HEART: Algorithms for hard problems in computer science 10-25-17

Discussion: "Social implications of P vs. NP"

For the works of fiction:

What's plausible?
What's implausible?
What inaccuracies did you notice or suspect (possibly due to simplification)?

1. "Traveling Salesman" (film, 2012)

Implications of solving a theoretical problem are unknown at the time of starting (and even finishing) the work

In the context of comparisons to the physicists researching the technology used to make atomic bombs in WWII,

Intentions of the researchers – does it matter?
Applications of the findings – are the researchers accountable? To whom?

Disparity between academia and government – goals, needs, pressures, vocabulary, culture (meetings, negotiations, leverage)

International relations and cyberwarfare (we'll talk about cryptography later on in the class)

Interconnectivity of critical infrastructure is its weakness – the power of a comprehensive attack is keeping things online but corrupting its function and behavior

Timothy claims he kept the key to the proof to himself – why? Does he think he is the only person who could connect the dots?

2. The Golden Ticket (chapter 2) by Lance Fortnow (2013)

In a future where a mathematician (academia) solves P=NP, Fortnow imagines a world where this knowledge is shared and applied (Urbana algorithm) and "Traveling Salesman" one where the government hires mathematicians, then attempts to cover-up the result (nondeterministic processor).
Could either Fortnow's or the film's situation really happen based on what you know about the applied implications of P=NP?

Other applications you can imagine

3. "Antibodies" (short story) by Charles Stross (2000)

Compare to Fortnow or "Traveling Salesman" on the utopia/dystopia scale

Are we (as humans) sabotaging scientific discovery in the way that the speaker says his people have been trying to do?

> Cut funding, spread rumors and misinformation, automation, applications overtake pure research, religious inhibitions (lack thereof)

Chapter 5 – "Martian Rule" of any civilization discovering a fundamental question

4. William Gasarch's SIGACT News 2002 and 2012 "P vs. NP" surveys

Which opinions were interesting, surprising, insightful, amusing?
How did opinions change in 10 years?
How might the opinions of people in mathematics, theoretical CS, applied CS, computer/electrical engineering differ?

Let's talk about:

Most of the computer scientists surveyed think neither the "Traveling Salesman" or Fortnow's scenario could happen because P≠NP. Some say it doesn't matter practically, theoretically, or both. Who should care and why? Do you?

If you surveyed a large population of students (ugrad/grad), professionals (academia/industry) and professors, what would you ask? What's your hypothesis about the responses? (Could we do this?)