Healthcare's AI Revolution: A Patient-First Perspective

Sacha Davis & Ehsan Misaghi





Brainstorming

- Sacha & Ehsan intro
- Ehsan: Intro to AIMSS (5-10 mins)
  - Major history/milestones
  - Mision, vision, and values
- Sacha: (~20) Definitions of AI, How AI is reshaping healthcare
  - Foundation models - solve every problem
  - Large language models
  - Agents
  - Examples of AI projects, research, startups, integration
  - Issues w/ AI in healthcare and what AIMSS is trying to go
- Ehsan: (10 mins) Opportunities in Patient Advocacy, Vision for collaboration with Patient Partners, how to reach out
  - Patients' (potential) role in Health AI
  - Our previous experience in event planning (also AI scribe)
  - Potential roles for AIMSS x PAN

Who are we?



Sacha Davis, MSc

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Ehsan Misaghi, MSc

Education Co-Lead, AI+Health Hub; MD/PhD Student, University of Alberta

Co-Founder and Director of Education, Innovation & Research, AI in Medical Systems Society

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Bridging the gap between AI and healthcare practitioners

- 2019 - Started as a student group in UofA/UofT
- 2020 - Launched the AI in Healthcare Conference
- 2021 - Launched the Introduction to AI in Medicine course
- 2023 - Incorporated as a non-profit organization

Volunteer-run

National Not-for-profit Organization

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What do we offer?

Research
AI Scribes

Education
AI in Healthcare Course

Events
AI in Healthcare Conference

Networking
Join our network

Newsletter

Outreach
Speaking engagements

Podcast - ByteMed

Students
Student Chapters

Canada and USA

www.aimss.ca

2023

ARTIFICIAL INTELLIGENCE
X
MACHINE LEARNING

IN

MEDICINE

COURSE

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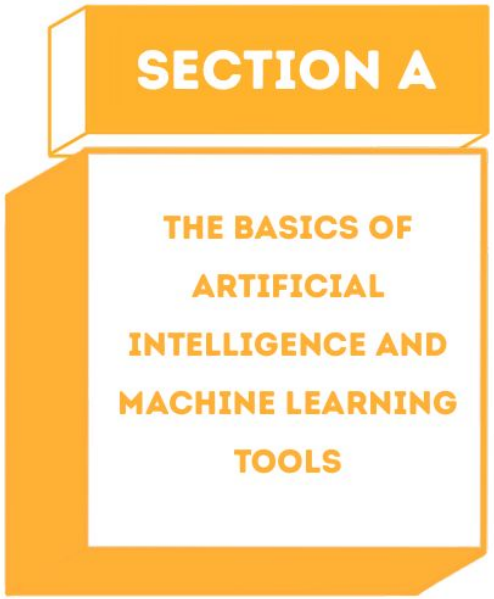
D.3. Case-based Learning and Wrap-Up

Learning Objectives (Students should be able to):

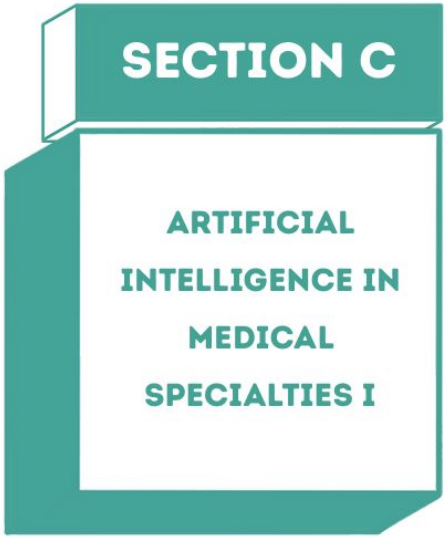
1. Describe how AI has been applied to the given study
2. Provide examples of how AI might transform the future of this discipline
3. Develop the ability to evaluate a medical AI paper

