Part 2

Lecture 1b How can AI help me? (continued)

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Who I am…

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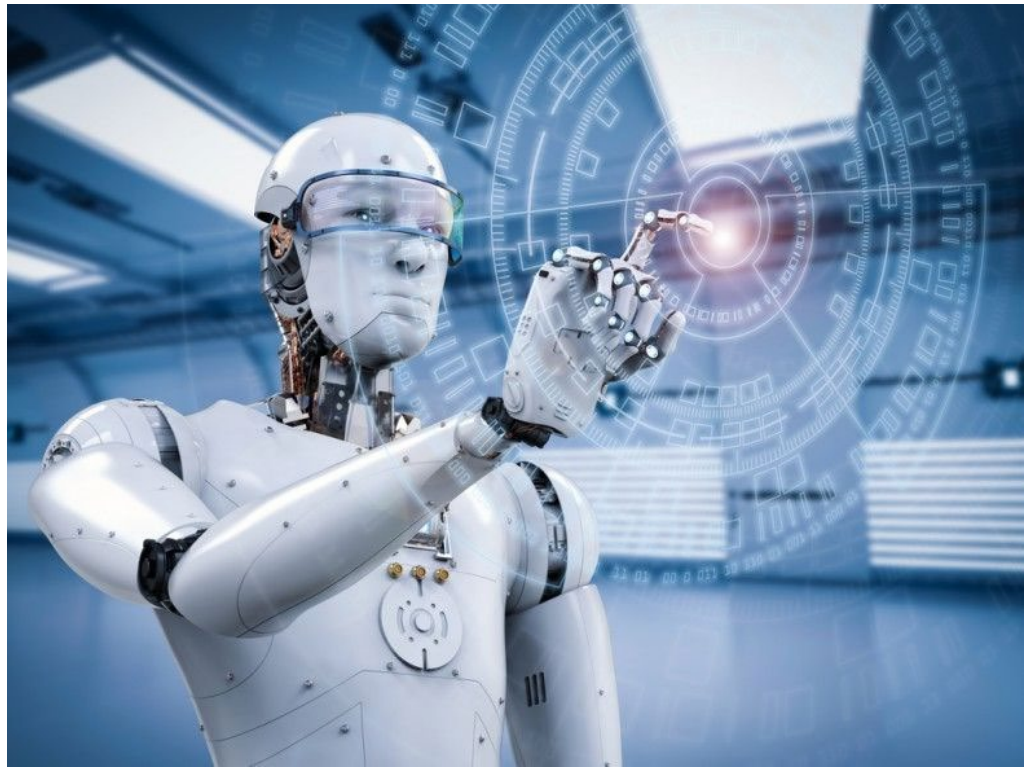
How does AI help?

- Decision making
- Efficiency
- Accuracy
- Precision
- User needs

Accuracy

Coupled with rapid improvements in computer processing, these AI-based systems are already improving the accuracy and efficiency of diagnosis and treatment across various specializations.



Accuracy and Drug Dosage

Tapering the dose of a steroid, proved exceptionally tricky across the board.

- Physicians often made dosage mistakes, at one medical site the error rate reached 50 percent
- Reinforced learning can dramatically cut toxic chemotherapy and radiotherapy by optimizing treatment plans and drug dosages for glioblastoma patients

Machine-learning algorithm cuts drug doses by as much as 50% for glioblastoma patients https://www.radiologybusiness.com/topics/artificial-intelligence/machine-learning-algorithm-cuts-drug-doses

Accuracy and Drug Dosage

- The model first goes through a database of traditionally administered regimens drawn from decades of animal studies, observational trials and clinical practice, then decides whether to initiate or withhold a dose during each planned dosing interval.

- If the model decides to administer a dose, it then determines whether the full dose, or just a portion, is necessary for optimal treatment.

Precision

- Cognitive assisted robotics which is considered minimally invasive whereby large incisions are replaced with a series of quarter-inch incisions and utilize miniaturized surgical instruments.

- Furthermore, surgeons integrate the data from patient pre-op medical records with real-time operating metrics to improve surgical outcomes

Ahuja A. The impact of artificial intelligence in medicine on the future role of the physician. Peer J. 2019; 7.

