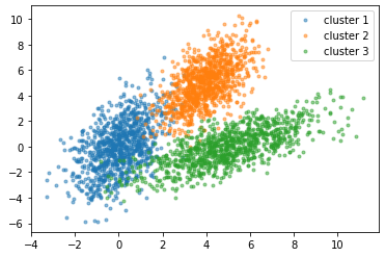
Image source: https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.appypie.com%2Fblog%2Fwhat-are-large-language-models&psig=AOvVaw3U37OXsqVwkX-3PMQu5x2F&ust=1713648204307000&source=images&cd=vfe&opi=89978449&ved=0CBQQjhxqFwoTCOC46pWbz4UDFQAAAAAdAAAAABAR

Generative AI

- Produce “new” content based on a statistical model trained on existing data
  - Text
  - Auditory
  - Visual
  - Synthetic data
- Probabilistic nature presents unique evaluation challenges

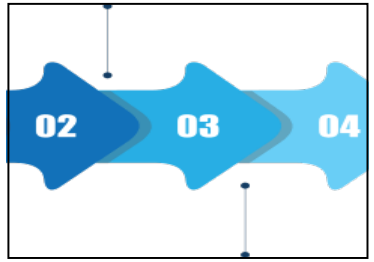
Twitter: @weirddalle / Via Twitter: @weirddalle

Intelligent Tasks that AI can Perform

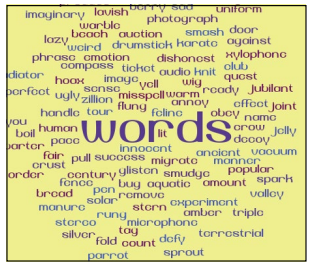


Exploring & Describing Data

Predicting Prespecified Outcomes



Supporting Sequences of Decisions



Language Data Processing & Production

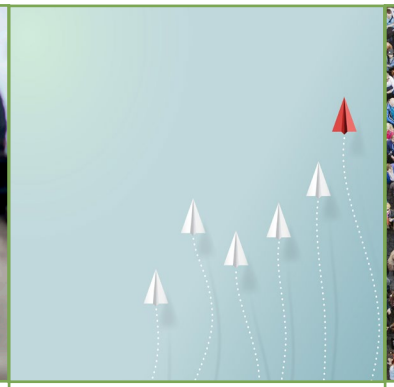
Image Data Processing & Production

Where can AI be applied in primary care?

Major Application Domains of AI for Primary Care

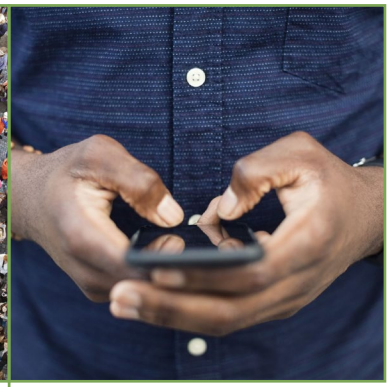
Administrative burden & operational efficiencies

Clinical decision support



Preventative care and risk profiling

Population health



Patient self-management

Example references leading to the categorization above: 1. Liaw W, Kakadiaris IA. Primary care artificial intelligence: A branch hiding in plain sight. *Annals of Family Medicine*. 2020;18(3):194-195. doi:10.1370/afm.2533 2. Kueper JK, Terry AL, Zwarenstein M, Lizotte DJ. Artificial intelligence and primary care research: a scoping review. *Annals of Family Medicine*. 2020;18(3):250-258. doi:10.1370/afm.2518. 3. Kueper JK, Terry A, Bahniwal R, et al. Connecting artificial intelligence and primary care challenges: findings from a multi stakeholder collaborative consultation. *BMJ Health Care Inform*. 2022;29(1):e100493. doi:10.1136/bmjhci-2021-100493. 4. Yang Z, Silcox C, Sendak M, et al. Advancing primary care with Artificial Intelligence and Machine Learning. *Healthcare*. 2022;10(1):100594. doi:10.1016/j.hjdsi.2021.100594 5. Kueper, J. K., Emu, M., Banbury, M., Bjerre, L. M., Choudhury, S., Green, M., Pimlott, N., Slade, S., Tsuei, S. H., & Sisler, J. (2024). Artificial intelligence for family medicine research in Canada: Current state and future directions: Report of the CFPC AI Working Group. Canadian Family Physician, 70(3), 161–168. doi:10.46747/cfp.7003161

AI Scribes

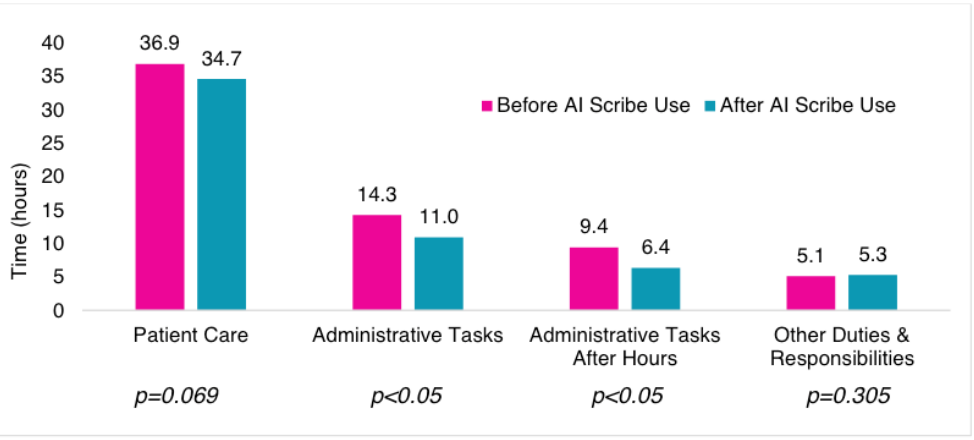
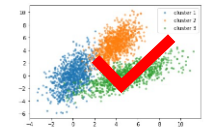
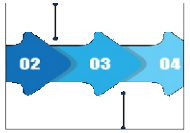


Figure 2. Average time, in hours per week, spent on various tasks before and after implementation of an AI scribe (n=152).

Figure from: Centre for Digital Health Evaluation. (2024). *Clinical Evaluation of Artificial Intelligence and Automation Technology to Reduce Administrative Burden in Primary Care*. Women's College Hospital Institute for Health System Solutions and Virtual Care.