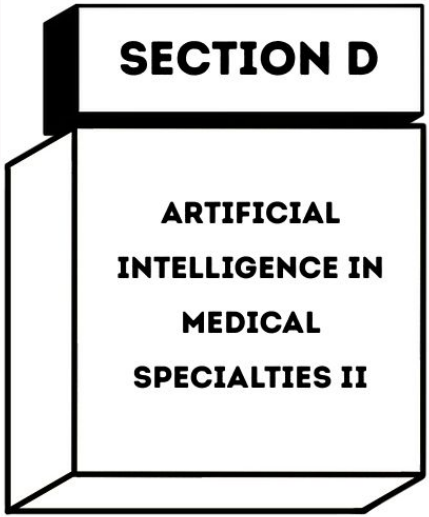
LECTURE SLIDES



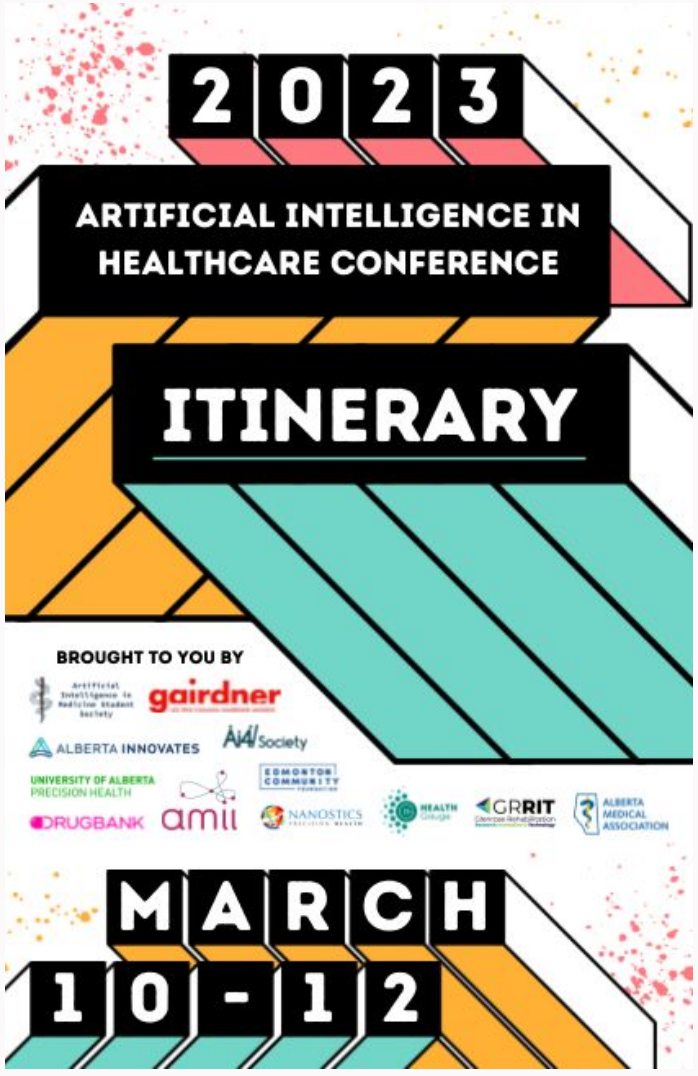


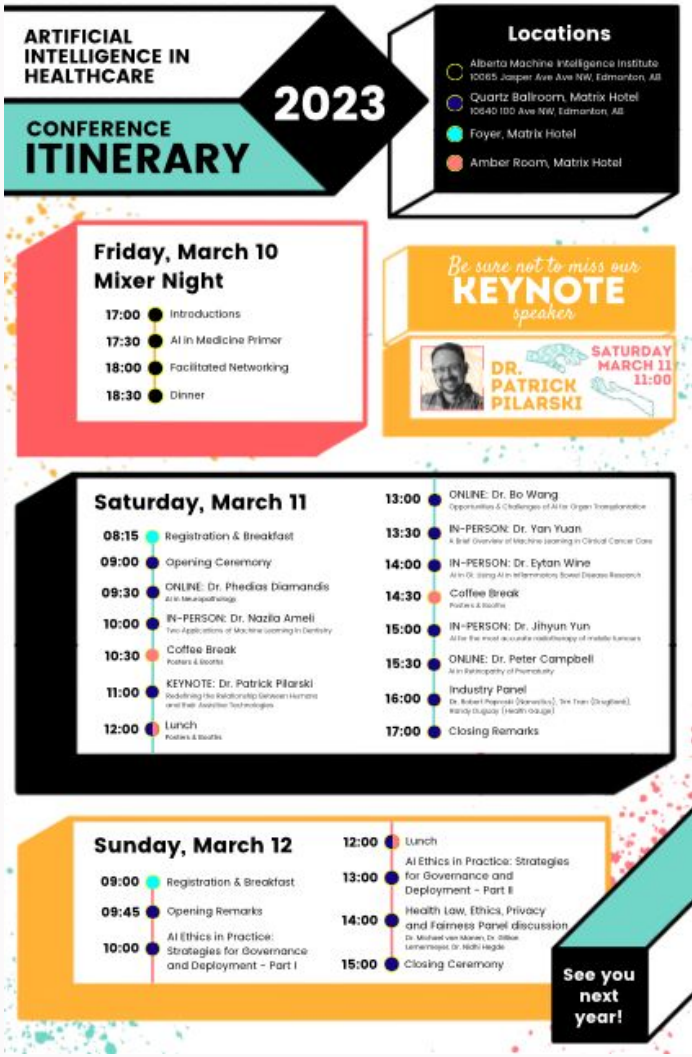






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recognizing good boys



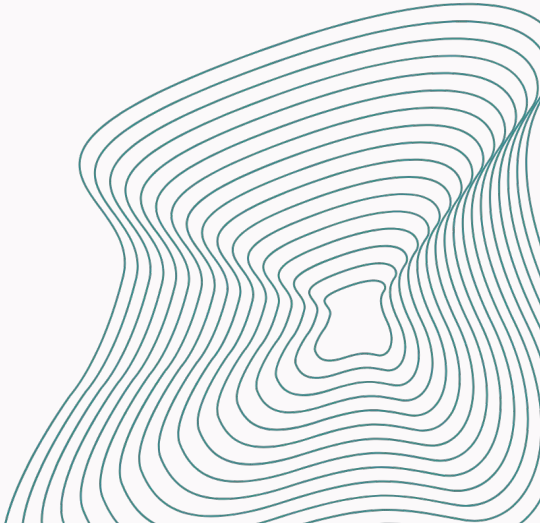





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TECHNOLOGY
SUPPORT GROUPS
HMW help her get involved in more social activities to feel less lonely
HMW teach people to balance living in both online and physical spaces
HMW reduce commute times to help nurses who travel throughout the province?
Online consults --> check in before hand to decide if a trip is necessary
Therapy Dogs
We could introduce K. Lehua to others with handicaps/ similar medical conditions
We could start with virtual meetings (especially because K. Lehua is already well-versed in using technology) - this way, K. Lehua has the option of anonymity and can leave whenever. In addition, this will allow people to get to know K. Lehua before being aware of their medical condition, which would also reduce the risk of judgement.
We could start with family and loved ones as opposed to friends
We could start by allowing K. Lehua to interact in smaller groups (perhaps with 1 or 2 people)
Use a facilitator at first (during the meeting) (eg a parent or trusted adult) so that K. Lehua will feel more comfortable to break out of her shell at first (also so that she isn't alone and doesn't get like bullied)
More structured or mandatory physical activity in schools
Posters to motivate new activities and stepping out of your comfort zone
Conversations about reducing the stigma for long hours of studying
HMW promote self-care for highschool students?
Health and Wellness student groups
Home economics classes
scientific posters and nice inspirational ones :)
