CS 4001: Computing, Society & Professionalism

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Week 14: AI and Machine Ethics

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Term Paper

AI and Society

Notable Achievements in AI since 1995

- Computer-controlled minivan “drove” on freeways across USA in 1995
- IBM supercomputer Deep Blue defeated chess champion Gary Kasparov in 1997
- Honda’s ASIMO android can climb and descend stairs and respond to human gestures and postures
- Electrolux introduced robotic vacuum cleaner in 2001
- Five autonomous vehicles successfully completed 128-mile course in Nevada desert in 2005
- Watson trounced two most successful human *Jeopardy!* champions in 2011

Stanley, the Autonomous Vehicle

Watson Wins *Jeopardy!* Challenge

Robot Chef

- https://www.youtube.com/watch?v=SNy6fEuPWbc

Class Activity 1

The threat of AI to the future of humanity

2001 A Space Odyssey

Some recent comments

WaPo: Elon Musk, the billionaire inventor and Tesla chief executive — who believes artificial intelligence could help trigger the next world war — has issued another severe warning about how super-intelligent machines could come to dominate the world. Those super computers could become "an immortal dictator from which we would never escape," Musk passionately warns in the new documentary "Do You Trust This Computer?"

Rise of Concerns About AI: Reflections and Directions

- Dietterich and Horvitz, 2015
- Authors identify domains where AI has made a positive impact
- Authors call out five classes of risk that AI poses: bugs, cybersecurity, the "Sorcerer's Apprentice," shared autonomy, and socioeconomic impacts

Class Activity 2

Discussion Point 1: Is it wrong to work on an intelligent machine if it can't be guaranteed the machine will be benevolent toward humans? Who takes the ownership of unforeseen outcomes?

Moving forward
Nature 556, 169-171 (2018)

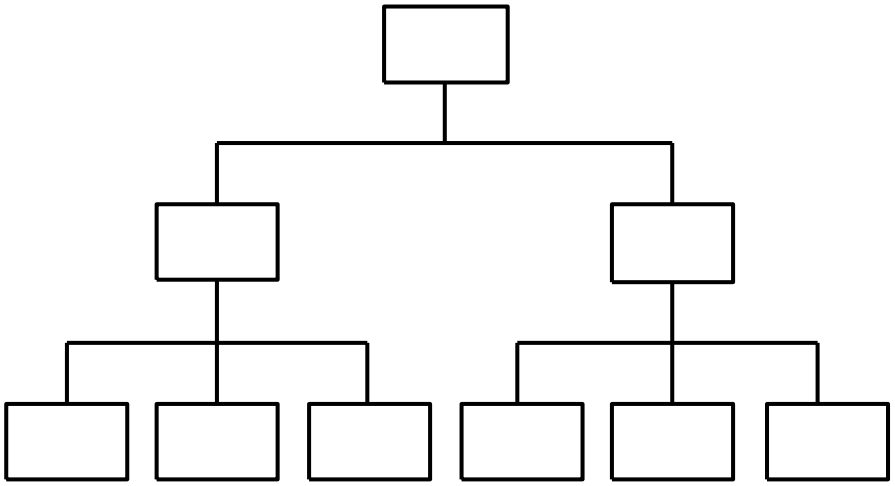
- Driverless does not, and should not, mean without a human operator.
- Users need information on how autonomous systems are working.
- Operators must demonstrate competence.
- Regular checks on user competency should be mandatory.
- Remote monitoring networks should be established.
- Work limits for remote supervisors should be defined.

Workplace Changes

Organizational Changes

- AI and information technology integration into firms
  - Improving manufacturing
  - Improving communication among business units
- Results
  - Flattened organizational structures
  - Eliminating transactional middlemen (supply-chain automation)

Inexpensive Interactions Lead to Flexible Information Flow



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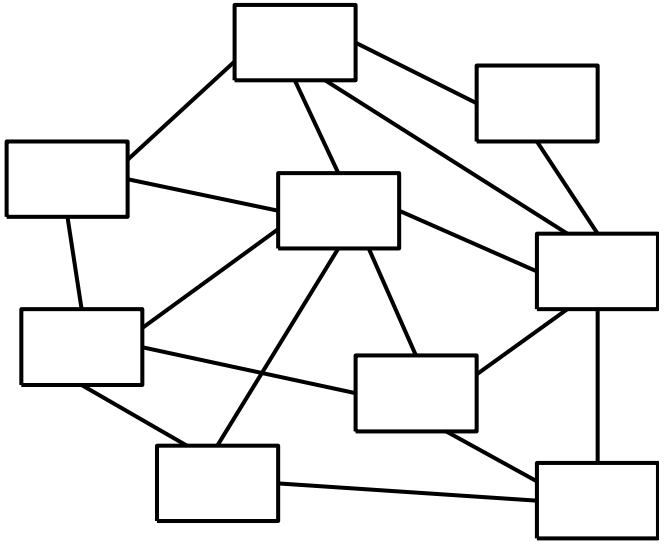