Exploring & Describing Data

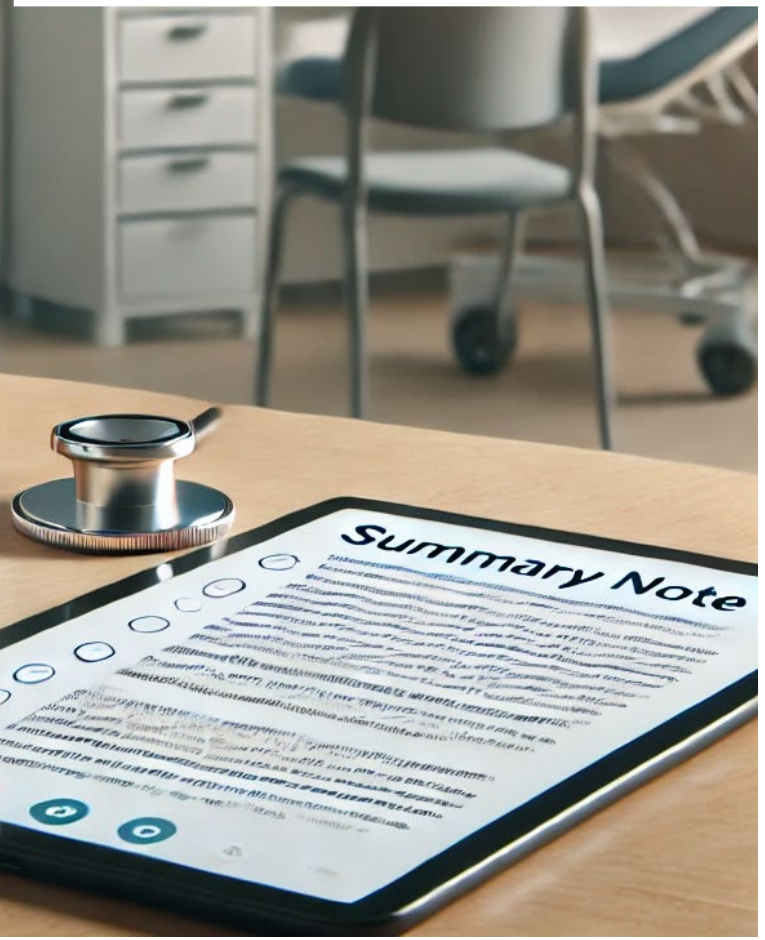

Predicting Prespecified Outcomes



Supporting Sequences of Decisions

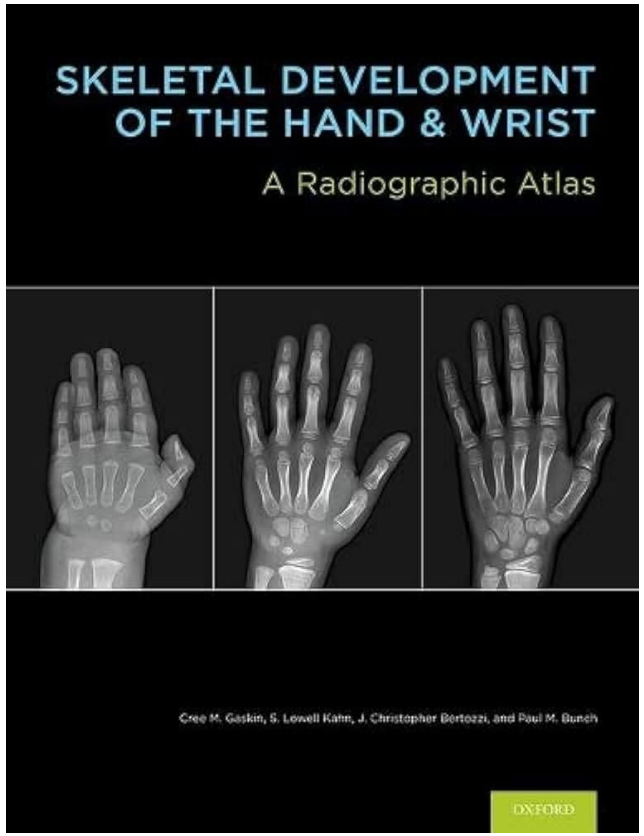

Language Data Processing & Production


Image Data Processing & Production

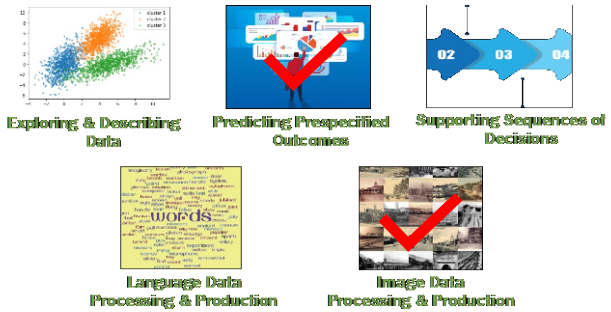


AI-generated image created using DALL·E, assisted by ChatGPT (OpenAI), [October 2024]

AI Assisted Bone Age Exams



Kueper, J. K., Abdalla, M., Abolhassani, F., Hussain, M., Chiam, K., Liu, A., Wang, J. H., Yang, R., Lee, J., & Fine, B. (2024, May). *Artificial Intelligence for Paediatric Bone Age Assessment: Proof of Concept for Embedded Model Facts into Clinical User Interface*. Symposium on Artificial Intelligence in Learning Health Systems, Puerto Rica. https://sail.health/wp-content/uploads/2024/05/Poster-18-Fine.pdf



