CIS 381: Social & Ethical Issues of Computing

The Digital Divide

Dr. David Koop
Self-Driving Cars

• Recent high-profile cases of self-driving cars causing deaths

• Vehicles will encounter situations outside of training data...but of course humans encounter catastrophic failure over 30k times a year in the US...

• Lots of potential effects on society: traffic congestion, personal ownership of cars, road rage, etc.
Deep Learning

• Lots of Applications:
  - Vision
  - Natural-language processing (NLP)
  - Medical
  - Speech recognition

• Challenges:
  - Human must set up model to get useable results
  - Requires lots of **training data**
  - Potential of getting stuck in local minima
  - Difficult to determine **why** answer is returned
Microsoft's Tay

• AI project built by Microsoft to work on NLP problems
• Learns from users and their interactions…

• Taken down after 16 hours of chats
• At least one Microsoft researcher had their faith in humanity shattered

[S. Abraham]
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Algorithmic Bias

• Training data influences AI’s understanding of the world
• Data curated by a human reflect human’s collection methods and selection process
• Higher dimensions of data implicitly encode bias even if area of bias is not included in data set
• Task system is assigned influences how it optimizes across data, e.g. fake news has better click rates leading to recommendations for fake news
• Causal relationships are assumed from correlated data, e.g. pneumonia patients with asthma given lower risk assessment as they statistically have a better probability of survival

[S. Abraham]
Workplace Changes

- Organizational Changes
- Telework
- The Gig Economy
- Monitoring
- Multinational Teams
The Gig Economy

• Some start-ups make money by **connecting** people who want a service with people willing to provide that service

• Gig economy: Service workers making a living by completing short-term jobs for clients

• Examples
  - Uber, Lyft: Connect riders and drivers
  - DoorDash, UberEats, GrubHub: Connect people and restaurants
  - Airbnb: Connect travelers and those with accommodations

• Issues:
  - Companies less committed to employees
  - Lay-offs not taboo as they once were
  - Companies hiring more subcontractors and temporary employees

[M. J. Quinn]
Term Paper Presentation

• Presentation dates announced
• Topic presentations are done in **groups**, but each person should speak for 3-4 minutes
• Try to be **succinct** in discussion of the background and focus on the ethical issues and dilemmas
  - Can have one person summarize background (e.g. extra minute)
  - **All** should dig into the ethical issues and dilemmas
• Need to evaluate issues using **ethical frameworks**
• Groups can choose to examine different issues related to a topic or examine a similar issue using different frameworks
Assignment 6

- "Digital Divide: Navigating the Digital Edge" by S. Craig Watkins
- Think about what the digital divide brings to your mind
- Does everyone use technologies in the same way?
- Is our appraisal of how tech-savvy someone is based on a certain perspective?
Assignment 7

• April 12:
  - No lecture at 9am
  - Attend CIS Seminar: Ralph Clifford, UMass Law School, 3-4pm, LIB 207
  - Talk on intellectual property
  - Write a reaction to the talk

• If you cannot attend the talk, I will provide another reading/video for A7 instead
Globalization

- Globalization: Process of creating a worldwide network of businesses and markets
- Globalization causes a greater mobility of goods, services, and capital around the world
- Globalization made possible through rapidly decreasing cost of information technology
Computing & Communication Costs Decline


Computer cost (dollars per million instructions per second)

[M. J. Quinn]
Arguments for Globalization

- Increases competition
- People in poorer countries deserve jobs, too
- It is a tried-and-true route for a poor country to become prosperous
- Global jobs reduce unrest and increase stability
Arguments against Globalization

• Makes the United States subordinate to the World Trade Organization
• Forces American workers to compete with foreigners who do not get decent wages and benefits
• Accelerates exodus of manufacturing and white-collar jobs from United States
• Hurts workers in foreign countries
Dot-Com Bust → IT Sector Unemployment

- Dot-com: Internet-related start-up company
- Early 2000: stock prices of dot-coms fell sharply
- Hundreds of dot-coms went out of business
- Half a million high-tech jobs lost
Foreign Workers in the IT Industry

- Visas allow foreigners to work inside U.S.
- H-1B
  - Right to work up in United States to six years
  - Company must show no qualified Americans available
  - Congress still authorizes 65,000 H-1B visas per year, plus 20,000 more for foreigners with advanced degrees
  - Quota not filled in 2009 due to economic downturn
- L-1
  - Allows a company to transfer a worker from an overseas facility to the United States
  - Workers do not need to be paid the prevailing wage
  - In 2006 about 50,000 foreigners in U.S. under L-1 visa