Da Vinci Surgical System

FOCUS: Surgical system with robotic limbs which provides a high-definition, magnified, 3-D view of the surgical site

It facilitates complex surgery using a minimally invasive approach and is controlled by a surgeon from a console.

- On the administrative side of healthcare, they can automate non-patient care activities such as writing chart notes, prescribing medications, ordering tests.

Da Vinci SP: For narrow access surgery
Da Vinci Xi

Information cart: carries the information

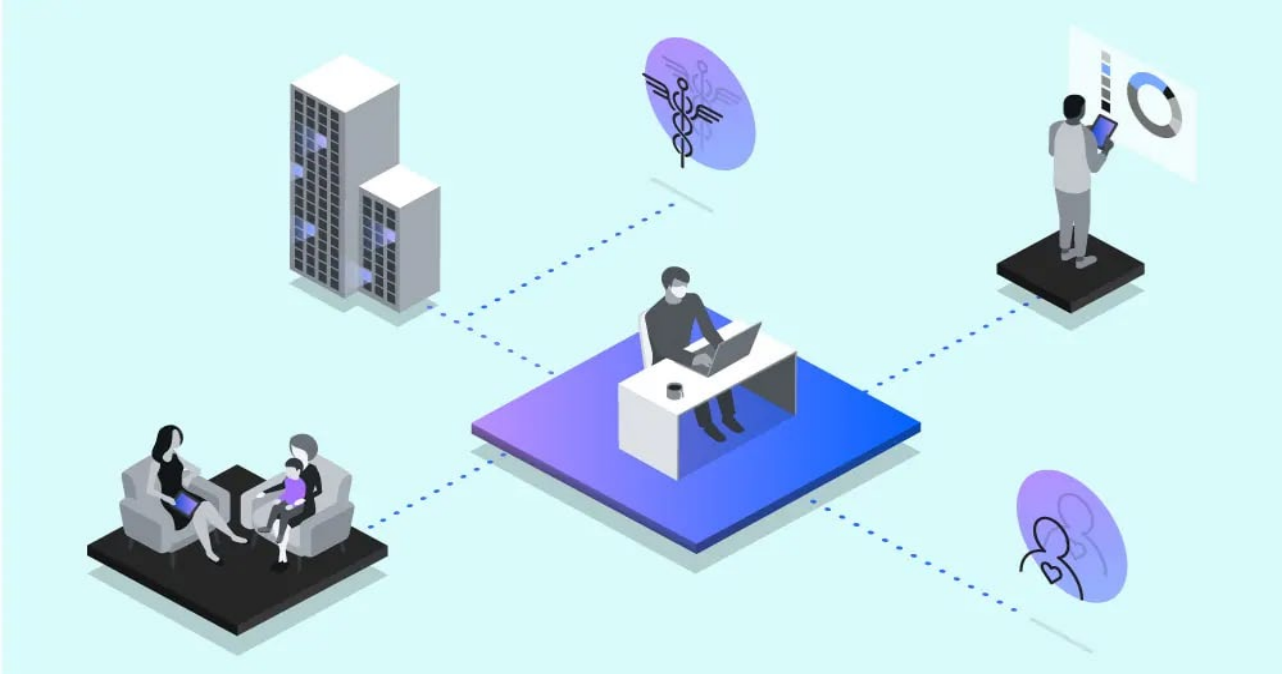
Therefore...

Such AI-based systems that depend on machine learning help healthcare providers cut documentation time and improve reporting quality

Supporting User Needs

AI can look for data to help people find full health information

The tool would perform routine reading tasks such as quantification, segmentation and pure pattern recognition



Identifies insights from patient data

AI tools search structured and unstructured medical records to provide relevant patient histories

Target similarities and patterns: AI identifies patterns and help researchers create patient cohorts for studies and clinical trials

IBM group. Artificial Intelligence in Medicine. IBM Watson. Available from: https://www.ibm.com/watson-health/learn/artificial-intelligence-medicine

The physicians who used documentation support such as dictation assistance or medical scribe services engaged in more direct face time with patients than those who did not use these services.