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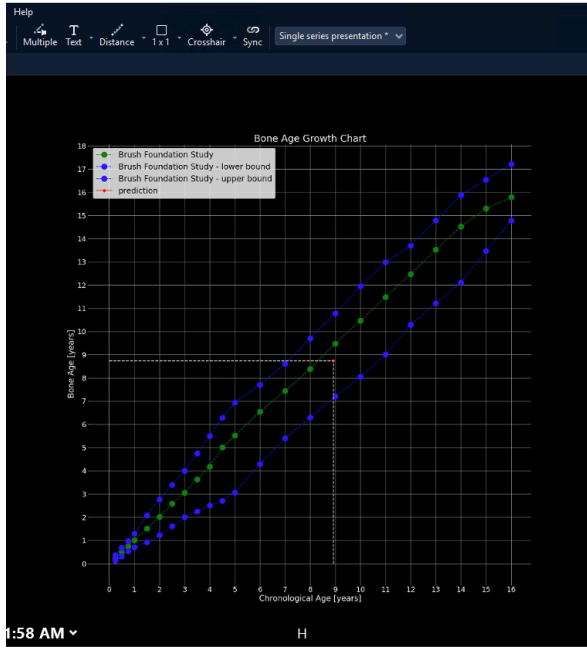
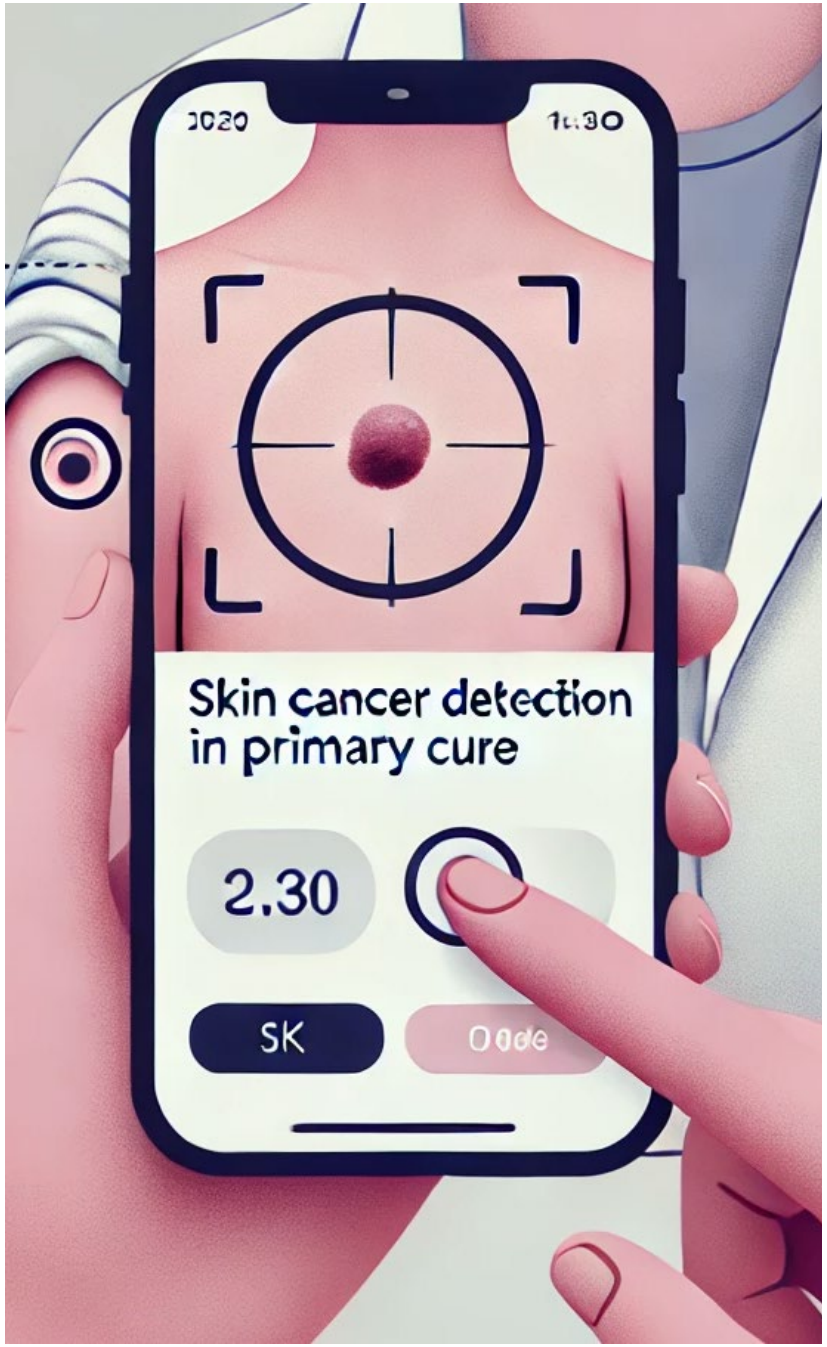


+ Written report partially prepopulated. Radiologist needs to enter skeletal age and normal/abnormal assessment.

Kueper, J. K., Abdalla, M., Abolhassani, F., Hussain, M., Chiam, K., Liu, A., Wang, J. H., Yang, R., Lee, J., & Fine, B. (2024, May). *Artificial Intelligence for Paediatric Bone Age Assessment: Proof of Concept for Embedded Model Facts into Clinical User Interface*. Symposium on Artificial Intelligence in Learning Health Systems, Puerto Rico. https://sail.health/wp-content/uploads/2024/05/Poster-18-Fine.pdf

Imaging Applications in Primary Care



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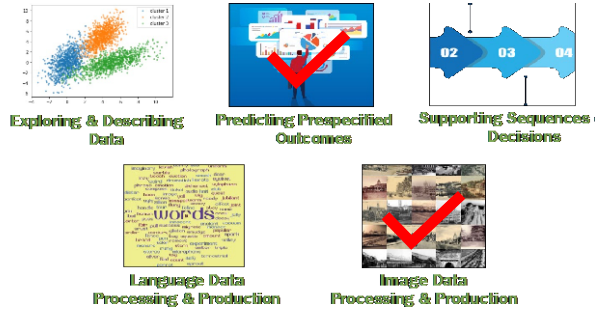


Example research and reports:

Venkatesh KP, Kadakia KT, Gilbert S. **Learnings from the first AI-enabled skin cancer device for primary care authorized by FDA**. *npj Digit Med*. 2024;7(1):1-4.

Menzies, S. W., Sinz, C., Menzies, M., et al. (2023). **Comparison of humans versus mobile phone-powered artificial intelligence for the diagnosis and management of pigmented skin cancer in secondary care: A multicentre, prospective, diagnostic, clinical trial.** The Lancet. Digital Health, 5(10), e679–e691

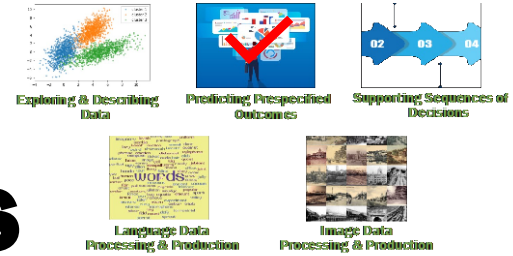
Webster P. **How AI-powered handheld devices are boosting disease diagnostics - from cancer to dermatology**. *Nature Medicine*. 2024;30(4):914-915.

Jaklitsch E, Thames T, de Campos Silva T, Coll P, Oliviero M, Ferris LK. **Clinical utility of an AI-powered, handheld elastic scattering spectroscopy device on the diagnosis and management of skin cancer by primary care physicians.** J Prim Care Community Health. 2023 Jan-Dec;14:21501319231205979.

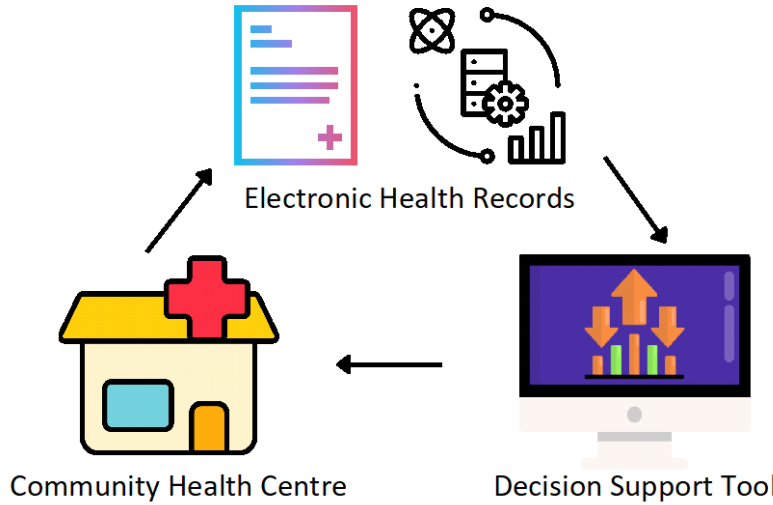
Krakowski, I., Kim, J., Cai, Z.R. *et al.* **Human-AI interaction in skin cancer diagnosis: a systematic review and meta-analysis**. *npj Digit. Med.* 7, 78 (2024).

