

Computer Science 1401: Lecture #5

Computing and Medicine

MEDICAL COMPUTING: THE IMAGE

MEDICAL COMPUTING: THE REALITY

MEDICAL COMPUTING AT THE MOVIES:
The Terminal Man (1974)

Medical Computing: The Image



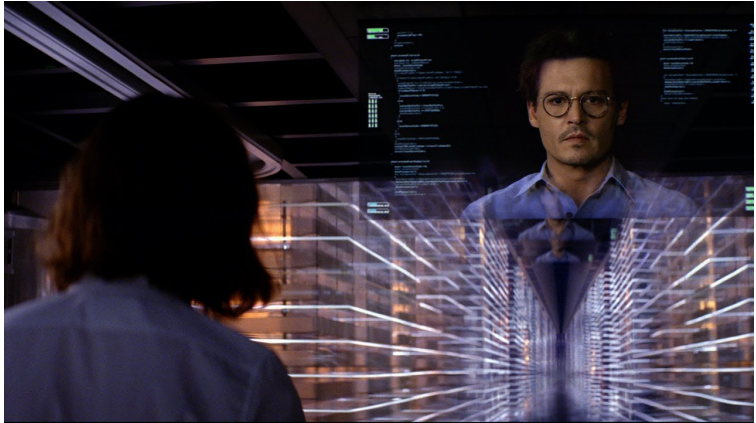
Robot and Frank (2012)

Medical Computing: The Image (Cont'd)



Lawnmower Man (1992)

Medical Computing: The Image (Cont'd)



Transcendence (2014)

Medical Computing: The Reality

- Initial focus on medical data storage.



Electronic Health Record (EHR) (1960s+)

Medical Computing: The Reality (Cont'd)



Personal Health Record (PHR) (1960s+)

Medical Computing: The Reality (Cont'd)

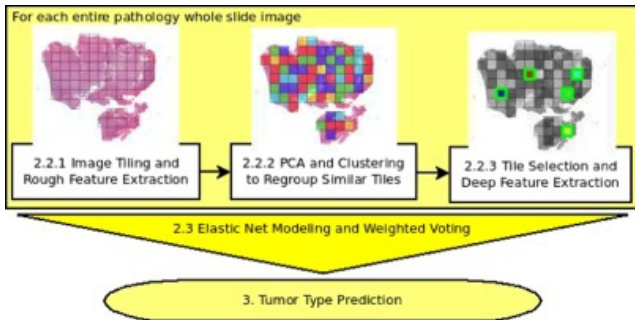
- Increasing computing power allowed new types of medical imaging, e.g., CAT, MRI, PET.



Magnetic Resonance Imaging (MRI) (1980s)

Medical Computing: The Reality (Cont'd)

- Automated diagnosis made possible by machine learning.
- Initial proof-of-concept with expert systems, e.g., MYCIN (blood infection diagnosis) (1970s).



Tumor type classification from image (1980s)

Medical Computing: The Reality (Cont'd)

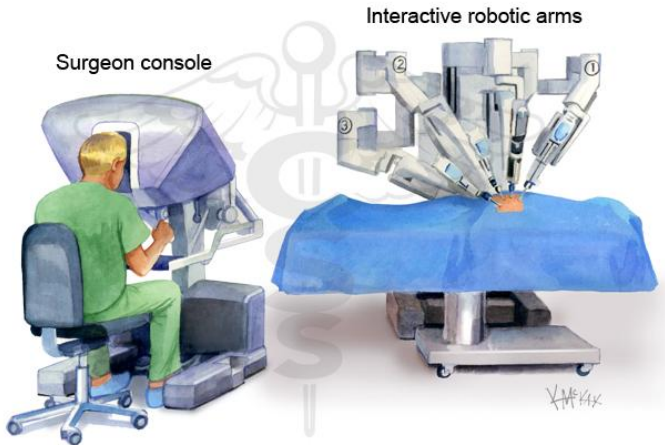
- Initial proof-of-concept in computer-assisted treatment done for Rogerian psychotherapy (ELIZA (1966)).

Talk to Eliza

```
> Hello, I am Eliza.
* I have many problems.
> Don't you ever say Hello?
* No. That's one of my problems. Rudeness.
> You are being a bit negative.
* Yes, I'm very negative most of the time. It runs in my
family.
> Did you come to me because you are very negative most
of the time. It runs in your family?
* I'm amazed by your insight. Yes, that's it. You're
amazing.
> Perhaps you would like to be amazing?
```

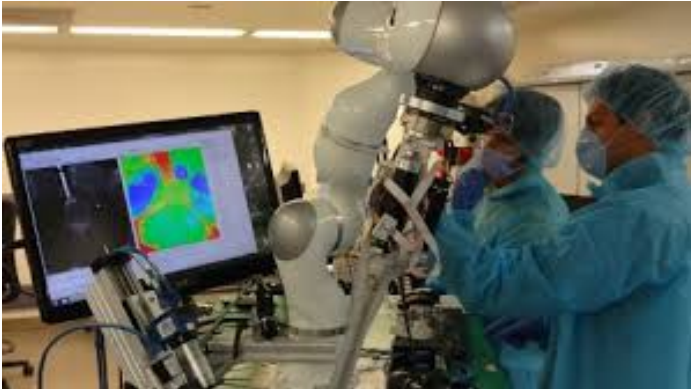
Input:

Medical Computing: The Reality (Cont'd)



Robot-assisted Surgery (2000s)

Medical Computing: The Reality (Cont'd)



Autonomous Robot Surgery (2016)
(Smart Tissue Autonomous Robot (STAR))

Medical Computing: The Reality (Cont'd)

- Use computer processing power to interpret nerve signals.



Medical Computing: The Reality (Cont'd)

- Interpret signals directly from brain using implanted chips.



- Signals can go both ways, e.g., sensory feedback (artificial retina / ear), artificial telepathy, behavior modification.

Medical Computing At The Movies: *The Terminal Man* (1974)



- Based on 1972 novel by Michael Crichton.
- Extremely realistic depiction of medical procedures.
- Movie emphasizes PR selling of computer-assisted behavior modification to public.
- Box office failure on release, though championed by famous directors (Kubrick, Malick).