[M. J. Quinn]
Foreign Competition

• China is world’s number one producer of computer hardware
• IT outsourcing to India is growing rapidly
• Number of college students in China increasing rapidly
• ACM Collegiate Programming Contest provides evidence of global competition
  - No American team has placed first since 1997
  - From 2011-2015, only 1 of 20 teams earning gold medals was from the United States
Growth of China’s Computer-Hardware Industry

- U.S.
- Japan
- Singapore
- Taiwan
- China

Y-axis: U.S. $ (millions)

[M. J. Quinn]
The Digital Divide

• The Digital Divide: Some people have access to modern information technology while others do not

• Underlying assumption: people with access to telephones, computers, Internet have opportunities denied to those without access

• Concept of digital divide became popular with emergence of World Wide Web
Evidence of the Digital Divide

• Global divide: Access higher…
  - in wealthy countries
  - where IT infrastructure good
  - where literacy higher
  - in English-speaking countries
  - where it is culturally valued

• Social divide: Access higher…
  - for young people
  - for well-educated people
Models of Technological Diffusion

- Technological diffusion: rate at which a new technology is assimilated
- Given highest (A) to middle (B) to lowest (C) socioeconomic status
Models of Technological Diffusion

• Normalization model:
  - Group A adopts first, then Group B, finally Group C
  - Eventually A use = B use = C use

• Stratification model:
  - Group A adopts first, then Group B, finally Group C
  - A use > B use > C use forever
Massive Open Online Courses

• Rate of tuition increases at US universities has exceeded inflation for several decades
• Financing college education increasingly difficult for poorer families
• Free massive open online courses (MOOCs) promoted as a way to make higher education more affordable
• Study by Community College Research Center
  - Students less likely to complete and do well in MOOCs than traditional courses
  - MOOCs widen achievement gap between white and black students and between those with higher GPAs and those with lower GPAs

[M. J. Quinn]
US Broadband Internet Access

Figure 1. Percentage of Households With Subscription to Any Broadband Service: 2013-2017

Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates. For more information on the American Community Survey, see <census.gov/acs>.
US Broadband Speeds

Percent of Downloads Reaching Broadband Speed

Quintile
- Most
- Least

[Daily Yonder]
World Broadband Speeds

### The Countries with the Fastest Internet

Mean download speed in Megabits per second* (in Mbps)

<table>
<thead>
<tr>
<th></th>
<th>Country</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Singapore</td>
<td>60.39</td>
</tr>
<tr>
<td>2</td>
<td>Sweden</td>
<td>46.00</td>
</tr>
<tr>
<td>3</td>
<td>Denmark</td>
<td>43.99</td>
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<td>4</td>
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<td>Romania</td>
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<td>6</td>
<td>Belgium</td>
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<td>7</td>
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<tr>
<td>8</td>
<td>Luxembourg</td>
<td>35.14</td>
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<tr>
<td>9</td>
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<td>34.01</td>
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<tr>
<td>10</td>
<td>Switzerland</td>
<td>29.92</td>
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**Selected other countries**

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<th></th>
<th>Country</th>
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<tbody>
<tr>
<td>20</td>
<td>United States</td>
<td>25.86</td>
</tr>
<tr>
<td>25</td>
<td>Germany</td>
<td>24.00</td>
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<tr>
<td>33</td>
<td>Canada</td>
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<tr>
<td>52</td>
<td>Australia</td>
<td>11.69</td>
</tr>
</tbody>
</table>

* Download speed test data collected by M-Lab from June 2017 to May 2018.  
Source: cable.co.uk
Net Neutrality
Net Neutrality

• What is net neutrality?
  - Require all Internet packets be treated the same
  - Companies cannot charge more for certain services or throttle selected content

• Supporters of tiered service say it is needed to support Voice-over-IP and other services

• Opponents to tiered service (e.g., Google, Yahoo!) say it would hurt small start-up companies and lower innovation

• Other critics believe companies controlling Internet might favor some content over other content

[S. Abraham]
Net Neutrality

- Idea that broadband Internet service is a common carrier
  - As a public utility, service providers cannot give preferential treatment to customers
  - Regulated by the Federal Communications Commission (FCC)
- Is high speed internet access a right?
  - Does everyone have a right to broadband?
  - What are the impacts on society when people don’t?