CSE/ISE 312

Chapter 7: Evaluating and Controlling Technology

Outline

- Evaluating Information
- The 'Digital Divide'
- Neo-Luddite Views of Computers, Technology, and Quality of Life
- Making Decisions About Technology

Evaluating Information

- Expert information or 'wisdom of the crowd'?
  - Daunting amount of information on the web, much incorrect
  - Search engines are replacing librarians, but Web sites are ranked by popularity, not by expert evaluation
  - Search engines give prominent display to party who pay them
  - Wisdom of the crowd - ratings of website by public, democratic journalism for news

Evaluating Information

- Wikipedia:
  - Written by volunteers, some posts are biased/inaccurate
  - Although anyone can write, most people do not
  - Those that do typically are educated and experts

The Need for Responsible Judgment

- Wisdom of the crowd
  - Problems of unreliable information are not new
  - The Web magnifies the problems
  - Rating systems are easy to manipulate
- Responsibilities of site operators
  - Should identify user-supplied content
  - Make clear which information has been verified

Narrowing the Information Stream

- The Web narrows information streams

- Some critics see the web as significantly encouraging narrowness and political extremes by making it easy for people to avoid seeing alternative opinions

- Searching online "puts researchers in touch with prevailing opinions, but this may accelerate consensus" and miss less popular but very relevant work

- People are seeing filtered information
  - Search engines, social media services personalize results based on location, past searches, profiles, etc.

Abdicating Responsibility

- New tools have displaced skills that were once important
  - Convenience of using a computer can encourage mental laziness
- Reading brief snippets replaces reading books and long articles
  - Need to avoid emphasis of data over analysis, facts over understanding and evaluation

Abdicating Responsibility

- Abdicating responsibility
  - People willing to let computers do their thinking
  - Reliance on computer systems over human judgment may become institutionalized
  - Fear of having to defend your own judgment if something goes wrong

Computer Models

- A collection of data and equations describing, simulating characteristics and behavior of things
- Example models
  - Population growth, Cost of proposed government program, Effect of second hand smoking, When we will run out of natural resources, Threat of global warming, Earthquake, flood prediction

Computer Models

- Evaluating Models
  - How well do the modelers understand the underlying science?
  - Models necessarily involve assumptions and simplifications
  - How closely do the results correspond with those from physical experiments or real experience?

Why Models May be Inaccurate

- Why models may not be accurate
  - We might not have complete knowledge of the system we are modeling
  - The data describing current conditions or characteristics may be incomplete or inaccurate
  - Computing power inadequate for the complexity of the model
  - It is difficult, if not impossible, to numerically quantify variables that represent human values and choices
- Ethical responsibility of professionals/modelers to honestly and accurately describe the results, assumptions, and limitations of their models

The "Digital Divide"

Digital divide:

Some groups of people have access to and regularly use information technology, while others do not.

Trends in Computer Access

- New technologies only available to the wealthy

- The time it takes for new technology to make its way into common use is decreasing

- Cost is not the only factor; ease of use plays a role

- Entrepreneurs provide low cost options for people who cannot otherwise afford something

- Government funds technology in schools

- As technology becomes more prevalent, the issues shift from the haves and have-nots to level of service

The Global Divide and the Next Billion Users

- Approximately one billion people worldwide have access to the Web; approximately five billion do not

- Non-profit organizations and huge computer companies are spreading computer access to people in developing countries

- Bringing new technology to poor countries is not just a matter of money to buy equipment; PCs and laptops must work in extreme environments

- Some people actively working to shrink the digital divide emphasize the need to provide access in ways appropriate to the local culture

Neo-Luddite Views of Technology

- Computers eliminate jobs to reduce cost of production

- Computers manufacture needs; technology causes production of things we do not need

- Computers cause social inequity

Neo-Luddite Views of Technology

- Weaken communities, thwart development of social skills

- Computers separate humans from nature and destroy the environment

- Benefit big business and big government the most

- Do little or nothing to solve real problems

Accomplishments of Technology

- Increased life expectancy
- Elimination or reduction of many diseases
- Increased standard of living
- Assistive technologies benefit those with disabilities

Making Decisions About Technology

Discussion Questions

- Can a society choose to have certain specific desirable modern inventions while prohibiting others?

- How well can we predict the consequences of a new technology or application?

- Who would make the decisions?

The Difficulty of Prediction

- Each new technology finds new and unexpected uses

- The history of technology is full of wildly wrong predictions

  - Weizenbaum argued against developing speech recognition technology. Mistaken expectations of costs and benefits

- Should we decline a technology because of potential abuse and ignore the potential benefits?

- New technologies are often expensive, but costs drop as the technology advances and the demand increases

Future Computers

Intelligent Machines and Super-intelligent Humans - Or the End of the Human Race?

- Technological Singularity - point at which artificial intelligence or some combined human-machine intelligence advances so far that we cannot comprehend what lies on the other side

- We cannot prepare for aftermath, but prepare for more gradual developments

- Select a decision making process most likely to produce what people want