Melarkode N, Srinivasan K, Qaisar SM, Plawiak P. **AI-powered diagnosis of skin cancer: A contemporary review, open challenges and future research directions.** Cancers (Basel). 2023 Feb 13;15(4):1183.

Escalé-Besa A, Yélamos O, Vidal-Alaball J, et al. **Exploring the potential of artificial intelligence in improving skin lesion diagnosis in primary care**. *Sci Rep*. 2023;13(1):4293



EHR-Based Decision Support Tools

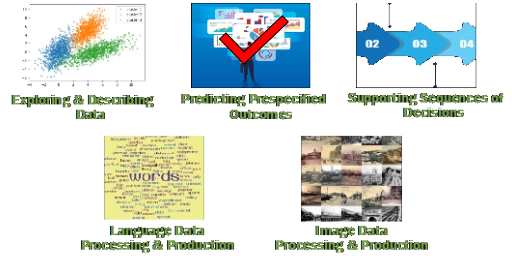


Goal: Support earlier detection of mental health decline after diabetes diagnosis

- EMR-embedded tool to notify care provider if client is at high risk of mental health decline
- Clinical actions: discussion, referral, monitoring
- Through co-development discussions, we shifted to a more pressing upstream target problem instead

Kueper JK, Rayner J, Bhatti S, et al. Data-Driven Decision Support Tool Co-Development with a Primary Health Care Practice Based Learning Network. *F1000Research.* 2024. doi:10.12688/f1000research.145700.1

Planning for CHC Mental Health Service Demand



Goal: Predict the number of clients with diabetes who will need mental health services in the next year

Initial goal: Individual-level care decision support tool

Current goal: Population-level planning and advocacy tool

Kueper JK, Rayner J, Bhatti S, et al. Data-Driven Decision Support Tool Co-Development with a Primary Health Care Practice Based Learning Network. *F1000Research.* 2024. doi:10.12688/f1000research.145700.1

Alliance for Healthier Communities
Alliance pour des communautés en santé

EPIC
Equity, Performance, Improvement, and Change

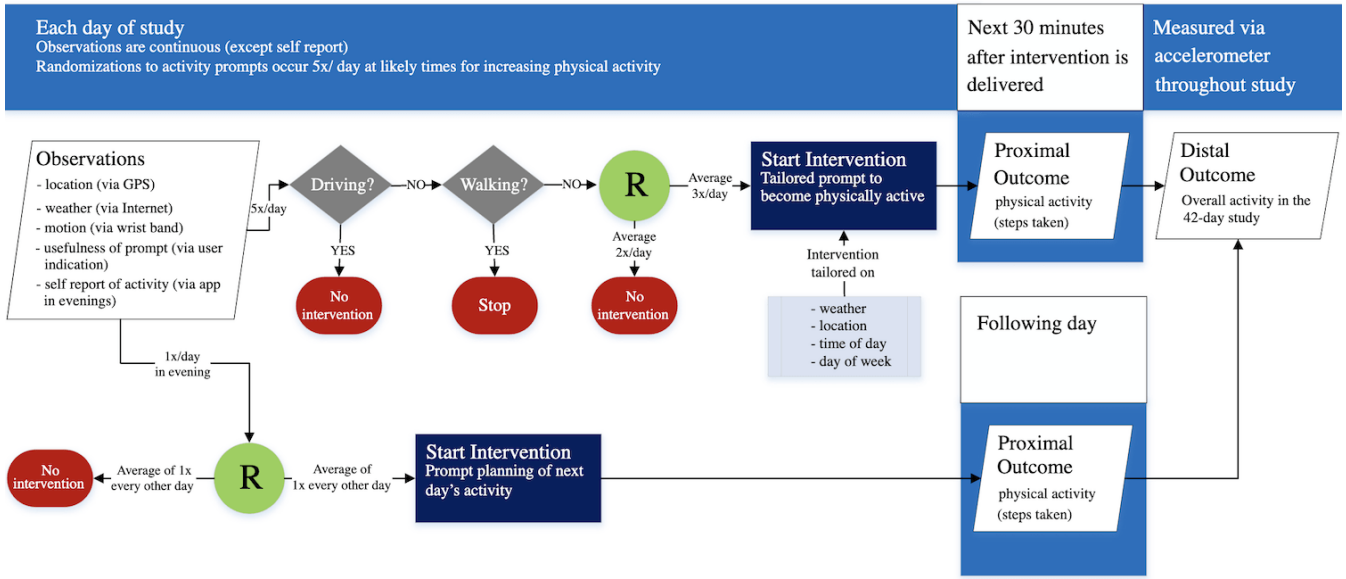
Just-in-Time Adaptive Interventions

Goal: Provide the right type of support at the right time

- Frequent or continuous monitoring to provide personalized recommendations and support
  - Data from phone apps, wearables, gps, etc.
  - Improves and adapts with patient progress over time
- Example applications: suicide prevention, smoking cessation, physical activity

Example

Heartsteps MRT to Promote Physical Activity Among Sedentary People



Case study: https://d3c.isr.umich.edu/case_study/heartsteps/

Brainstorming Activity

Think Big

Select one of the example tools and brainstorm, for your context, how to make it

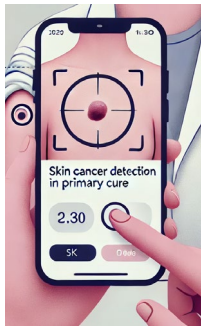
1. *Even better* or
2. *More relevant*

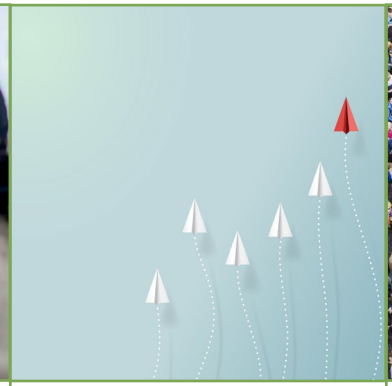
If truly none are applicable,

3. Largest barrier to application in your context

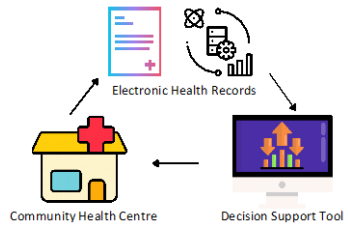
Administrative burden & operational efficiencies