(b)

Telework

- Employees work away from traditional place of work
- Examples
  - Home office
  - Commuting to a telecenter
  - Salespersons with no office
- About 20% of Americans do some telework

Advantages of Telework

- Increases productivity
- Reduces absenteeism
- Improves morale
- Helps recruitment and retention of top employees
- Saves overhead
- Improves company resilience
- Helps environment
- Saves employees money

Disadvantages of Telework

- Threatens managers' control and authority
- Makes face-to-face meetings impossible
- Sensitive information less secure
- Team meetings more difficult
- Teleworkers less visible
- Teleworkers "out of the loop"
- Isolation of teleworkers
- Teleworkers work longer hours for same pay

Distance Still Matters – Olson and Olson

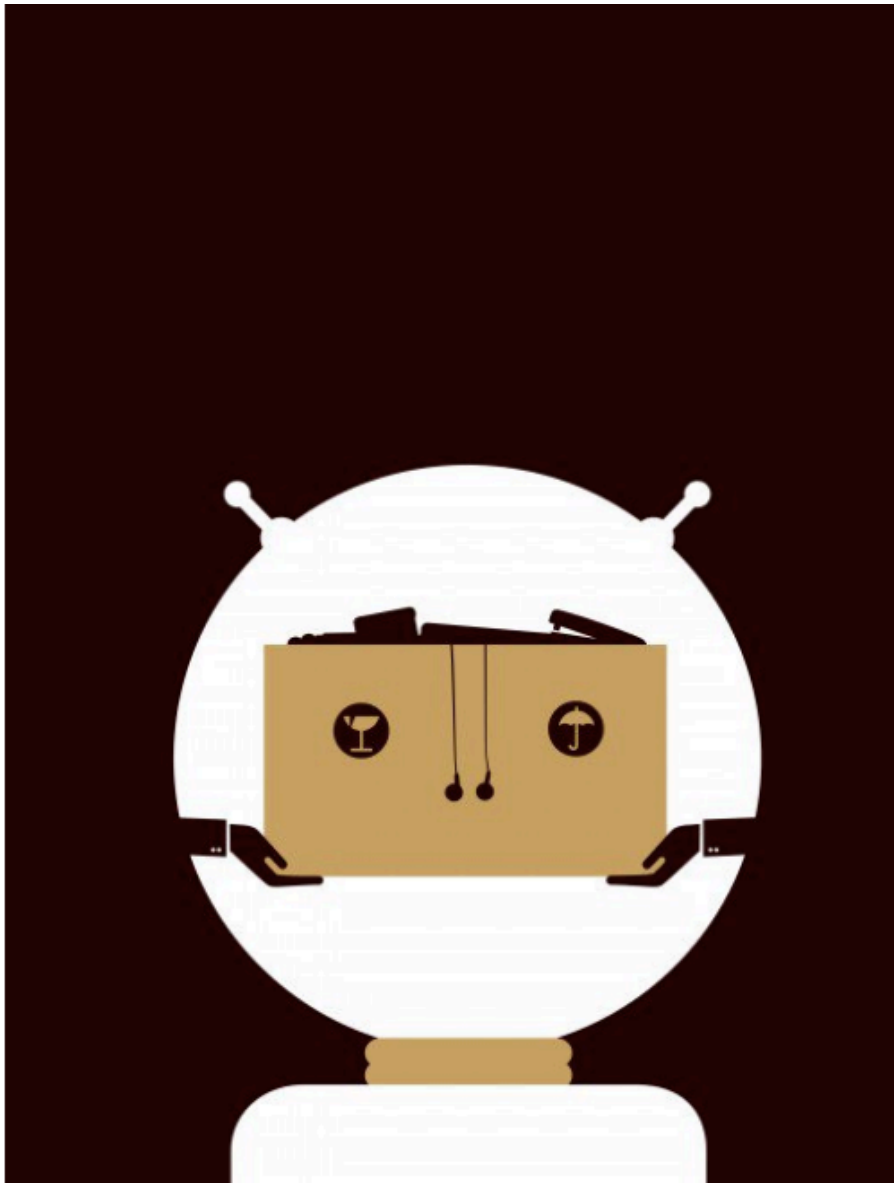
- 35% of respondents ranked the difficulty of leading virtual teams as the biggest challenge ahead, placing a premium on developing virtual leadership skills.