How might we make information regarding those resources more public user friendly?
Educate kids in schools
Have instructions in multiple formats (pictures, videos, words)
Hand out pamphlets after patients have check-ups
YouTube / video series instructions
Put information on bus stops
Make the info on an easier level to understand
Make resources accessible (ie. in locations near the doctor's office or where the people using it are likely to frequent)
Educating caretakers as well as patients
Repetition of information
Include resources to make patients more aware of potential problems (sitting times)
Include prices and alternatives of different products and points on information packets.
Incorporate discounts for patients (also also benefit stores by driving business)
Thermal Sensor
Electric Sensor
Adhesive
Pictoral Scale and pictograms
What if there was a product that we could send to patients that they could use that would be placed in the general location of their pain that would record signals from the brain and the data back to their doctors to analyze.
3D model visually showing the locations of pain and which surrounding regions might be affected (maybe color code them too?)
Provide a list of different intensities/types of pain
Use more specific words to describe pain for the doctor to see the patient, such as the specific type of feeling from the pain (sharp, dull, etc.)
Move from general areas of the body to more specific points, such as using specific bone structures to feel for
Create visual systems of describing pain (eg. diagrams, that allows patients and doctors to connect, add on to or pinpoint the pain location)
Using these as a visual vocabulary
Using these options to arrange they can make.
What could be the possible causes of the pain?
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Intro to AI in Healthcare: **Presentation Goals**



