Artificial Intelligence and Medical Technology

Australian System Safety Conference

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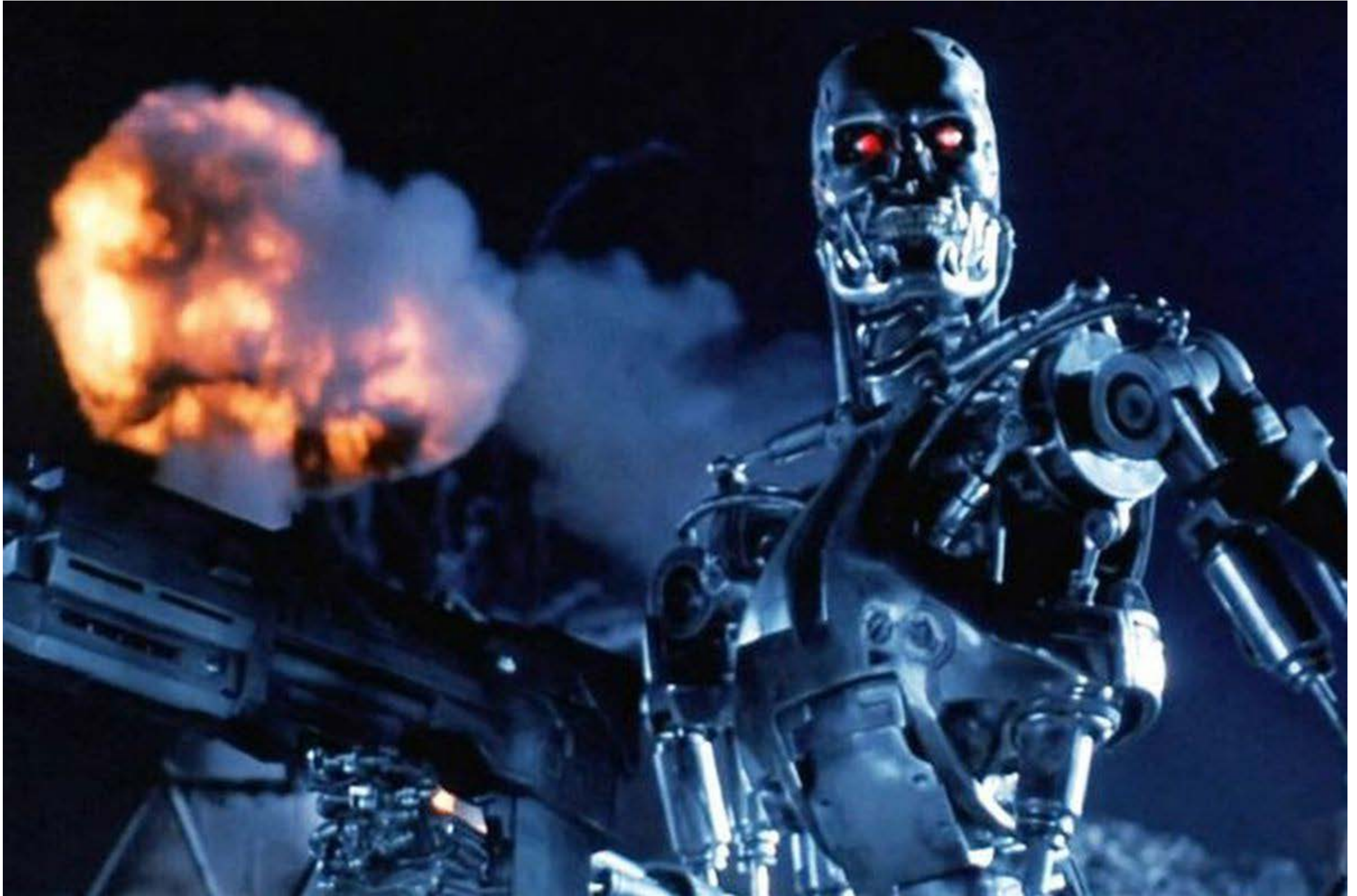**Technical Fellow**
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Artificial Intelligence

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Agenda

- What is AI?

- What are the main drivers for AI?

- AI in healthcare

- Safety risks associated with AI

- Can we be safe with AI?

