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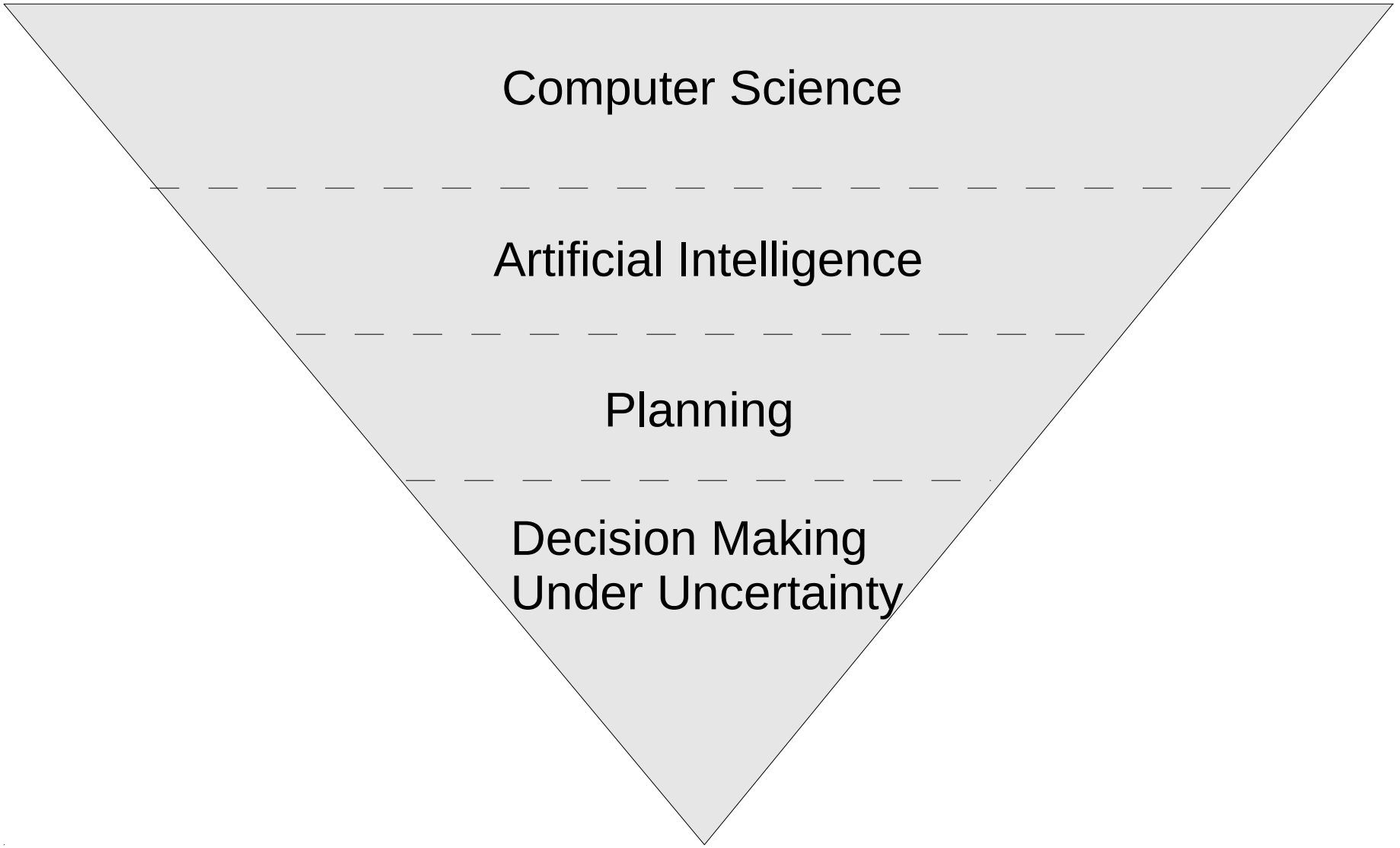
Presentation for HGD
April 11, 2013
Fisher 139

Outline

- My research and teaching
- What is artificial intelligence (AI)?
- AI in games
- Research in Game AI

Research Area



Why is it so dam hard to create intelligence?

Because things always do not always go as planned

Assessing the situation is challenging

What can be done for contingencies?

