Measuring, Modeling & Managing Massively Interacting Systems

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Massively Interacting Systems

• Modern “bioinformatics” is growing to encompass interactions among many levels and properties of individuals, groups and environments

• It is computationally enabled science
  – increasingly blurring the distinction between social, environmental, socio-technical and biological domains
  – uptake of diverse unstructured information
  – in-silico generation of detailed extreme scale interaction dynamics

• Relevance to policy and science
Unencapsulated Self: Inside/Outside Problem

• Who are “You”? Where is this You active?
• Example: B-12 and the microbiome
  – Acts like an organ; not your DNA but is “you”
  – “tuned” to matrilineal heritage, that is “you” too
• Example: Distributed selves and thinking
  – Bees, ants
  – Neurons don’t know what they are thinking
  – Distributed cognition; you may not know what (or how)
  you are thinking either
• Example: The molecular multispecies
  – Phenotypic plasticity and modes

Expression of the hopper is distributed:
DNA is just “middle ware”
Unencapsulated agency

- Interactions + media concretely shape individuals
  - Where is your money?
  - Where is your debt?
  - Where are your actions?
  - Where is your accountability?
  - Where is your identity?
  - Etc

- In what forms are populations of “You” to be represented and analyzed?
  - We know granular detail can often matter
The trouble with prediction as the only purpose

- Branching
- "doors close"
- Arbitrage law-style effects
- Inherent non-predictivity
- Mediated states
  - Non-invertibility, non-uniqueness
  - Wrongness/ temporary confirmation
    - Deception
    - Lack of usual simplicity criteria
- The perfect model that requires impossible data
- Still, there are obviously places for prediction

Example: Integrated Synthetic Information Apps
my4Sight: a multi decision-maker synthetic information application platform

Captures and includes intuitive judgment to improve analytical forecast methods in complex social contexts

Deployable on various resources: stand-alone, Facebook, Turks, etc.

Specialized applications (e.g., military units, medical professionals)

Multiple model generated forecasts are shown; user can vote to select the most likely forecast

Extension to individual behavioral forecasting and analysis

Can combine forecast components

Human situations and complex agency: many challenges to policy and to science

- Epigenetics of juvenile exposure to violence
- Influence networks
  - incarceration rates
  - and personal success
  - and smoking
  - and stopping smoking, etc
- Human distributed computing
- Market based pricing,
  - e.g., the Indian rice markets in 2009....
  - famine without food shortage or plan
- Resilient interdependent societal infrastructure
What’s the point of Synthetic Information Systems?

• ICT layered into society, guiding state assessment, decisions and actions at all levels

• Scales to the natural size and richness of society

• Evolves with ICT and focuses on ecologies of needed applications and specialized methods

• It changes how to think about computationally-enabled social decision making

So…

• Increasingly the ICT world is a large part of the lab and computer model; people/tech are embedded enactively rather than observed and managed

• New ICT methods are the only way to deal with this

• Scalable ecologies of synthetic information applications replace monolithic models for “deciders”

• Unstructured data upends a lot of scientific thinking about status of “data”

• Non-demonstrative methods and use of all this data as evidence must be carefully introduced to practice

• Prediction per se is diminished in purpose and plausibility
Thank you