- Risk management
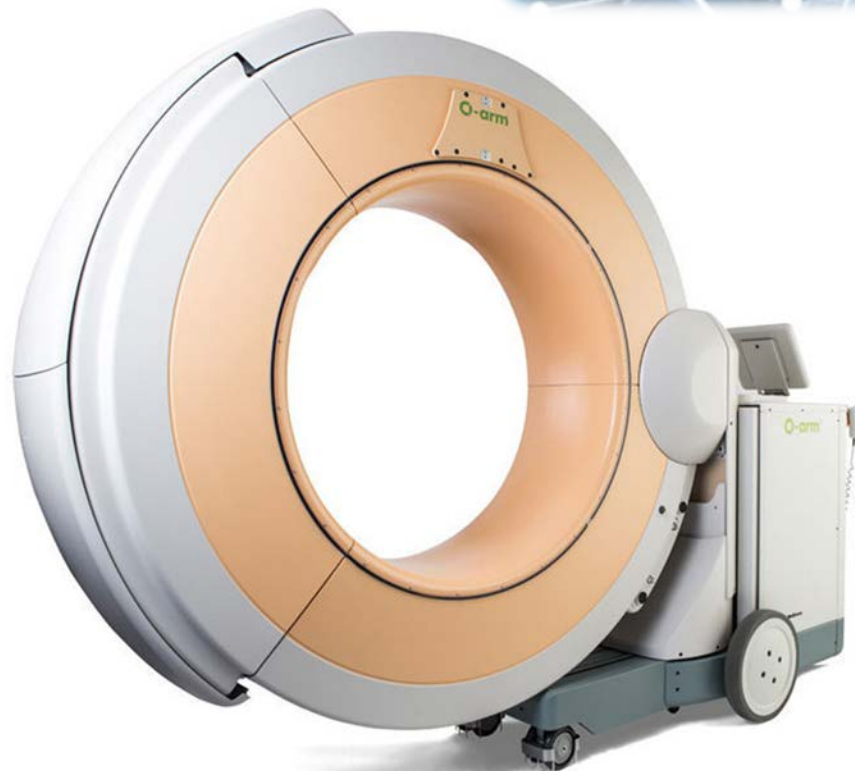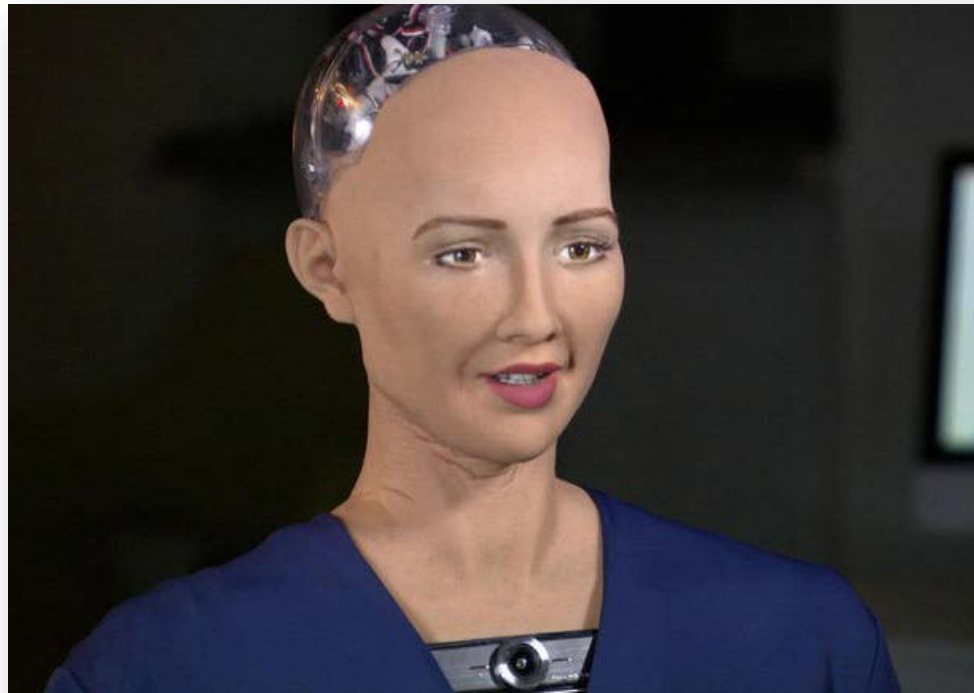
- Liability and ethics

- Wisdom

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AI is coming & there's no stopping it