- The reactive approach

- The robust approach

- The advance planning approach

How to develop intelligent software that can deal with contingencies?

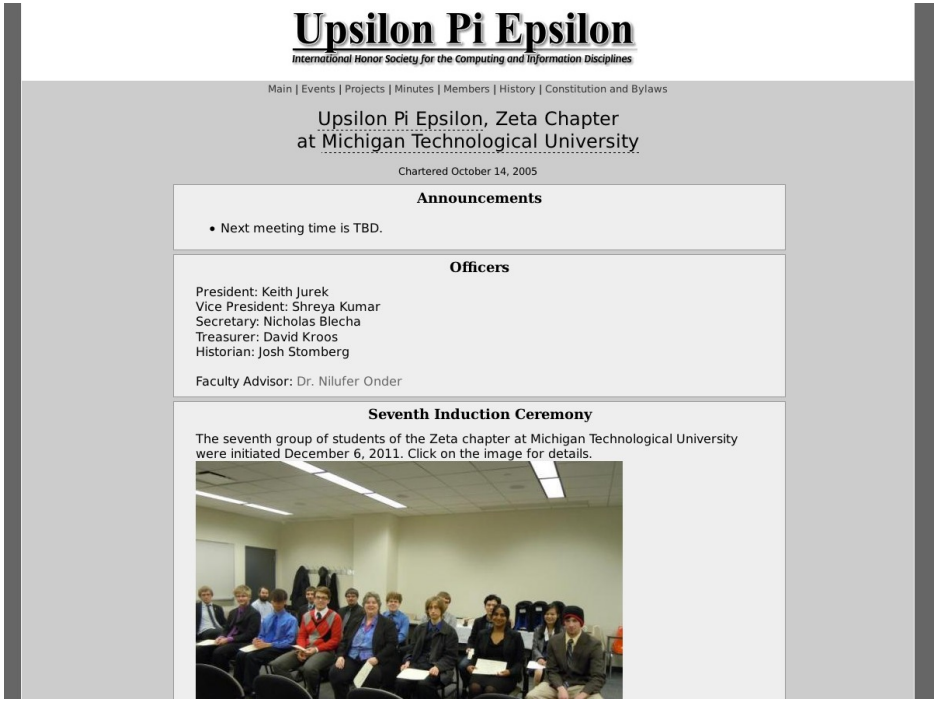
- Create a model of the world (knowledge representation)
- Create algorithms that can deal with planned or unplanned changes (reasoning)

Heuristics

- Estimates of how close we are to finding a solution
- Heuristics are found by the naturally intelligent
- Means ends analysis
- Strategies

Student organizations

WiCS
Women in Computing Sciences



UPE
Upsilon Pi Epsilon

Diversity is important

- Study of student persistence
- Effects of under-representation

Teaching, Research, & Service

- CS 3311
  Formal Models of Computation
- CS 4811
  Artificial Intelligence
- CS5811
  Advanced Artificial Intelligence
- CS 3090
  Web Based Services

- Artificial Intelligence Planning
- Decision making under uncertainty
- Heuristic techniques
- Applications

- Women in Computing Sciences
  WiCS
- CS Honor Society
  UPE
- Diversity research

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What is artificial intelligence?

Systems that:

Think like humans	Think rationally
Act like humans	Act rationally

Source: Artificial Intelligence, A Modern Approach, Third Edition, by Russell and Norvig, page 2.

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AI and games

- AI to play challenging games
- AI to solve game tasks
- AI to develop “interesting” games