EHR- Electronic Health Records

EHRs: digital versions of the paper charts in which doctors used to record patients' visits, laboratory results and other important medical information

- This was supposed to transform the practice of medicine and help patients

Room for Improvement: Problems with EHR

- Clunky interfaces.
- Information does not flow easily between providers
- The system lacks “the ability to seamlessly and automatically deliver data when and where it is needed under a trusted network without political, technical, or financial blocking,” according to a 2018 report from the National Academy of Medicine.
- If a patient changes doctors, visits urgent care or moves across the country, her records might or might not follow.

Solution to the EHR Problem

- As a stopgap measure, some hospitals now have scribes sit in on appointments to document the visit while the physician interacts with the patient.
- But several companies are working on digital scribes, machine-learning algorithms that can take a conversation between a doctor and a patient, parse the text and use it to fill in the relevant information in the patient's EHR.

Impact on radiologists as machine learning/artificial intelligence is more integrated into clinical practice

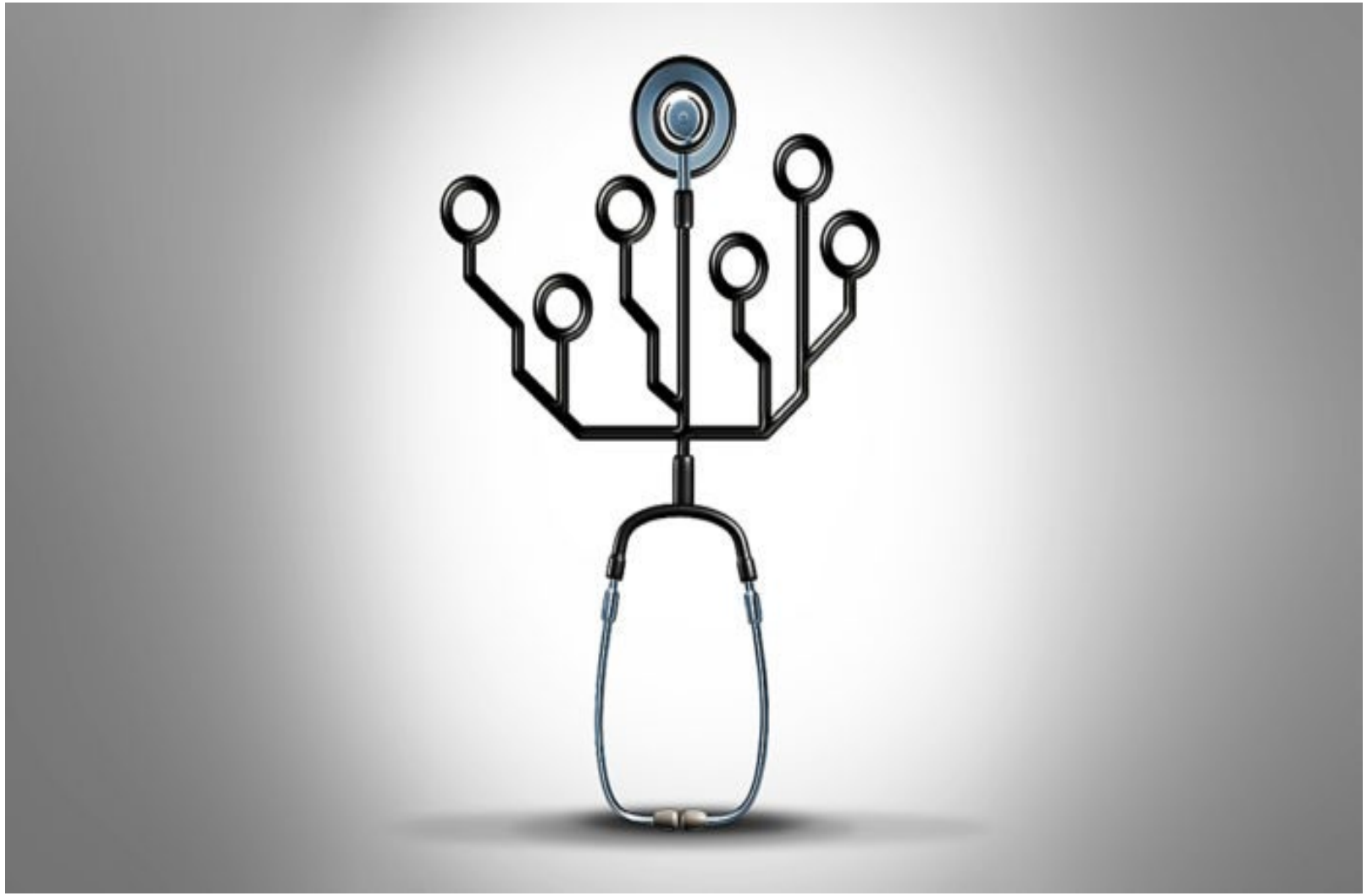
Radiologists and AI/ML