Presentation Goal #1:

ML in healthcare intuition

Presentation Goal #2:

ML in healthcare from a patient perspective

Presentation **NOT** Goal #1:

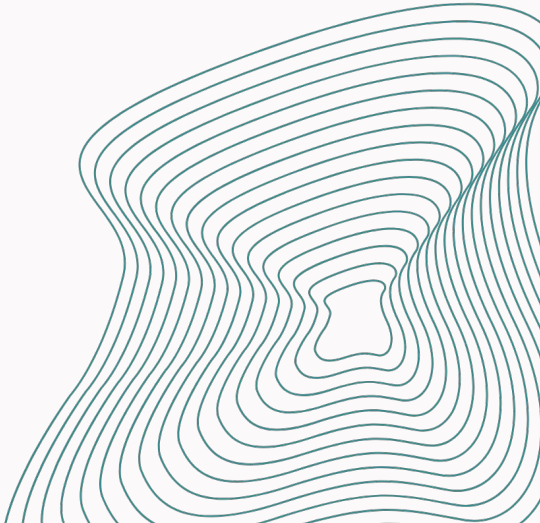
ML in healthcare technical details

Presentation **NOT** Goal #2:

Overwhelming you with information

In the chat:
What is the first thing that comes to mind when you hear “AI in Healthcare”?

AI in Healthcare:
Introduction



What is AI?

- “Intelligence” exhibited by machines or software
- Complex computer algorithms
- Perform functions that were not explicitly programmed



Pixar’s WALL-E

What can AI do?

Human intelligence

- Excels at pattern recognition
- Struggles with large datasets

Artificial Intelligence

- Integration of complex data
- Excels with large datasets - fast!
- Pattern recognition - catching up!

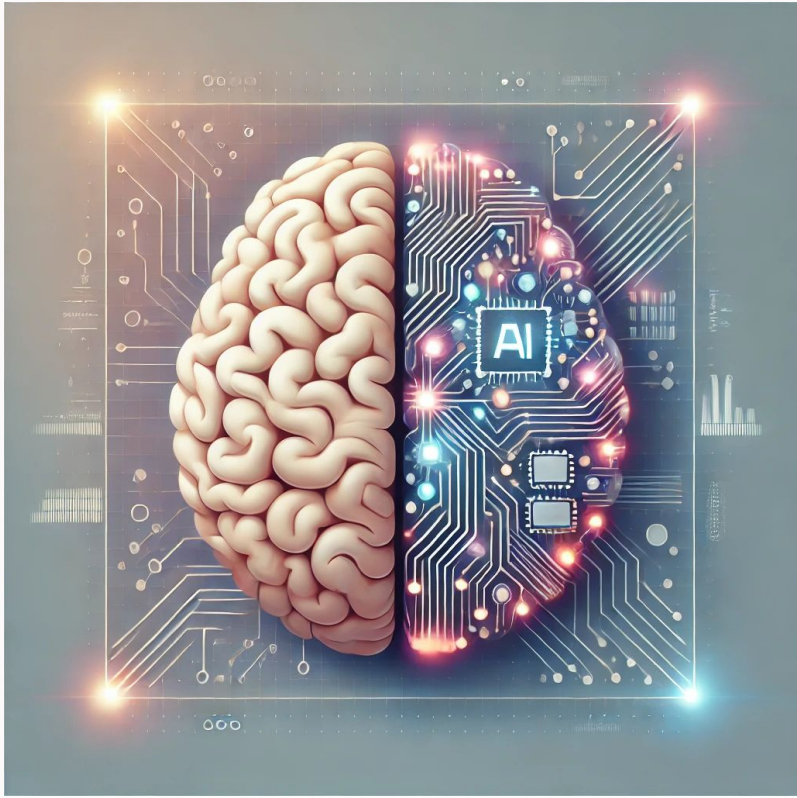


Image generated by DALL-E

Transforming Medicine:

7 Potential Roles of AI in Modern Healthcare

01 | **Operational Efficiency** and **Workflow Optimization**
02 | **Diagnostics** and **Imaging**
03 | **Treatment Planning** and **Personalized Medicine**
04 | **Predictive Analytics** and **Risk Assessment**
05 | **Remote Monitoring** and **Wearable Technology**
06 | **Virtual Health Assistants** and **Chatbots**
07 | **Health Record** Management and Processing