What we need

- Collaboration readiness
- Technology readiness
- Common ground
- Management and decision making
- Timezones
- Culture
- Trust
- Ad-hoc conversations

Business Impact

How Technology Is Destroying Jobs

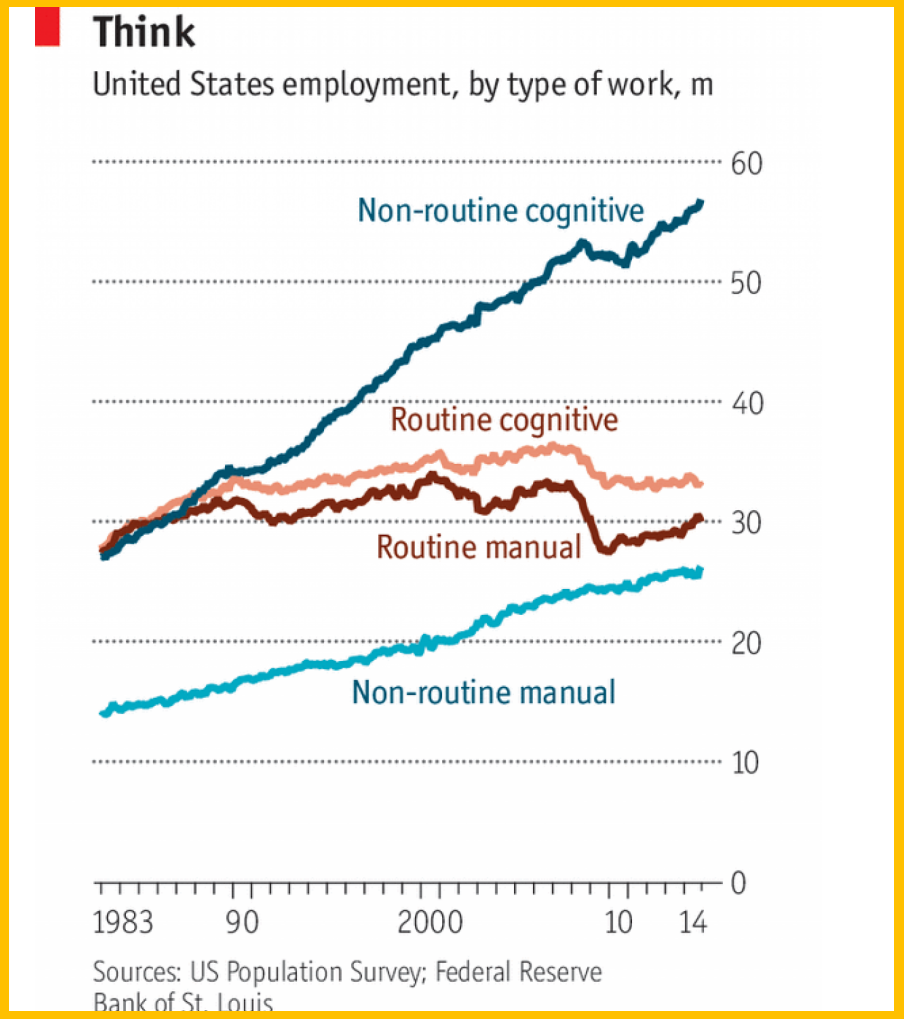


Automation is reducing the need for people in many jobs. Are we facing a future of stagnant income and worsening inequality?

by David Rotman June 12, 2013

AUTOMATION HAS BEEN CHANGING THE JOB LANDSCAPE FOR MANY YEARS

- Over many decades:
  - Routine jobs (manual or cognitive) have declined.
  - Only non-routine jobs have continued to grow. (Source: Economist)
- Now: The most famous study on Job Loss and AI, by Carl Frey and Michael Osbourne, predicts that 47% of the workforce is in danger.