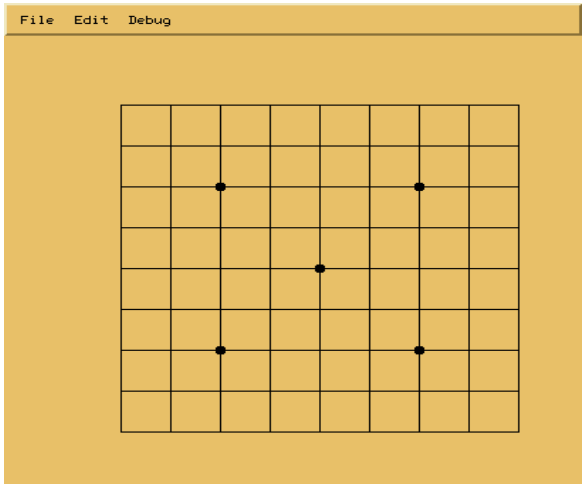
Chess

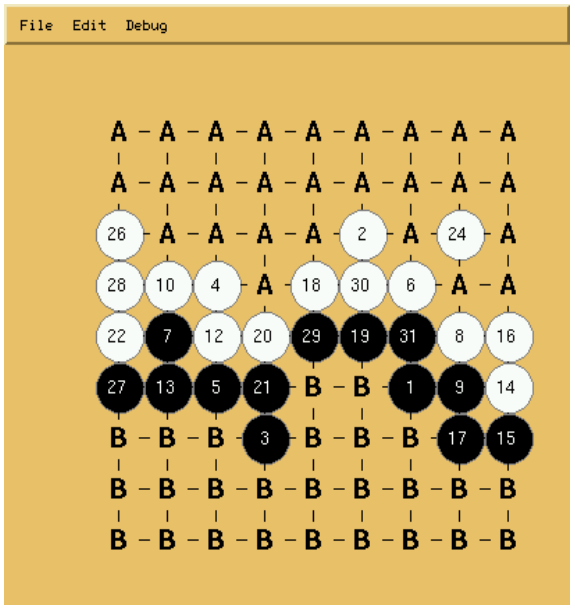
“I could feel human level intelligence across the room.”

- Gary Kasparov, 1997 (playing against the Deep Blue)

Picture: http://www.wired.com/techbiz/it/multimedia/2003/01/57497?slide=2&slideView=2