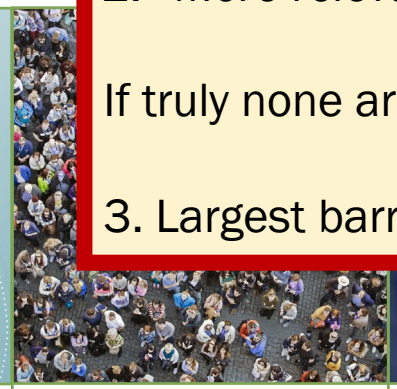
Clinical decision support



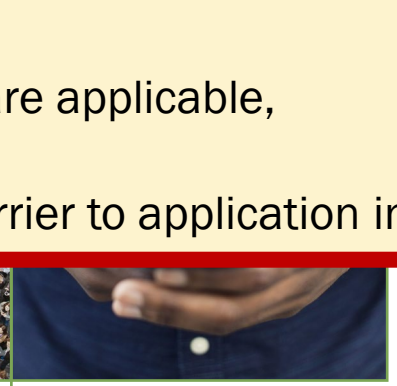


Preventative care and risk profiling

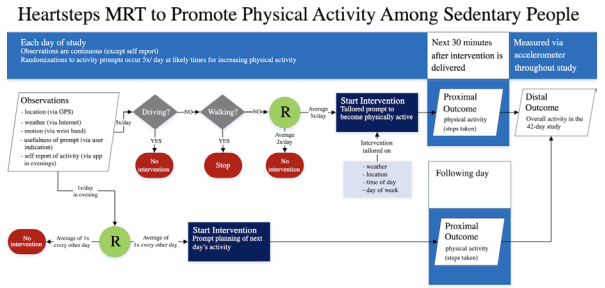




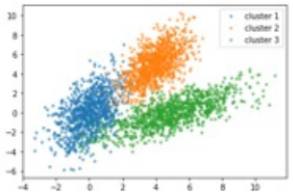
Population health



Patient self-management

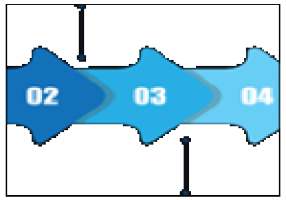


How is generative and multimodal AI different?

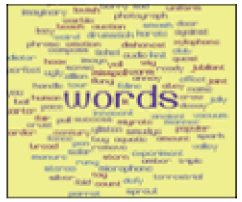


Exploring & Describing Data

Predicting Prespecified Outcomes



Supporting Sequences of Decisions



Language Data Processing & Production

Image Data Processing & Production

Unimodal, single-task AI models

Multimodal, Multipurpose AI Models

R&D Directions in AI for Healthcare

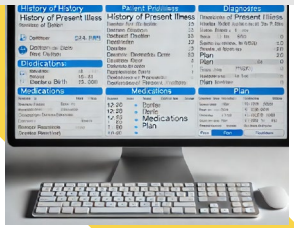
- Example of AI Scribe progression with emerging methods capabilities

Input Data

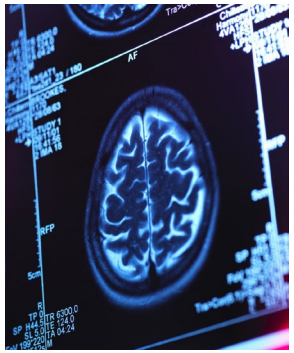
Output

Unimodal, single-task model

EMR Notes

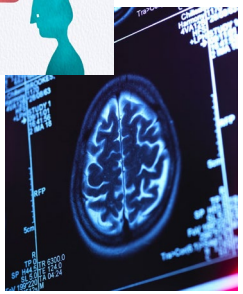


Multimodal, single-task model



EMR Notes

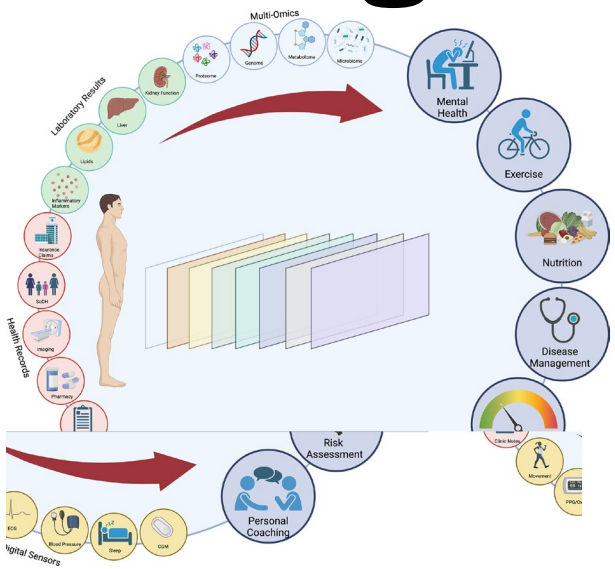
Multimodal, general-purpose model



Response to prompt (suggested diagnosis, treatment, follow-up tests, etc.)

+ additional end user(s)

Lots of excitement. Several challenges. Largescale success TBD.



CellPress

Cell Metabolism

Review

Transforming the cardiometabolic disease landscape: Multimodal AI-powered approaches in prevention and management

Evan D. Muse[1,2] and Eric J. Topol[1,2,*]
[1]Scripps Research Translational Institute, Scripps Research, La Jolla, CA 92037, USA
[2]Division of Cardiovascular Diseases, Scripps Clinic, La Jolla, CA 92037, USA

Towards Generalist Biomedical AI

Tao Tu*, ‡, [1], Shekoofeh Azizi*, ‡, [2],
Danny Driess[2], Mike Schaekermann[1], Mohamed Amin[1], Pi-Chuan Chang[1], Andrew Carroll[1],
Chuck Lau[1], Ryutaro Tanno[2], Ira Ktena[2], Basil Mustafa[2], Aakanksha Chowdhery[2], Yun Liu[1],
Simon Kornblith[2], David Fleet[2], Philip Mansfield[1], Sushant Prakash[1], Renee Wong[1], Sunny Virmani[1],
Christopher Semturs[1], S Sara Mahdavi[2], Bradley Green[1], Ewa Dominowska[1], Blaise Aguera y Arcas[1],
Joelle Barral[2], Dale Webster[1], Greg S. Corrado[1], Yossi Matias[1], Karan Singhal[1], Pete Florence[2],
Alan Karthikesalingam†, ‡,[1] and Vivek Natarajan†, ‡,[1]

[1]Google Research, [2]Google DeepMind

NEJM AI 2024; 1 (8)
DOI: 10.1056/AIp2400289

PERSPECTIVE

Evolution of Future Medical AI Models — From Task-Specific, Disease-Centric to Universal Health

Weizhi Ma, Ph.D.,[1] Bin Sheng, Ph.D.,[2,3] Yang Liu, Ph.D.,[1,4] Jing Qian, Psy.D.,[5] Xiaoxuan Liu, Ph.D.,[6]
Jingshan Li, Ph.D.,[7] David Ouyang, M.D.,[8] Haibo Wang, M.B., B.S., M.P.H.,[9] Atanas G. Atanasov, Ph.D.,[10,11]
Pearse A. Keane, M.D.,[12,13] Wei-Ying Ma, Ph.D.,[1] Yih-Chung Tham, Ph.D.,[14,15,16,17] and Tien Yin Wong, M.D., Ph.D.[14,18]

Ethics and governance of artificial intelligence for health: Large multi-modal models

Risks to be addressed		What can be done, and by who		
Development phase		Developer actions		Government actions
Bias	Privacy	Certification/training for programmers		Have and enforce strong data protection laws
		Data protection impact assessments		Issue target product profiles
		Training data collected with 'best-practice' data protection rules		Mandate outcomes (predictability, interpretability, corrigibility, safety, cybersecurity)
Labor concerns	Carbon and water footprints	Training data are refreshed, up-to-date, and context-appropriate		Introduce pre-certification programmes to identify and avoid ethical risks
		Ensure transparency of training data		Conduct audits during early AI development
False information	Safety and cyber security	Fair wages and support to data workers		Require developers to address carbon and water footprints
		Involve diverse stakeholders in design		Require developers to label AI-generated content for users