AI outperforming humans

TECH NEWS

Monday, 2 Jul 2018

7:00 PM MYT

AI defeats elite doctors in diagnosis competition

AI 2 – Humans 0
Accuracy: AI 87% – Humans 66%

The main drivers

- Cost control

- Better outcomes

- More access

- Inordinate amounts of data
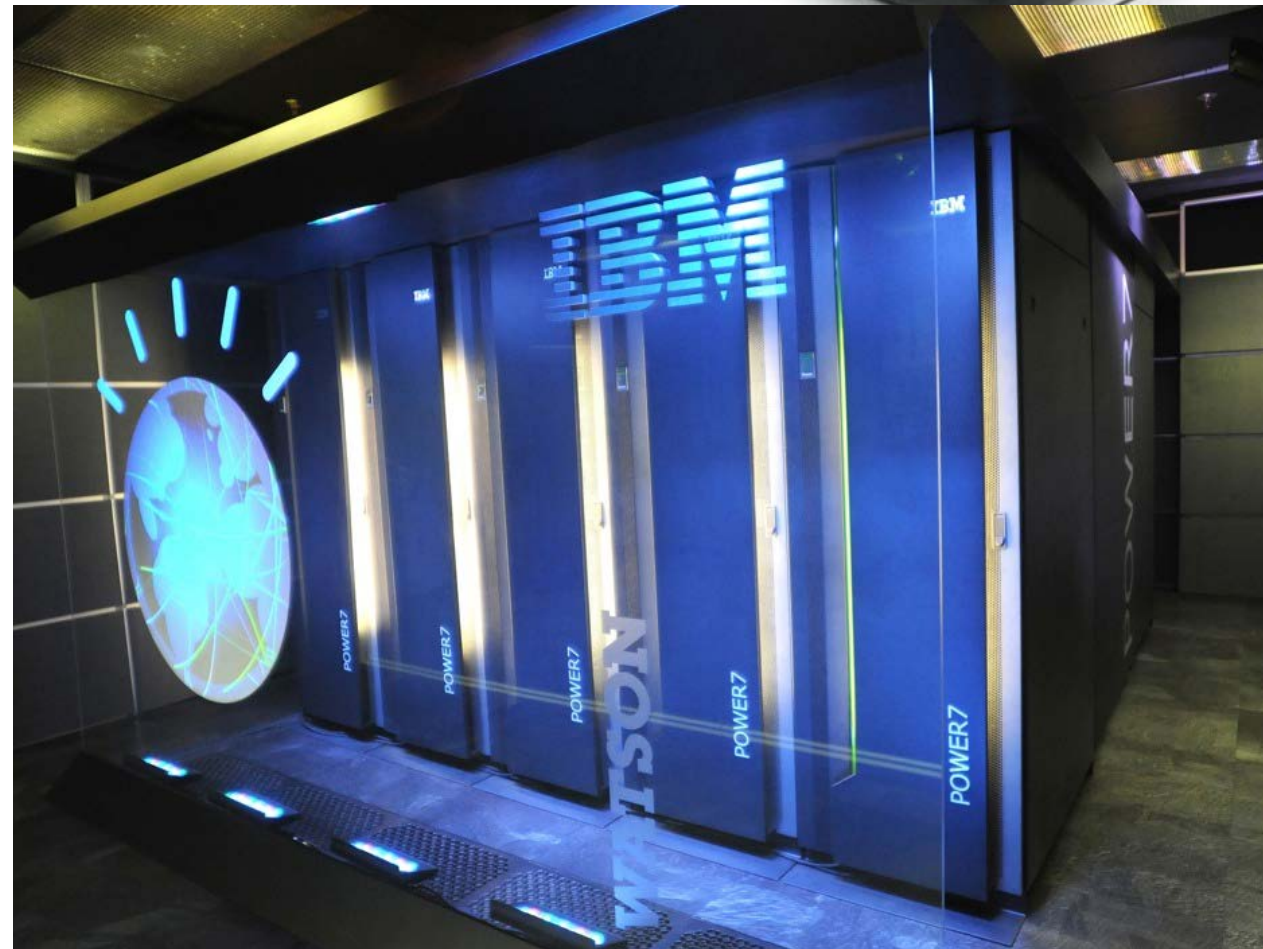
- Shortage of physicians and nurses

What is AI?

- Simulation of human intelligence

- Speech/image recognition

- Reasoning

- Learning

- …

How is AI different from algorithms?