Go vs. chess





- Chess
  b = ~35
  d = ~100 half moves
- Go
  b = ~250
  d = ~200 half moves

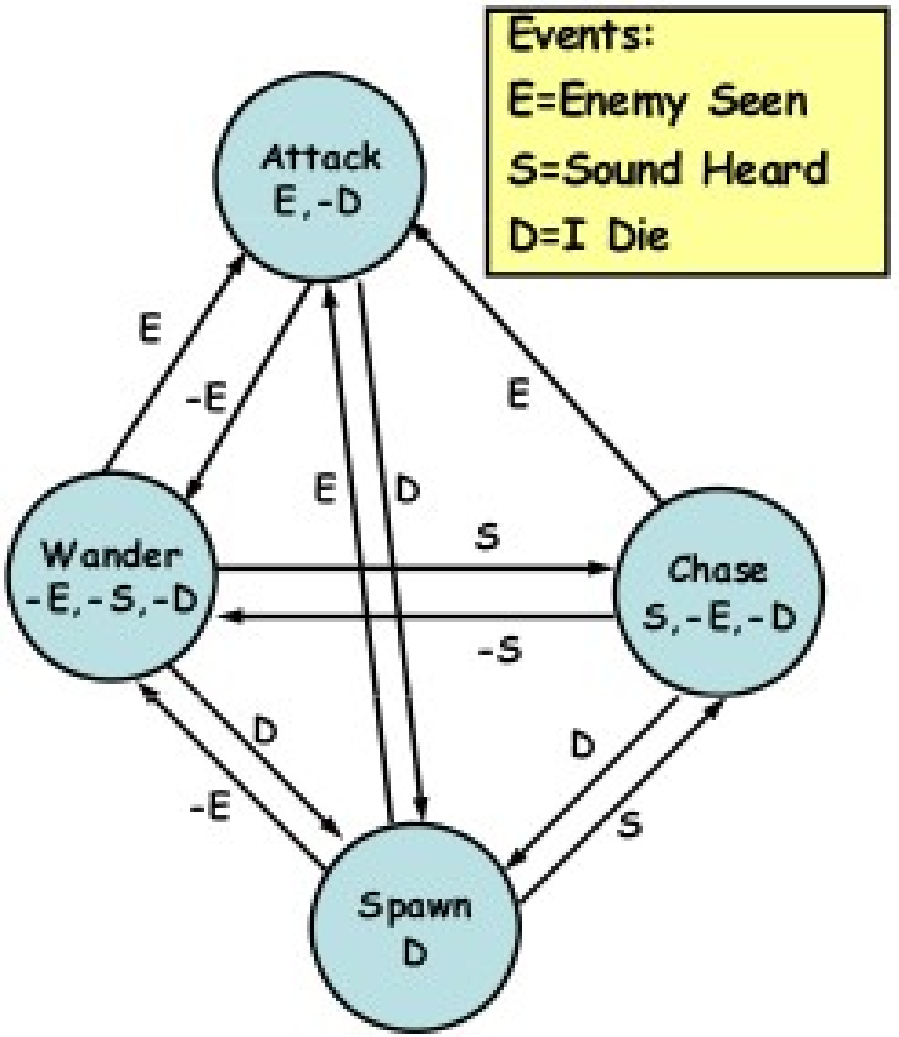
Go

After the game, Ishida said that he thought the program was a 'genius' and marveled at the calmness and flexibility of its moves.

(2013)

Picture: http://gogameguru.com/crazy-stone-computer-go-ishida-yoshio-4-stones/

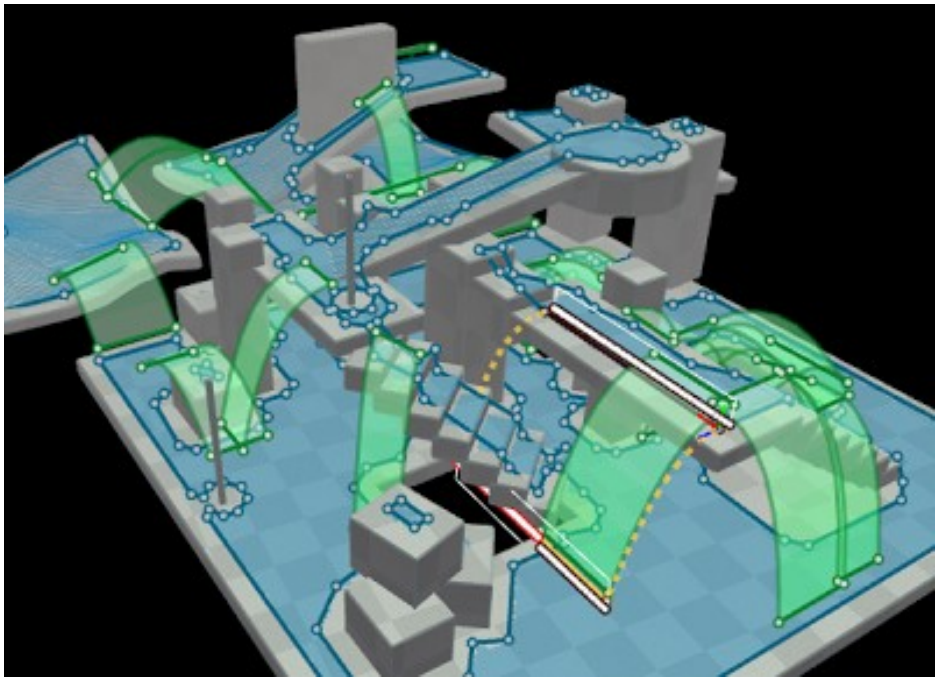
Agent behavior



- If you don’t see an enemy wander randomly
- When you see an enemy, attack
- When you hear an enemy, chase
- On dying, re-spawn

