Computer Science 1401: Lecture #3

Computing and the Workplace

WORKPLACE COMPUTING: THE IMAGE

WORKPLACE COMPUTING: THE REALITY

WORKPLACE COMPUTING AT THE MOVIES:
Desk Set (1957)

Workplace Computing: The Image

Runaway (1984)

Workplace Computing: The Image (Cont'd)

Real Humans (TV) (2012)

Workplace Computing: The Reality Background

Jaquard loom (1802)

- Debates about machines taking human jobs date back to the Industrial Revolution.
- John Maynard Keynes (1883–1946): Technology eliminates jobs, not work, e.g., blacksmiths $\Rightarrow$ auto workers, and technological displacement is a temporary but necessary stepping stone for economic growth (Markoff (2015), p. 74).

Workplace Computing: The Reality (Cont'd)
The Modern Situation

- 1950s debates about machines taking human jobs inspire 1964 US National Commission on Technology, Automation, and Economic Progress; the Commission's 1966 report backed traditional Keynesian view.
- Robots in factories starting in 1960s eliminate certain blue-collar jobs, and certain white-collar jobs eliminated in 1970s and 1980s by personal computer technology, e.g., typesetters $\Rightarrow$???.
- With success of Artificial Intelligence (AI) technologies since mid-2000s, more types of jobs, e.g., taxi and truck drivers, and certain professions, e.g., lawyers, doctors, financial analysts, are under threat in the near future,

Workplace Computing: The Reality (Cont'd)
Artificial Intelligence

Artificial Intelligence (Merriam-Webster):
1. a branch of computer science dealing with the simulation of intelligent behavior by computers.
2. the capability of a machine to imitate intelligent human behavior.

- Two flavors of AI:
  - **Strong AI**: Design computer systems that demonstrate full human-level intelligence using "same" mechanisms.
  - **Weak AI**: Design computer systems that demonstrate human-like abilities using any mechanisms.

Workplace Computing: The Reality (Cont'd)
Artificial Intelligence (Cont'd)

- Original goal in 1956 was Strong AI, which is very hard; focus is now typically on Weak AI.
- View cognitive abilities as mappings between perceptions (inputs) and actions (outputs), e.g.

text / speech query	$\Rightarrow$	text / speech reply
car environment and goal	$\Rightarrow$	driving action
market state and investment goal	$\Rightarrow$	financial advice

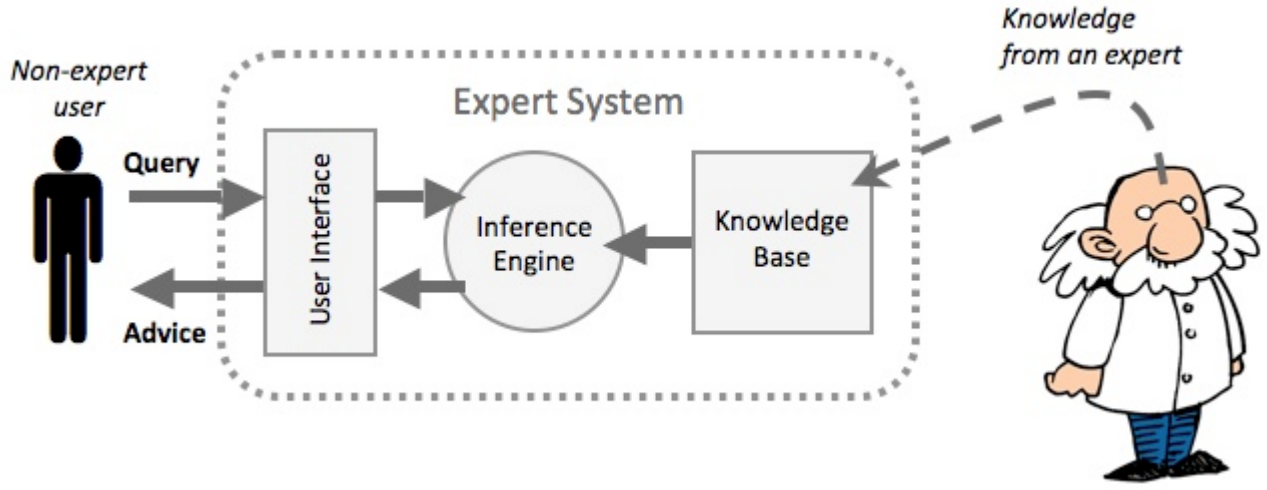
Workplace Computing: The Reality (Cont'd)
Artificial Intelligence (Cont'd)

- Earliest Weak AI systems derived outputs by matching handcoded patterns on inputs and substituting matched entities into handcoded templates, e.g., chatbots (1960s).

"It's about **X**."		"Tell me more about **X**."
"**X** drives me crazy."	$\Rightarrow$	"Why do you **Y X**?"
"I **Y X**."		"Go on."

Workplace Computing: The Reality (Cont'd)
Artificial Intelligence (Cont'd)

- Later systems handcoded human knowledge into IF-THEN rules that were then manipulated by automated inference engines, e.g., expert systems (1970s – 1980s).



- Overconfidence led to "AI Winter" of late-1980s.

Workplace Computing: The Reality (Cont'd)
Artificial Intelligence (Cont'd)

- Modern systems use machine learning on very large datasets to automatically infer input-output mappings.
- Such mappings have shown human-level speed, e.g., speech recognition, and in some cases better than human-level accuracy, e.g., financial advice, and once created are often much cheaper to use than humans.
- Potential problems:
  - Need enough data (and memory).
  - Need enough processing power.
  - Mappings may not operate correctly on new inputs.

Workplace Computing: The Reality (Cont'd)
The Future

- Given that Weak (and maybe one day, Strong) AI systems are coming into the workplace, what can we do about it?
  1. Use the law to limit workplace AI, e.g., driverless cars in India.
  2. Keep human beings "in the loop" by focusing on Intelligence Augmentation (IA) rather than AI, e.g., driver-assisting cars.
  3. Make (groups of) human beings owners of AI systems, e.g., 5th Generation Project (Japan, 1980s).
  4. Use profits derived by using AI systems to establish universal basic incomes.
  5. Do nothing, e.g., Vonnegut (1952).

Workplace Computing At The Movies: *Desk Set* (1957)

- Based on a moderately successful Broadway play.
- Was 8th Hepburn-Tracy film (and first in color and Cinemascope).
- Made with extensive co-operation (and perhaps encouragement) of IBM.
- Screenplay altered original play to (1) make it a romantic comedy and (2) subvert the anti-automation stance.

Computing Movie Cliches (#2 in a Series)

Technopyromania*: Affliction that compels filmmakers and special effects people to depict the malfunction of computers as being accompanied by smoke, flames, showers of pyrotechnic sparks, frenzied flashing lights, and wildly spanning tape drives spewing tapes into the air.*

- Paul A. Lee (in Ebert (1994))

TRISHA Phenomena*: The ability of the technical names of all movie computers to improbably collapse into a cute acronym, usually a female name, e.g., "Triply-Recursive Iteratively Symbolic Hierarchical Analyzer".*

- Stephen J. Baughman (in Ebert (1994))