- AI will become a routine part of radiologists' lives and make their work more efficient and accurate
- Healthcare systems already possessing an effective data collection strategy may be better suited to implement AI-based applications for data management.
- It is a possibility within the next 10 years that medical images will first be pre-analyzed by an AI tool before being reviewed by a radiologist.

Radiology and AI

In this first stage AI systems perform automatic segmentation of various structures within CT and MR images - Quantification

This will help isolate and identify pathologic lesions for analysis and will yield significant savings in time for radiologists

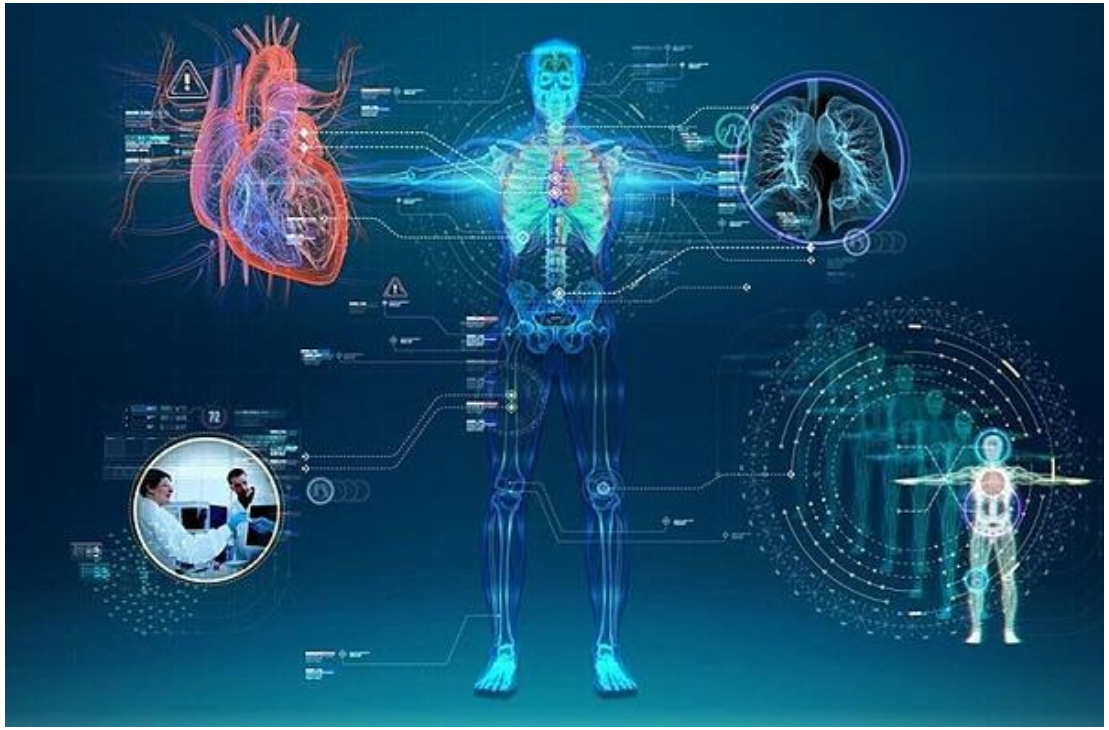


What About Doctors?

AI-based systems will augment physicians and are unlikely to replace the traditional physician–patient relationship.

AI was developed to work hand in hand with physicians and enhance the workplace

AI will help unlock new insights and accelerate breakthroughs in medicine which in turn can help improve clinical practice



Next Steps

The next breakthrough will come from AI utilizing the imaging data that is already available from imaging technologies such as ultrasound, CT, MRI, and PET

End of Lecture 1

Next up Part 3 Lecture 1: Image recognition in medical imaging