Perspective

Foundation models for generalist medical artificial intelligence

https://doi.org/10.1038/s41586-023-05881-4
Received: 3 November 2022

Michael Moor[1,6], Oishi Banerjee[2,6], Zahra Shakeri Hossein Abad[3], Harlan M. Krumholz[4],
Jure Leskovec[1], Eric J. Topol[5,7]✉ & Pranav Rajpurkar[2,7]✉

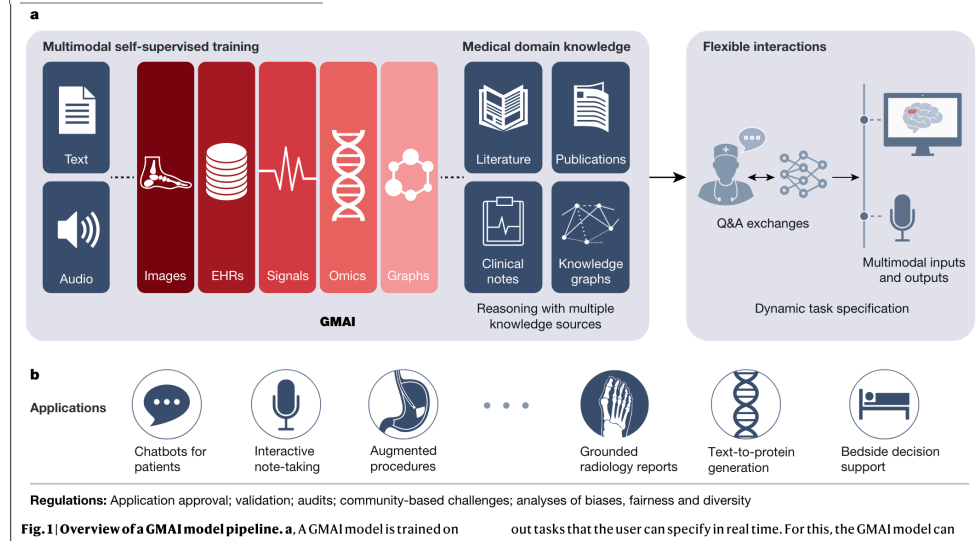


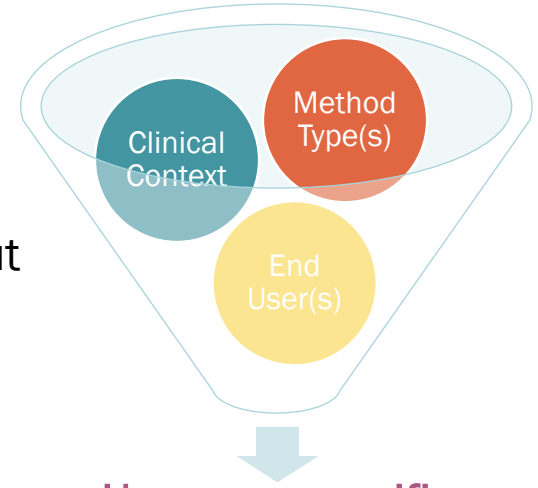
Fig. 1 | Overview of a GMAI model pipeline. a, A GMAI model is trained on out tasks that the user can specify in real time. For this, the GMAI model can

What is needed for AI to work well?

Striving for Effective and Equitable Applications of AI for Healthcare

Many exciting possibilities for benefit and positive change!

- Improve patient care
- Reduce provider burnout
- Broaden care access
- More cost-efficiency
- Improve health equity



Use case specific considerations

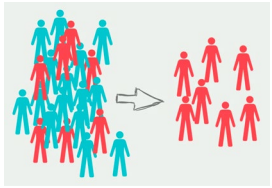
Potential to do harm, replicate biases, and exacerbate inequities.

- Bias and safety risks
- Ethical and legal challenges
- Training and implementation costs
- Data privacy and security
- Exacerbate digital divide

Necessities for Effective and Equitable Applications of AI for Healthcare

Problem Selection

Data Decisions



AI Model Development

Evaluation

Distribution & Deployment

Training & Human Use

Lifecycle Management

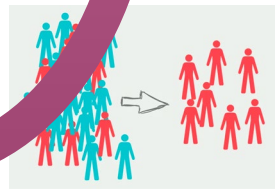
*Any given project may not move linearly through these stages.
*Most do not make it through all the stages.

Lots of skills and expertise needed!

Necessities for Effective and Equitable Applications of AI for Healthcare

Problem Selection

Data Decisions



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**Most do not make it through all the stages.*

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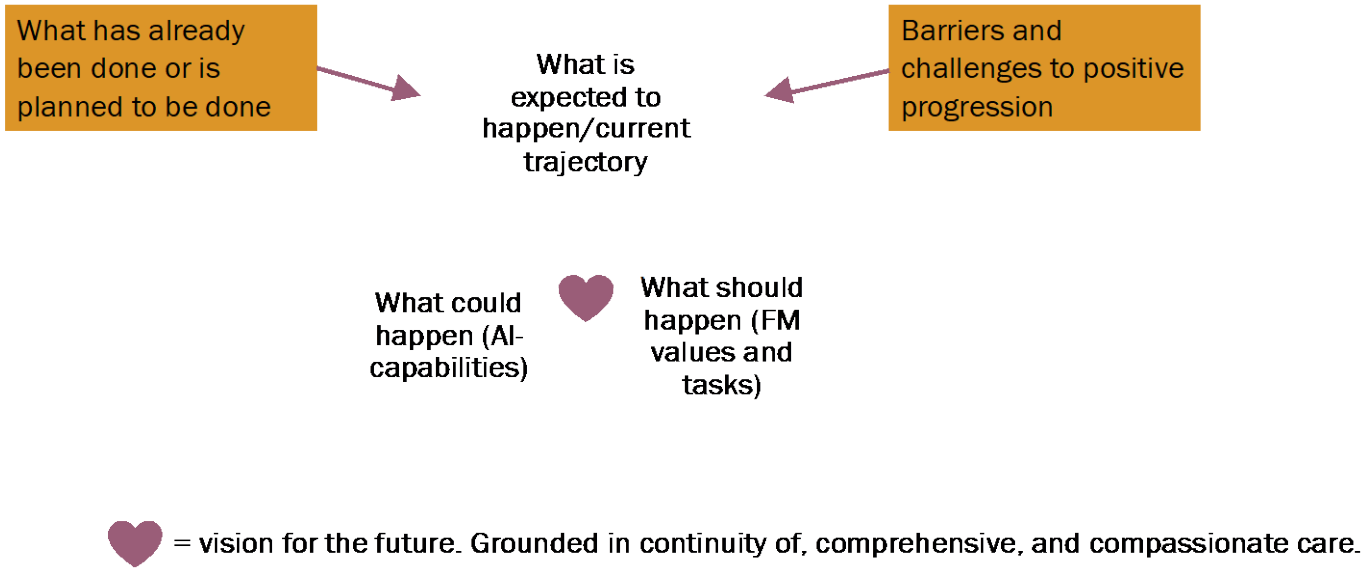
CFPC Invitational Roundtable (April 2022)