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Potential of AI in Healthcare



Reactive -> Proactive



Decrease provider burnout

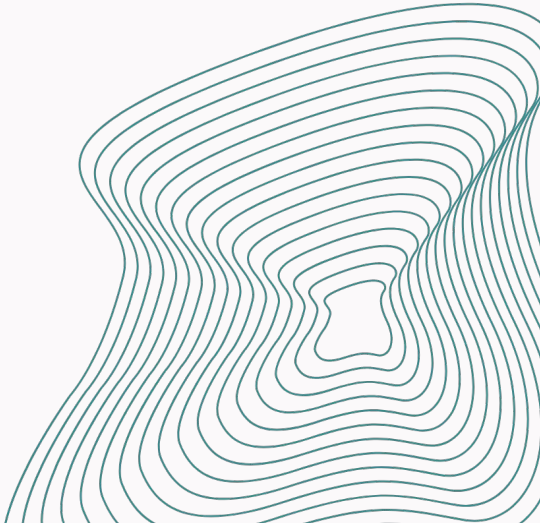


Increase quality of care



Make healthcare more human

AI in Healthcare:
Where are we going?



General Trends in AI

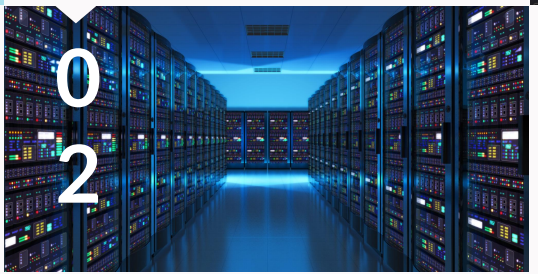


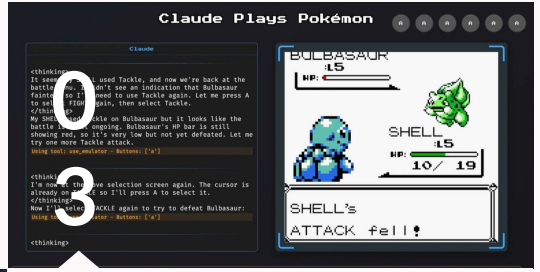
Large Language Models

Artificial intelligence systems trained on vast amounts of text data that can understand, generate, and manipulate human language for a wide range of tasks.

Foundation Models

Large-scale AI systems trained on diverse data that serve as versatile bases for developing specialized applications across multiple domains with minimal additional training.

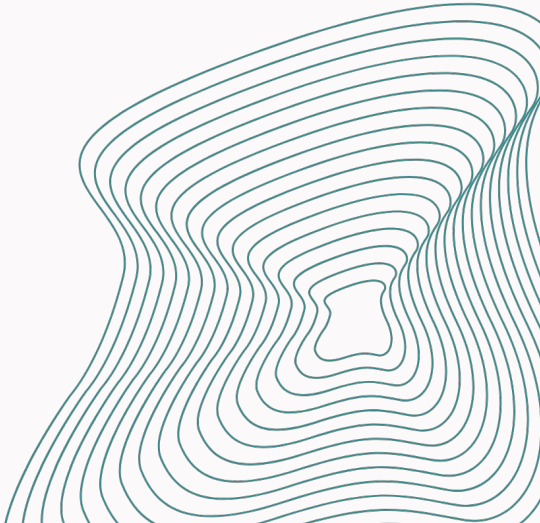




Agentic AI

Autonomous artificial intelligence systems that can plan, execute complex tasks, and interact with the world independently based on goals and feedback.

AI in Healthcare:
The patient perspective



“Will AI affect my privacy and data security?”

- AI systems need lots of data for training
  - diagnoses, medication information, encounter reports, test results, images…
- You have rights!
  - HIA, PHIPA, PIDA, PIPEDA…
- Transparency measures will vary from provider to provider



Image generated by DALL-E

“How will AI change my healthcare experience?”

- AI Scribes
- Personalized appointment timing
- Check-in messages between appointments
- Different verbiage
- Precise medication adjustments
- Virtual triaging
- Explanatory tools

“How are patients supposed to trust AI?”

