MISCONCEPTIONS ABOUT ARTIFICIAL INTELLIGENCE IN MEDICINE
A CLINICIAN- DATA SCIENTIST PERSPECTIVE

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Robots can’t take your job if you’re already retired.
His decisions aren’t any better than yours — but they’re WAY faster...
CLINICIANS WILL BE REPLACED BY AI

Operation

Perception
Medical Image Interpretation

Cognition
Complex Decision Making

Integrative Data Analytics

Creative Problem Solving
Design thinking involves observation to discover unmet needs within the context and constraints of a particular situation. It frames the opportunity and scope of innovation, generating creative ideas, testing and refining solutions. It creates a repeatable and scalable process for innovation.

**AI to Every Aspect of Healthcare**

**Design Thinking** designs products this way...

- **Empathize**: Learn about audience for whom you are designing. Who is my user? What matters to this person?
- **Define**: Create POVs based on user needs and insights. What are their needs?
- **Ideate**: Brainstorm as many creative solutions as possible. Wild ideas encouraged!
- **Prototype**: Model one or more of your ideas to show to others. How can I show my idea? Remember: A prototype is just a rough draft.
- **Test**: Share prototype for feedback. What worked? What didn’t?

**Machine Learning** refines, tunes and predicts this way...

- **Analyze**: Break down needs into each of base parts (decisions)
- **Synthesize**: Combine separate elements in order to create a new ‘whole’
- **Ideate**: Brainstorm to process the product requirement into:
  - Feature maps
  - Classes
  - Metrics
  - Adaptive needs
- **Tune**: Tune the model to boost accuracy. Avoid ‘over-fitting’
- **Validate**: Meet inference performance metrics. Avoid ‘over-fitting’

**Human-centered**

**Machine-centered**

Source: John Morley & Associates
AI CONQUERED GO (SO BIOMEDICINE IS EASY)
DO YOU HAVE TO USE FINGER QUOTES EVERY TIME YOU MENTION MY ARTIFICIAL "INTELLIGENCE"?
DL will be main AI tool for a long time.
THE AUC/ROC INDICATES AI PERFORMANCE
THE AUC/ROC VS PRECISION RECALL
I'm being sued for a missed diagnosis! What do I do now?!

Sorry, buddy, comes with the job.

When handing radiology over to artificial intelligence sounds appealing.
YOU HAVE TO PROGRAM TO CONTRIBUTE
WE NEED MORE DATA FOR DL IN MEDICINE
AI IS FOR IMAGE-FOCUSED SUBSPECIALTIES
PRIMARY CARE AND AI

CAN'T WE JUST USE ARTIFICIAL INTELLIGENCE TO MANAGE OUR SALES FUNNEL FOR US?

I FOUND FOUR PLACES THAT SELL FUNNEL CAKES FAIRLY CLOSE TO YOU.
AI will make clinicians less human
AI IS A BLACK BOX

Device X
Uses deep learning on medical images from retina for earlier diagnosis of diabetic retinopathy.
New Approach

Create a suite of machine learning techniques that produce more explainable models, while maintaining a high level of learning performance.

Learning Techniques (today)

- Neural Nets
- Graphical Models
- Deep Learning
- Bayesian Belief Nets
- Ensemble Methods
- Random Forests
- Markov Models
- Decision Trees
- SRL
- CRFs
- HMMs
- MUA

Deep Learning
- AOGs
- SVMs

Deep Explanation
- Modified deep learning techniques to learn explainable features

Interpretable Models
- Techniques to learn more structured, interpretable, causal models

Explainability (notional)

- Prediction Accuracy
- Explainability
AI in Medicine will be Here in the Future

The future is already here – it’s just not evenly distributed.

William Gibson
GO BENEATH THE SURFACE

Evidence-Based Medicine

Intelligence-Based Medicine
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