- Algorithms

- AI

AI Types

- Artificial Narrow Intelligence (ANI), aka Applied AI
  - Medical diagnostic systems
  - Speech recognition
  - Machine learning
    - Supervised
    - Unsupervised

- Artificial General Intelligence (AGI)

- Artificial Super Intelligence (ASI)

AI in Healthcare

- Which areas are the biggest beneficiaries?
  - robotic surgery
  - radiological image analysis
  - Diagnostics
  - Nursing

What's special about AI in healthcare?

- Performance vs. safety
  - Speech recognition
  - Behavioral predictions
  - Agriculture
  - Aviation
  - Security
  - Finance
  - …

- Is AI in healthcare doomed or destined for greatness?

Safety risks of using AI

- Spectrum of AI-human interaction

Fully human decision making	Machine assists human decision-making	Fully autonomous machine decisions

- Presence of risk

Safety risks of AI in healthcare

- Direct Risks
  - AI Action

- Indirect risks
  - Reliance on the human as the final arbiter
  - Loss of human skills

- Ultimate outcome

- Unexpected outcomes

Can we be safe in the face of AI?

- How much safety?

- RM is not enough

Risks of not using AI

- Left behind

- Psychological resistance to AI
  - Giving up control

AI vs Human

- Domains of strength for AI
  - Data-rich domains

- Domains of strength for humans
  - Working with incomplete/erroneous information
  - Incorporation of peripheral information
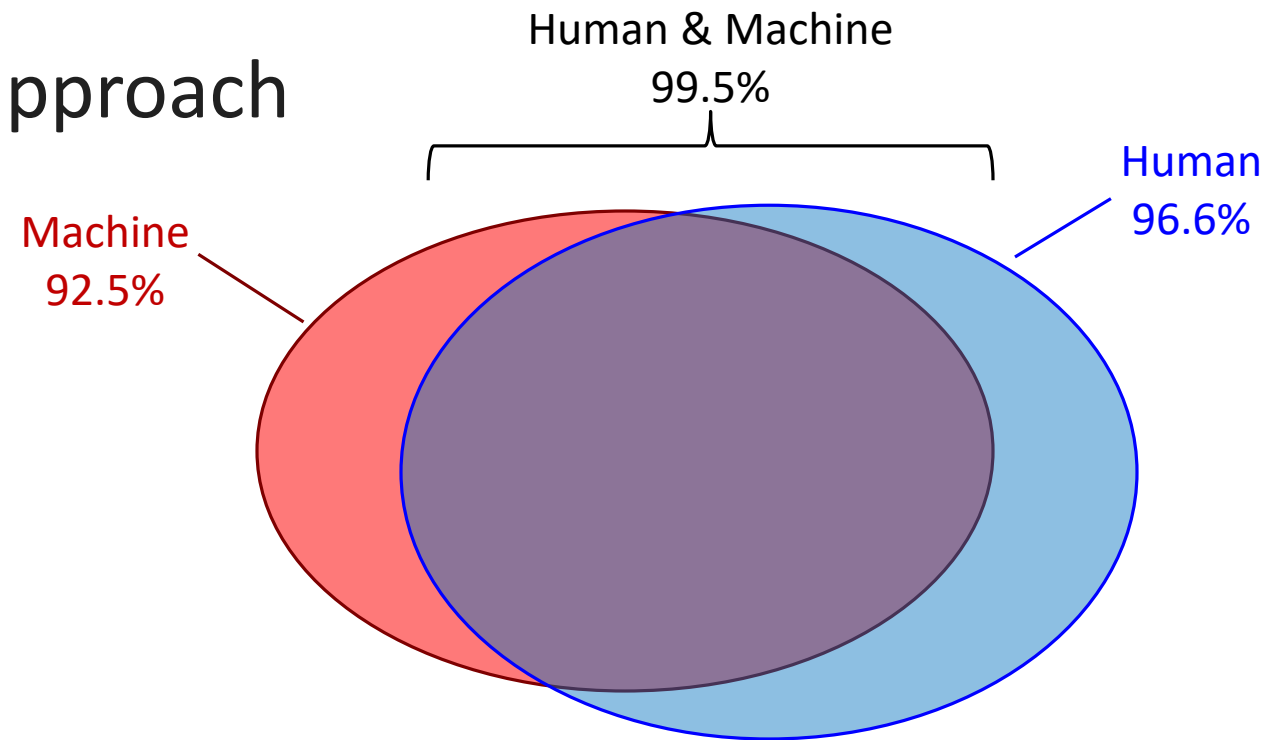 - Creativity
  - Associative thinking