01 | Transparency
02 | Human Oversight
03 | Explainability
04 | Proven Performance
05 | Accountability
06 | Cultural Sensitivity

07 | **Being part of the narrative!**



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AIMSS x PAN: Vision

- Direct access of the patients to their own health data
  → patient-centred care
- Active engagement of patient partners in the planning, design, and implementation of health AI solutions
- Role of patients in policy-making and shaping the future of health AI tools

AIMSS x PAN: Opportunities

- Incorporating patient partners and their voice in future events (from planning to execution)
- Matching patient partners with projects we/our network run
- Active engagement of patient partners as advisors for AIMSS (in the form of a formal advisory board or informal feedback)

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Join Our Team

https://www.aimss.ca

hello@aimss.ca

www.aimss.ca/join-us

AI in Healthcare
Examples

Rapid stroke detection

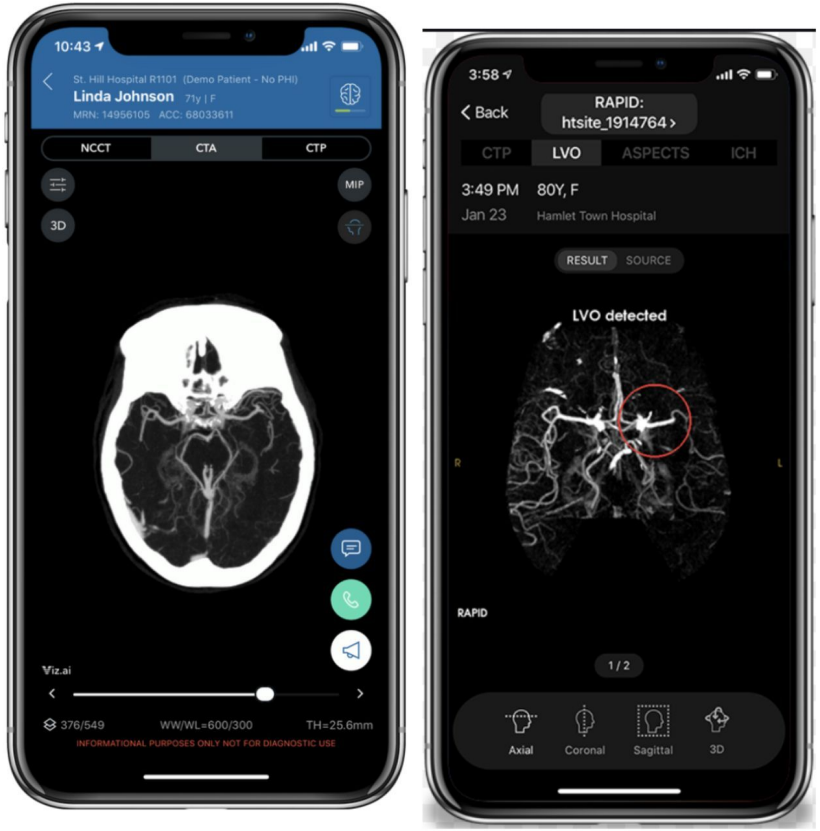
Viz LVO

- Detects large vessel occlusions
- Patient gets a CTA
- AI triages the scans
- An alert is sent to the care team

How does it perform?

- 0.75 PPV - some false positives
- 0.98 NPV - doesn't miss much!

Time is brain!