Economist

WHAT JOBS ARE IN DANGER

- **Previous trends**: high skill and low skill were safe, mid skill has been cut by automation.
- **New Danger is regardless of level:** All logistics, transport, taxi, office support, security people, telemarketing, accounting, auditors, tech writers.
- **Industry Areas Most Effected:** Accommodation/Hospitality, Food Service, Manufacturing, Agriculture, Transportation, Warehousing, Retail, Mining, and Construction

Sources: Frey, Osbourne, and US Dept. of Labor

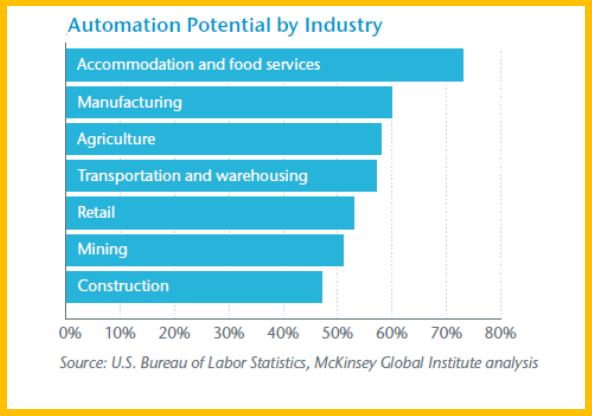
Catalogue of fears

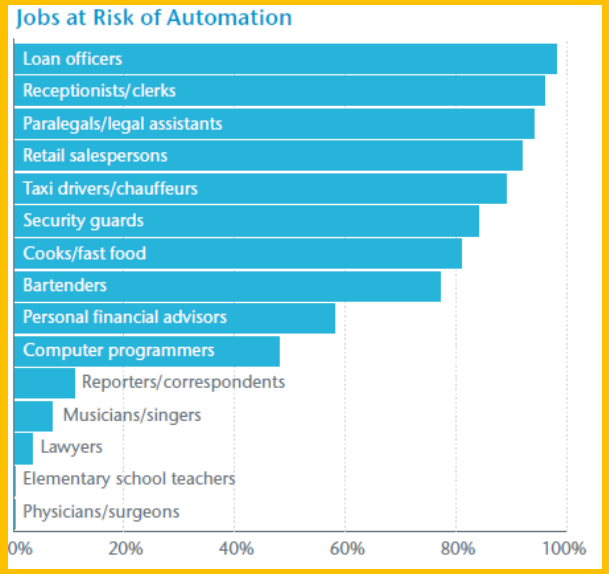
Probability of computerisation of different occupations, 2013
(1 = certain)

Job	Probability
Recreational therapists	0.003
Dentists	0.004
Athletic trainers	0.007
Clergy	0.008
Chemical engineers	0.02
Editors	0.06
Firefighters	0.17
Actors	0.37
Health technologists	0.40
Economists	0.43
Commercial pilots	0.55
Machinists	0.65
Word processors and typists	0.81
Real-estate sales agents	0.86
Technical writers	0.89
Retail salespeople	0.92
Accountants and auditors	0.94
Telemarketers	0.99

Source: "The Future of Employment: How Susceptible are Jobs to Computerisation?", by C. Frey and M. Osborne (2013)

Economist.com





World Economic Forum is among the most negative: Five Million Jobs by 2020. The Real Challenge of the Fourth Industrial Revolution

- Skills and job displacement will affect every industry and geographical region, but losses can be offset by job growth in key areas.

- "Over the next five years is such that as many as 7.1 million jobs could be lost through redundancy, automation or disintermediation, with the greatest losses in white-collar office and administrative roles. This loss is predicted to be partially offset by the creation of 2.1 million new jobs, mainly in more specialized 'job families', such as Computer and Mathematical or Architecture and Engineering."

Cann, O. (2016, January 18). Five Million Jobs by 2020: the Real Challenge of the Fourth Industrial Revolution [Web log post]. Retrieved September 23, 2017, from https://www.weforum.org/press/2016/01/five-million-jobs-by-2020-the-real-challenge-of-the-fourth-industrial-revolution/

THE ERRORS IN JOB REPLACEMENT LOGIC

- Every machine that replaces a job also creates new work.
- In many cases, we need AI to scale productivity to efficiently meet needs, like healthcare.
- Displaced jobs cause economic growth which creates new demands that are hard to predict.
- Historically, those places that automated increased their efficiency, and actually had very low unemployment rates

A MODIFIED ARGUMENT

- The First Industrial Revolution already replaced repetitive "manual" functions
- Now AI can replace all repetitive "cognitive" functions
- Compare with historic job destruction:
  - Average worker was replaced.
  - New job functions were to "design" the machine, and operate the "machine"
- Most places that automated had higher employment than before.
- Safest jobs*: (simplest argument)
  - Creating the AI machines
  - Operating and developing/designing the process for them to run.
  - Any managing function of people becomes managing of AI tools.