Challenges with AI

- Verifiability and explainability

- Fixing AI
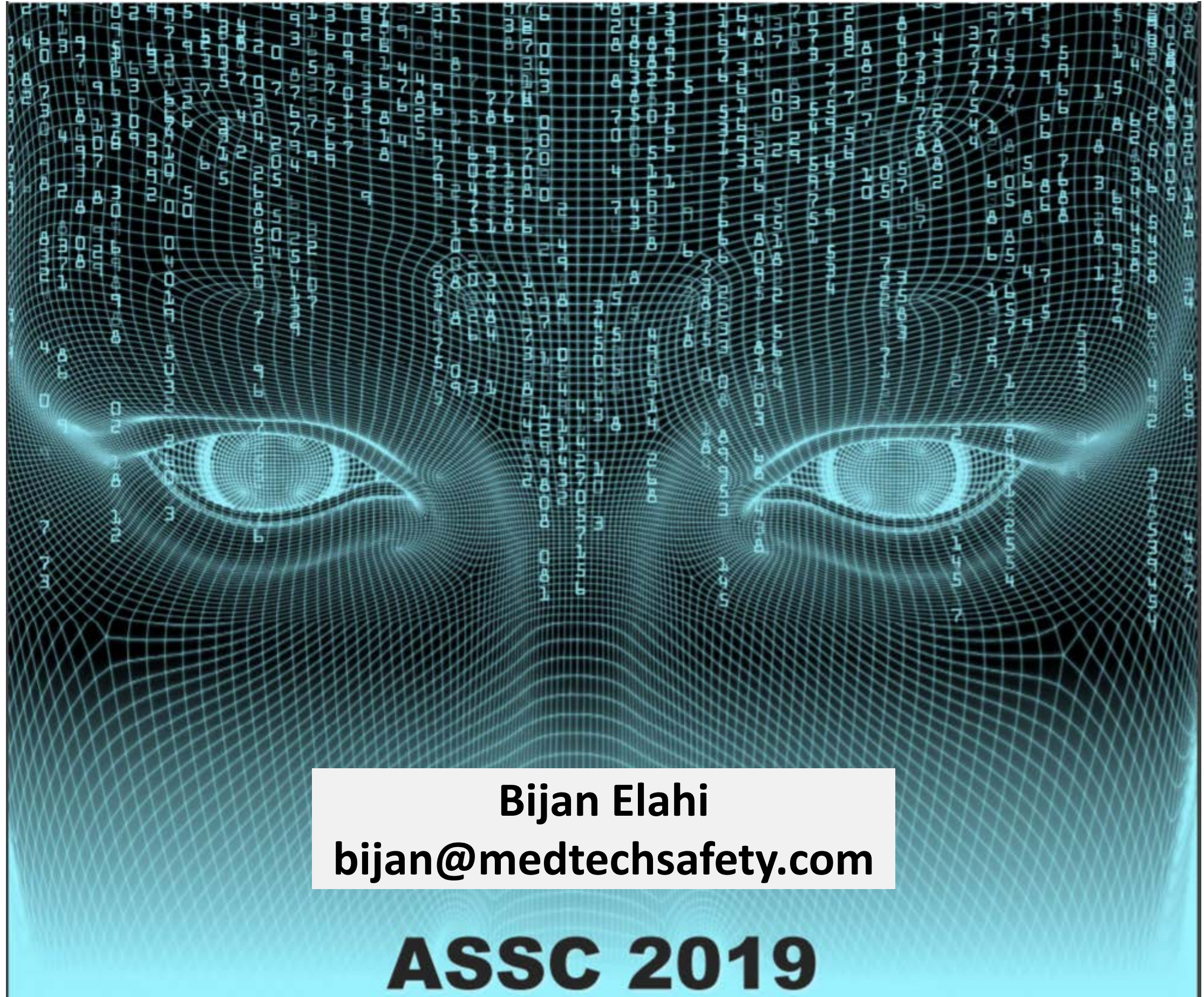
- Question of liability

- Question of ethics

Wisdom

- Do not be afraid

- Optimal outcomes

- Optimal approach

Grand challenge: International Symposium on Biomedical Imaging (2016)
Detection metastatic breast cancer

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ASSC 2019