Viz LVO

PMID: 39237155

Surgical Safety

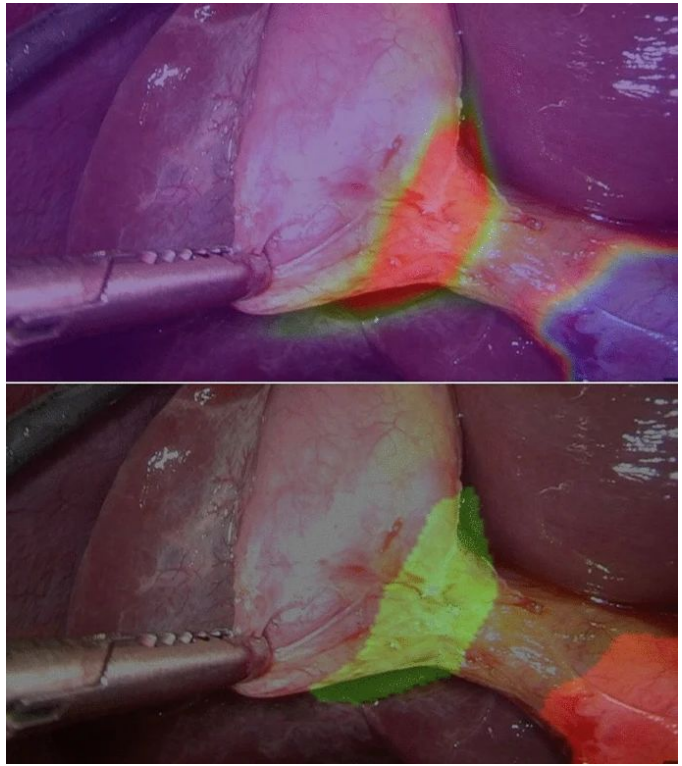
GoNoGoNet

- Laparoscopic cholecystectomy
- Identifies safe (go) and unsafe (no go) tissue regions

How does it perform?

- 90% agreement among human annotators
- GoNoGoNet has equivalent performance to humans

Reduce errors and complications



GoNoGoNet (PMID: 35918549)

Automated pathology

HAVOC

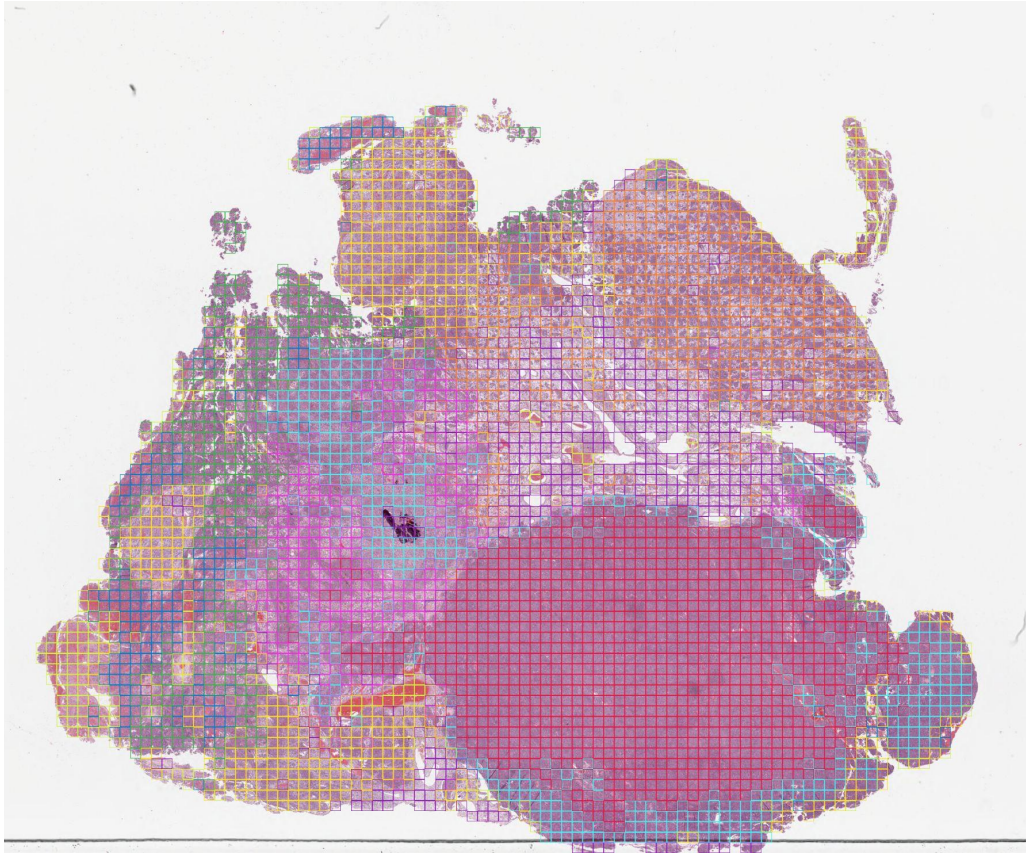
Histomic atlases of variation in cancer[1]

- Histology slides
- Automated segmentation
- Scanned images are tiled
- Tiles coloured based on tissue type

PHARAOH

Phenotypic and regional analysis of histology[2]

- Crowd-sourcing platform
- Users can develop additional AI tools
- Further classify the HAVOC regions



[1]PMID: 37774029
[2]PMID: 39820318

AI warning systems

ChartWatch

- Predict patient deterioration
- Analyzes patient age, sex, vital signs, and laboratory test results
- Sends an alert to nurse and doctor

How does it perform?