Picture: http://www.cs.umd.edu/class/spring2011/cmsc198i/cmsc198I-motion.pdf

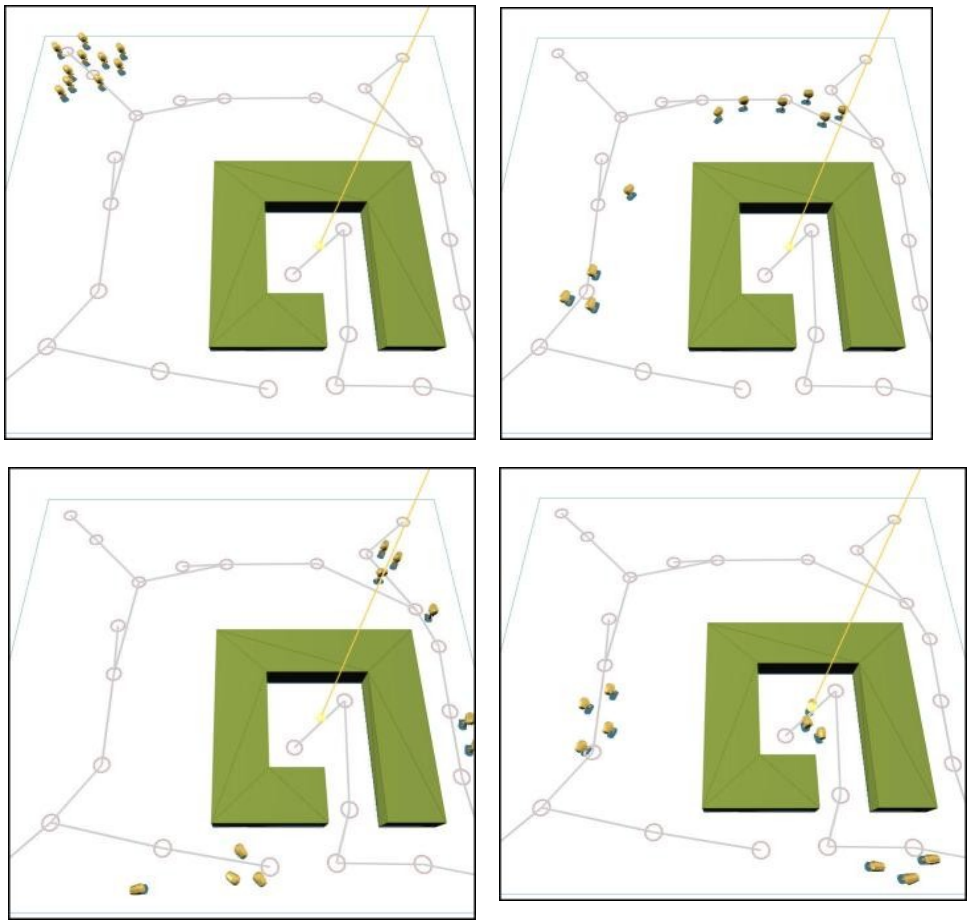
Path planning



- Represent the map as a graph
- Given a starting point (s) and a destination point (d) find a path from s to d
- Optimal path

Picture: http://digestingduck.blogspot.com/2011/07/paris-gameai-conference-2011-slides-and.html

Multiple agents, flocking



- Common goal or not
- Flocking rules
  - Separation
  - Alignment
  - Cohesion
  - Avoidance

Picture: http://parasol.tamu.edu/dsmft/research/cflock/index2.php

How to create interesting games

- Agents not too simple, not too sophisticated
- Non-repeating story lines
- Learn behavior, “grow” with the user

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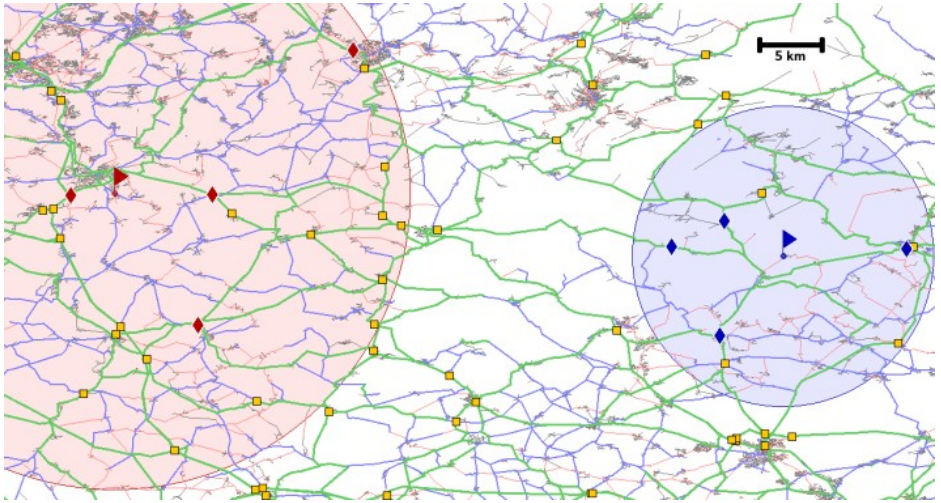
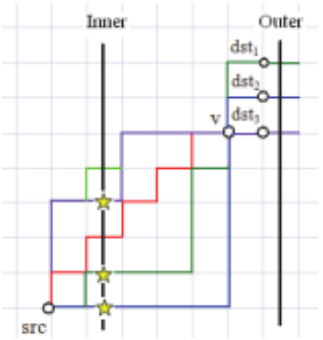
Path planning research

