Human problem solving: Plenary talk

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Topics

- Complexity theory in cognitive modeling
- Graph theory in cognitive modeling
- Optimal decision making under uncertainty
- Individual differences in problem solving
- Traveling salesman problem
- Variants and applications of TSP

The New Approach

- It is clear that we – the assembled company – have developed a new approach to human problem solving
- Emphasis on human cognitive successes, as opposed to cognitive failures
- Emphasis on cognitive functions that are computationally difficult
  - The set of currently available models is small (often empty)

Cross-fertilization

- Psychologists can learn from mathematical/ computational scientists how to formulate computationally efficient model.
- Mathematical/computational scientists can learn from psychologists about what is computationally possible (existence proof for cognitive functions).

Interdisciplinary Work

- Psychologist tries to provide evidence about human cognitive abilities that at present cannot be replicated by a computer. When she succeeds:
- Computational scientist will have to try to figure it out. When he succeeds:
- Psychologist will test the new model and will try to figure out under which conditions the model is not “smart” enough. When she succeeds:
- Computational scientist will have to try to figure it out…

Continuing and future issues

- The range, limits and individual variation in human performance. Relatedly, are there easy classes of problem for humans?
- Expanding the range of problems studied
- Influence of instructional variation and mode of data collection: engagement of serial vs. parallel cognitive/perceptual processes?

More of them

- Models and heuristics: bridge-building between formal mathematical accounts and cognitive (and even neuroscientific) accounts. Tractability as a major issue here
- Relationship between the fields of sequential decision-making and optimization
- Still only a limited amount we can tell Richard: he needs us to do more basic work to help him keep Cumbria gritted. How do humans deal with constraints added to problems?

Mahalo nui loa

- Thank you all for coming and contributing so vigorously and enthusiastically
- We hope that we have achieved our goal of having this meeting produce “more than the sum of its parts”
- We are hoping to run this meeting again in two years.