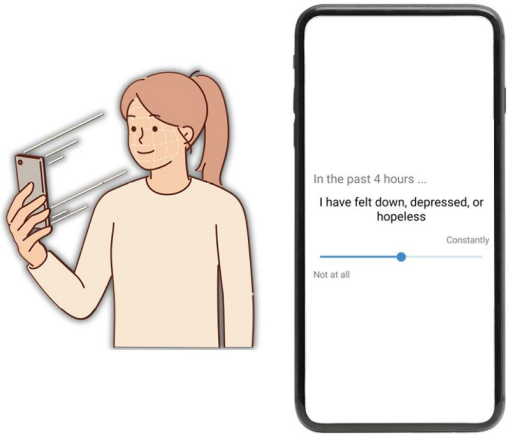
- Some false positives
- 26% reduction in unanticipated mortality!

PMID: 39284602



Early detection

Depression



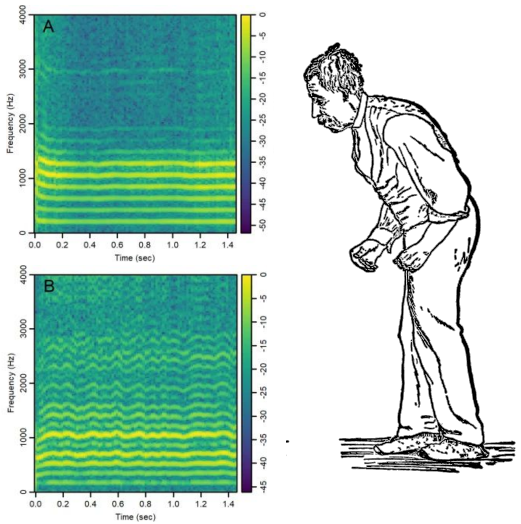
MoodCapture

Arrhythmia



Apple ECG

Parkinson's



PMID: 37996478

AI Scribes

ScribeBerry

- Ambient scribe
- Large language model (LLM)
- Automated transcription
- Automated chart notes

How do AI scribes perform?

- Early evidence shows
  - Reduced administrative burden
  - More quality time with patients
- Review is important to eliminate errors

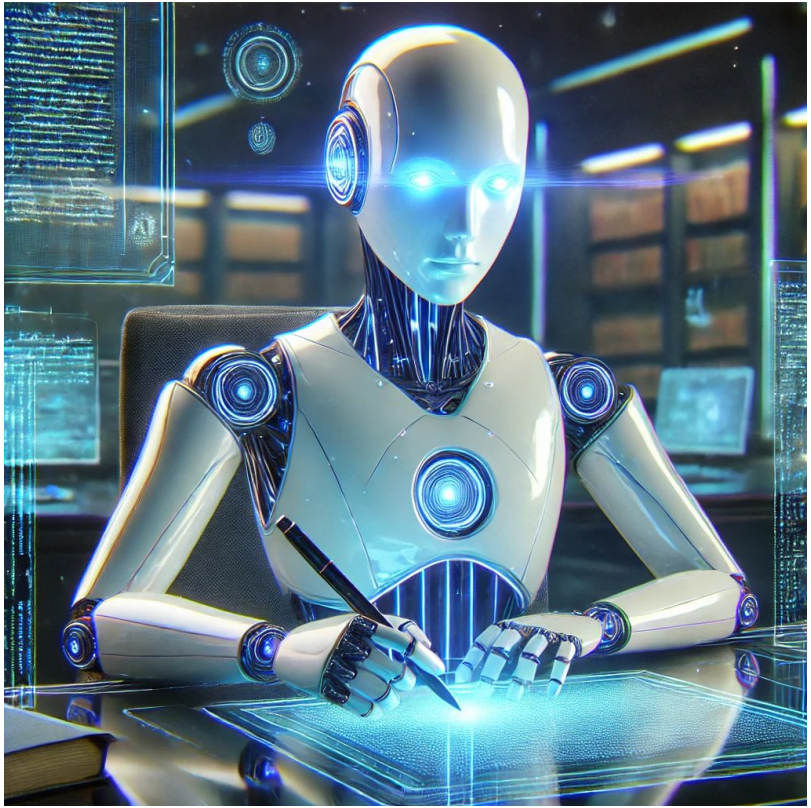


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