Candidate action items for the CFPC to support positive progress in AI for family medicine (FM) research
Develop and disseminate a **formal statement** about values and principles necessary in AI for FM
Support **existing high-quality FM data efforts**
Establish national **research priorities**
Support **dissemination and discussion** of research addressing applications of AI for FM
Work with CFPC's Foundation for Advancing Family Medicine to **fund proof-of-concept grants**
Take leadership role in **new dataset creation**
Initiate and support **national, interdisciplinary community** of people interested in AI for FM
Promote FM representation on AI development initiatives
Develop initiatives to **support FM leaders** to build capacity in research
Support **AI-related partnerships within academic departments of FM**

***Note**: Order of items is not meaningful.*

THE COLLEGE OF FAMILY PHYSICIANS OF CANADA
LE COLLÈGE DES MÉDECINS DE FAMILLE DU CANADA
AMS advancing innovative healthcare with compassion at its core

Kueper JK, Emu M, Banbury M, et al. Artificial intelligence for family medicine research in Canada: current state and future directions: Report of the CFPC AI Working Group. *Canadian Family Physician*. 2024;70(3):161-168. doi:10.46747/cfp.7003161

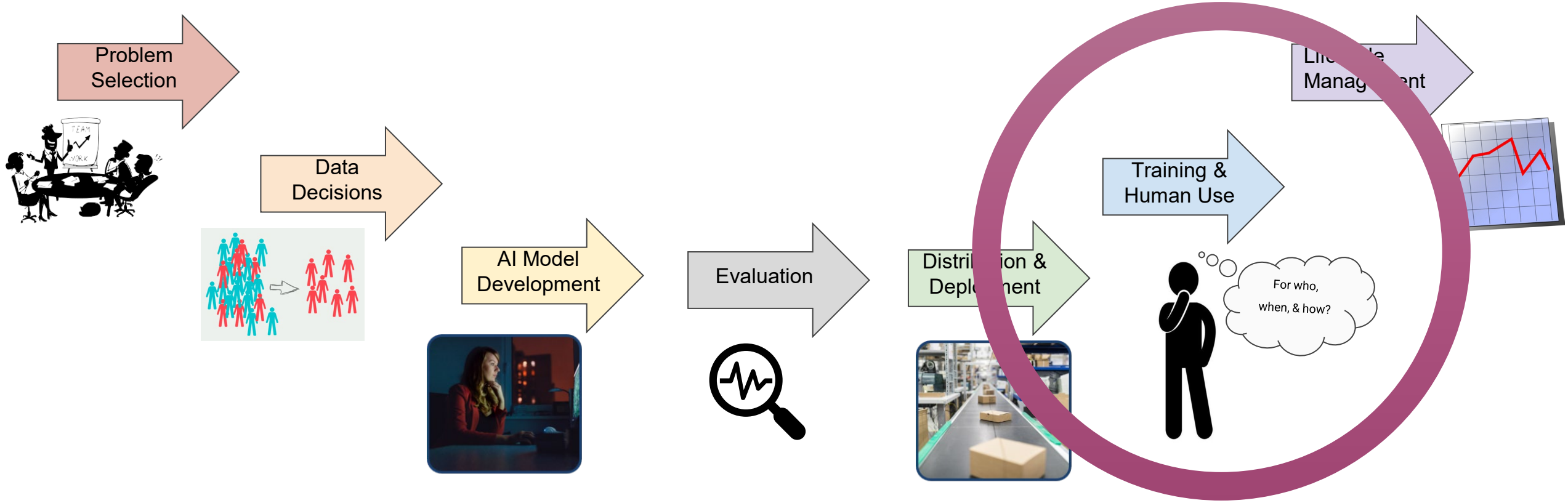
CFPC Statement of Guiding Principles on AI for Family Medicine

1. AI tools should address problems that have a direct or indirect impact on family medicine.
2. AI tools should support team-based care.
3. AI tools should be trained and validated using representative family medicine data.
4. AI modeling must follow sound technical practice, respecting the unique nature of family medicine.
5. AI tool development should include user-centered design and co-development.
6. AI tools should be rigorously evaluated before widespread implementation in practice.
7. AI tool deployment and scale-up should be equity-enhancing.
8. AI tools should be sustainable.

Family medicine functions and values.
Equity, diversity, and inclusion.
Knowledge translation and transparency.

The College of Family Physicians of Canada. *CFPC Statement on Artificial Intelligence*. 2024. https://www.cfpc.ca/CFPC/media/Resources/Health-Policy/CFPC-Statement-on-AI-for-FM-FINAL.pdf

Necessities for Effective and Equitable Applications of AI for Healthcare



*Any given project may not move linearly through these stages.
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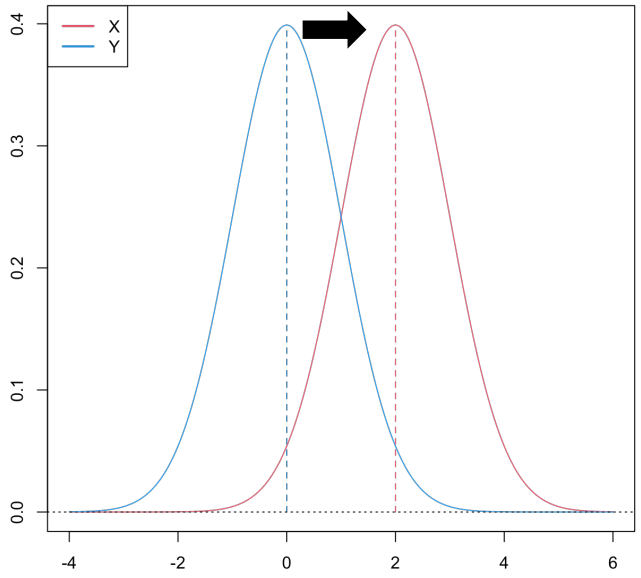
Lots of skills and expertise needed!