*Jobs least likely to be replaced by AI.

Economists and historians claim that job disruption actually helped the economies that participated.

One Caveat: The McKinsey Global Institute estimates that, compared with the Industrial Revolution of the late 18th and early 19th centuries, AI's disruption of society is happening ten times faster and at 300 times the scale.

Reference: Do we understand the impact of artificial intelligence on employment? | Bruegel

Textile vs Hand weaving: During the 19th century, amount of cloth a single weaver in America could produce = 50X gain. Labor required fell by 98%. Result: cloth became cheaper, demand greater, 4X more jobs were created in the same sector.

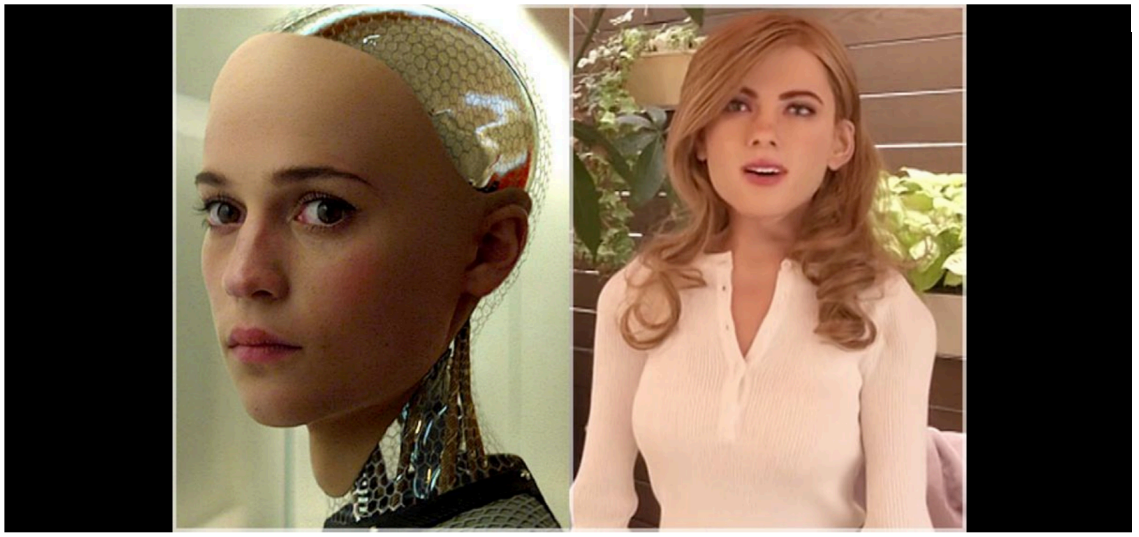
Auto vs Horse-based transportation: This led to a decline in horse-related jobs. However, the automobile industry itself grew fast. Jobs were also created in different sectors, e.g. motel and fast-food industries that arose to serve motorists and truck drivers.

ATM Machines at Banks: Automated teller machines (ATMs) reduce the number of bank clerks (20/bank in 1988 to 13/bank in 2004) by taking over some of their routine tasks. However, bank branches grew in numbers by 43% and total employees grew.

47 % of U.S. jobs are at risk of being replaced by AI technologies and computerization

Only 9% of jobs are at risk of being fully replaced. Majority of jobs to be amplified by AI.

Discussion Point 2: Is it wrong to create machines capable of making human labor obsolete? Contrast Kantian and act utilitarian perspectives.



Alicia Vikander in "Ex Machina," Scarlett Johansson Robot (Credit: Universal Pictures)

From Siri to sexbots: Female AI reinforces a toxic desire for passive, agreeable and easily dominated women

From telephone operators to the ScarJo robot, tech's female voice has little to do with empowerment [UPDATED]

JENNIFER SEAMAN COOK
04.08.2016 • 7:00 PM

This story has been corrected since it was originally published.

A recent article titled "Why is AI Female?" made the connection that gendered labor, in service professions in particular, is fueling our expectations for gendered AI assistants and service robots. Furthermore, the author argues, this "feminizing — and sexualizing — of machines" signals a future with a disproportionate use of feminized VR and robots for a male-dominated sex industry. Monica Nickelsburg writes:

> "Sex with robots is a big leap from asking Siri to set an alarm, but the fact that we've largely equated artificial intelligence with female personalities is worth examining. There are, after all, few sexualized male robots or avatars."