

Summary of the Climate Change Breakout Discussion

Participants: Doug Fisher, Auroop Gangoly, Michael Steinbach

Scope of breakout: Computing problems, methods and challenges for characterization of, mitigation of and adaptation to climate change

Machine Learning and Optimization

- Deal with solution uncertainty and sensitivity: because of climate change, what is optimal today, may not be optimal 'tomorrow'
 - ◆ How to characterize model/solution robustness in face of change?
 - ◆ How to adapt (already implemented) 'solutions' in real world?
 - ◆ Optimality at present → acceptability in future ?
 - ◆ Solving for change
- Deal with lack of iid in climate data

Modeling and Simulation

- Downscale models for regional characterizations and predictions
- Integrate information (physical, social, biological, etc) to get impacts population shifts, biodiversity, invasive species, energy and water supplies/demands

High Performance Computing

- *and human-computer interfaces with it, to include visualization*

Sensors and Satellite Data

- Challenges of sharing of data, to include data management
 - ◆ e.g., for invasive species monitoring (highlighted in talks)

Social computing

- Crowdsourcing of city and other built structure designs
 - ◆ design was a topic highlighted in at least one talk

AI and Design

- Retrofitting old (e.g., city) designs

Software Engineering

- model validation – how to validate climate models?
- automated software engineering applied to 2M lines of code, for
 - ◆ simplification
 - ◆ transparency
 - ◆ identification of model interdependencies
- interplay between models and data
 - ◆ automated refinement of models in light of data

Other challenges

Education

- role of computing on climate change (and other sustainability) education
 - ◆ K-12
 - ◆ other sciences
 - ◆ policy makers, defense and others in government
- climate change (and other sustainability) education in CS
- role of games, such as ‘climate change war games’

Why US and China in particular?

- The US and China are the current and probably future leaders in GHG emissions, respectively, and its right that they either lead or follow in solutions and adaptations, preferably together
- Open question: If scientists collaborate across national lines, will there be any ripple to policy makers?