Physician Education



2021 Survey: Desired role from “never/forced adopter” to “innovator” shifted when assuming adequate training & education

- Similar trends for autonomy and selection of AI tools for use in clinical practice

https://cfpclearn.ca/ai-for-family-medicine/

THE COLLEGE OF FAMILY PHYSICIANS OF CANADA
LE COLLÈGE DES MÉDECINS DE FAMIL DU CANADA
AMS
advancing innovative healthcare with compassion at its core

Provider Education

Discussion | Special Reports

Competencies for the Use of Artificial Intelligence in Primary Care

Winston Liaw, Jacqueline K. Kueper, Steven Lin, Andrew Bazemore and Ioannis Kakadiaris

The Annals of Family Medicine November 2022, 20 (6) 559-563; DOI: https://doi-org.proxy1.lib.uwo.ca/10.1370/afm.2887

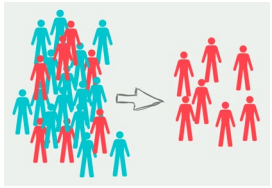
Domain	Bottom Line	Competency
Foundational knowledge	What is this tool?	Clinicians will explain the fundamentals of AI, how AI-based tools are created and evaluated, the critical regulatory and socio-legal issues of the AI-based tools, and the current and emerging roles of AI in health care.
Critical appraisal	Should I use this tool?	Clinicians will appraise the evidence behind AI-based tools and assess their appropriate uses via validated evaluation frameworks for health care AI.
Medical decision making	When should I use this tool?	Clinicians will identify the appropriate indications for and incorporate the outputs of AI-based tools into medical decision making such that effectiveness, value, equity, fairness, and justice are enhanced.
Technical use	How do I use this tool?	Clinicians will execute the tasks needed to operate AI-based tools in a manner that supports efficiency and builds mastery.
Patient communication	How should I communicate with patients regarding the use of the tool?	Clinicians will communicate what the tool is and why it is being used, answer questions about privacy and confidentiality, and engage in shared decision making, in a manner that preserves or augments the clinician-patient relationship.
Unintended consequences (cross-cutting)	What are the "side effects" of this tool?	Clinicians will anticipate and recognize the potential adverse effects of AI-based tools and take appropriate actions to mitigate or address unintended consequences.

10,000 Foot View: AI for Health Activity

Up until recently, most AI for health R&D activity was here.
Target: Technical performance on retrospective data and controlled settings.

Problem Selection

Data Decisions



AI Model Development

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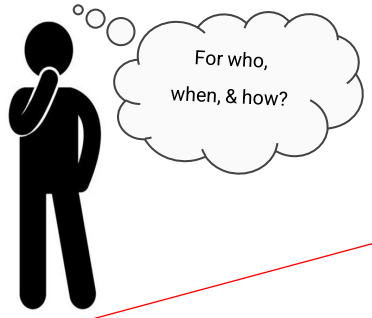


Lifecycle Management

Demonstrated value of teamwork and proper target problem definition is steadily growing.

Newer, rapid development & discovery.
Target: Prospective, 'real world' outcomes.

Statements, Guidelines, and Efforts*

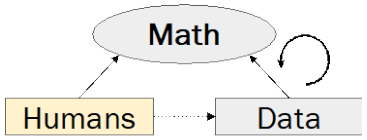
- CIFAR AI for Health Task Force Report
- Royal College Task Force & Report
- CAR AI white papers & initiatives
- CFPC Roundtable Report
- CFPC AI Statement
- AMS Nursing reports
- World Health Organization AI Ethics & Governance of AI
- World Health Organization Multimodal AI Guidance
- OECD AI Principles
- IMDRF AI Medical Devices
- Health Canada Premarket Guidance
- Good Machine Learning Practice Principles
- Canada Health Infoway AI Implementation Toolkit
- Healthcare Excellence Toolkit
- Health AI Partnership (best practices from US)

*Not a complete list of interesting and potentially useful resources

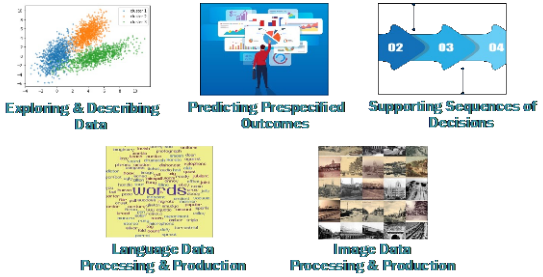
Summary

01. What is AI?

Many things; most commonly:



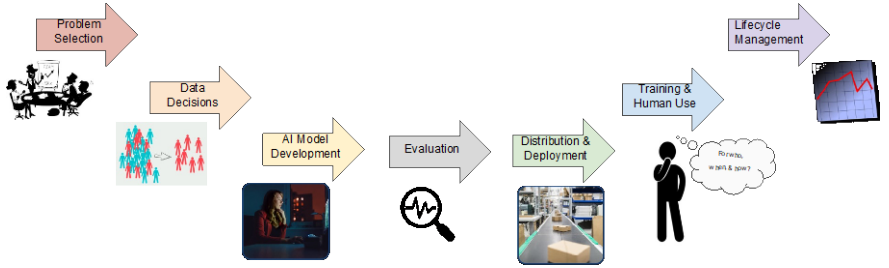
02. What can AI do for us?



03. Where can AI be applied in healthcare?

04. What is needed for AI to work well?

Interdisciplinary teamwork



05. Discussion

Questions? Comments?

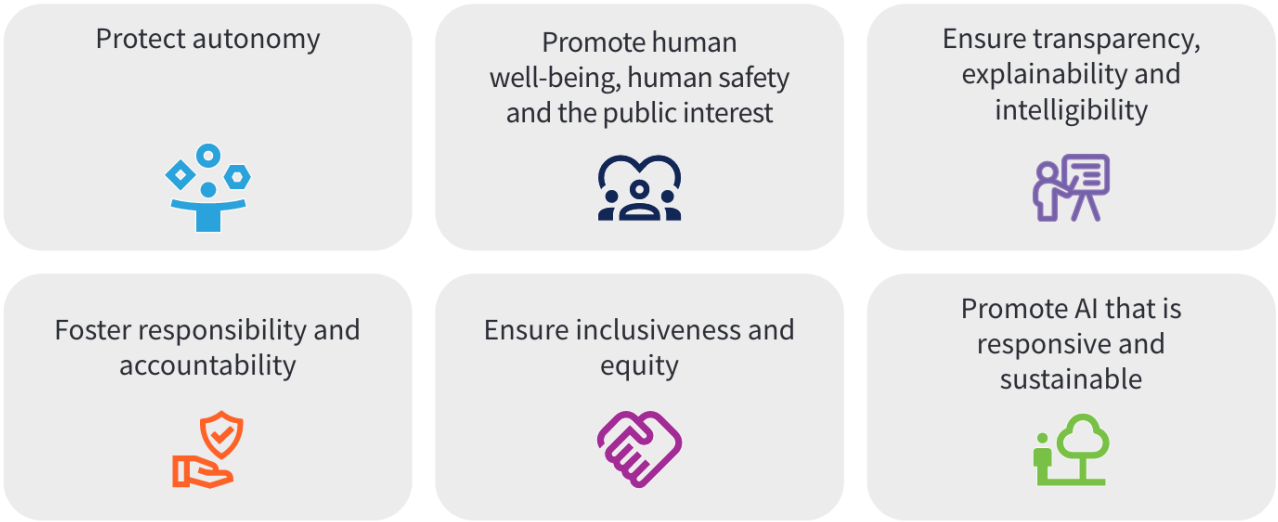
Thank you

International Guidelines

OECD Principles for Trustworthy AI (2024)

https://oecd.ai/en/principles

WHO Ethics and Governance of AI for Health (2021, 2024)



https://www.who.int/publications/i/item/9789240084759