Challenges that Emerge When Systems and People Meet: Privacy and Accountability

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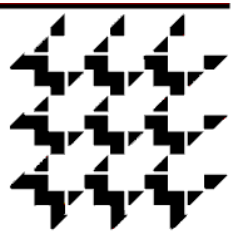
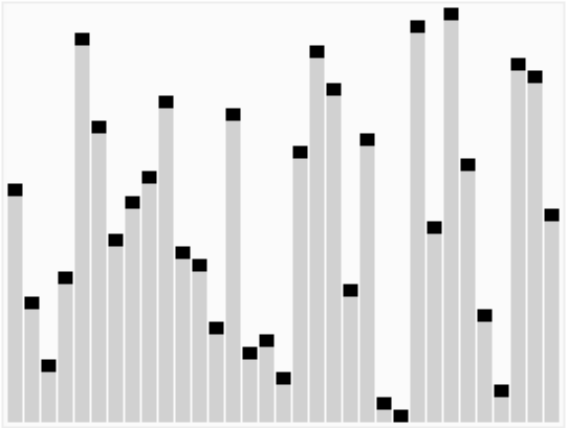
DIMACS
Center for Discrete Mathematics & Theoretical Computer Science
Founded as a National Science Foundation Science and Technology Center



CCICADA
Command, Control, and Interoperability Center for Advanced Data Analysis
A Department of Homeland Security Center of Excellence

Does a System Do What It Is Supposed To?

- We often ask whether a computer program or system does what it is supposed to do.
- To do this, we need to know what the system is supposed to do.
- Example:
  - Proving a program P correctly sorts its inputs into ascending order.
  - For every input $(a_1, a_2, \ldots, a_n)$, program P produces an output $(b_1, b_2, \ldots, b_n)$, such that
    - $i < j \Rightarrow b_i < b_j$
    - For each i, there exists j such that $a_i = b_j$.



Quicksort animation from Wikipedia **User:RolandH**

When Systems and People Meet

- Mathematical definitions can be elusive when the desired properties are more subjective in nature.
- Examples:
  - Privacy
  - Accountability

Privacy

- Means different things to different people, in different contexts.
- Appropriate uses of data:
  - What is appropriate?
  - Who gets to decide?
  - What if different stakeholders disagree?

- Simple approaches to “anonymization” don’t work in today’s world where many data sources are readily available.
- There are some good definitions for some specific notions of privacy.

Accountability

- Both in the real world and in Internet systems, people often express a desire for “accountability”.
- It is not completely clear in either case what this actually means, though typically it is about ensuring that people who don’t follow the rules suffer consequences.
- Questions:
  - Does accountability require everyone to be identified at all times?
  - Does accountability require those who break the rules to be identified?
  - To what extent can accountability be provided in large-scale, international computing systems?