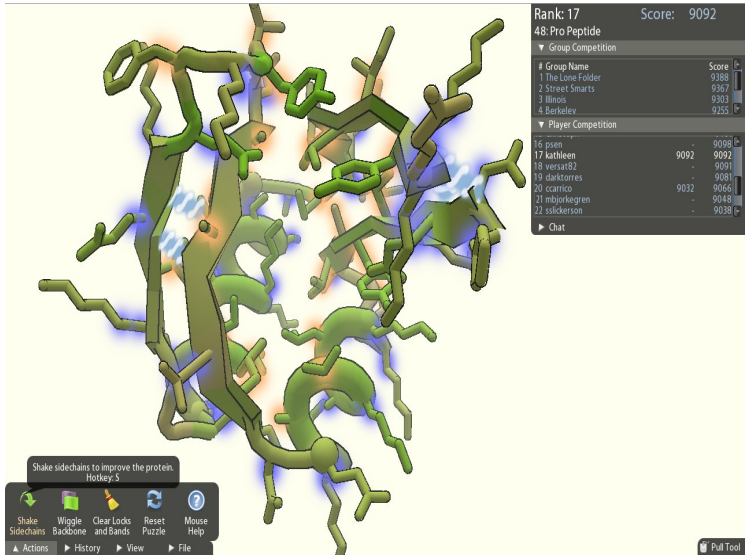




- Artificial Intelligence and Interactive Digital Entertainment Conference (AIIDE)
- TRANSIT: technique for finding shortest paths and distances
- This paper describes how to break symmetry to improve speed

Source: “Transit Routing on Video Game Maps,” by Leonid Antsfeld et al.
In Proceedings of the 8th Conference on Artificial Intelligence and Interactive Digital Entertainment, 2012.

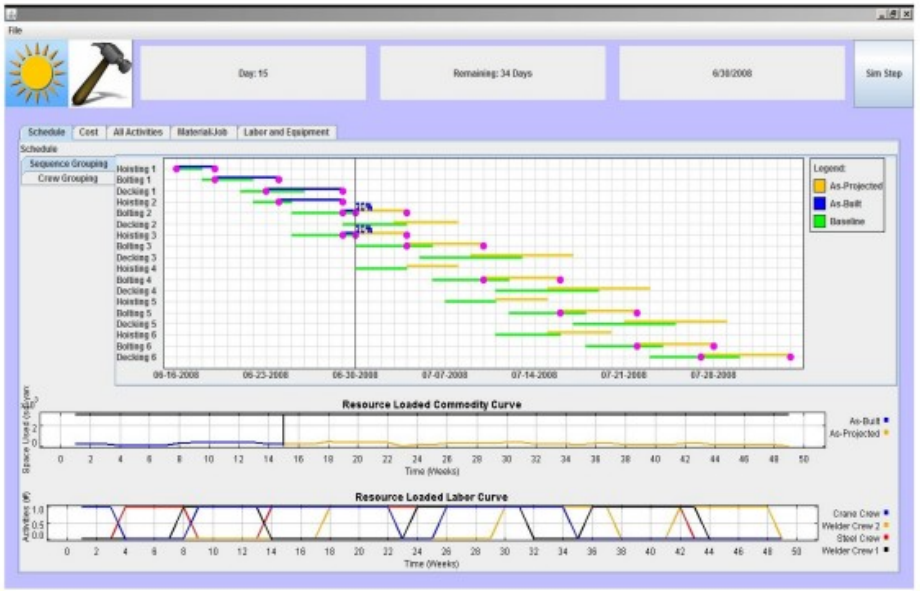
Center for Game Science



Picture: http://www.centerforgamescience.org/site/

- “The Center for Game Science focuses on solving hard problems facing humanity today in a game based environment.”
- Treefrog: teaches whole numbers and fractions
- Foldit: tackles problem of protein folding

ICDMA



- Interactive Construction Decision Making Aid
- Play a game of decision making
- Forecast scenarios, use strategies

Source: “Construction Management Applications: Challenges in Developing Execution Control Plans, by N. Onder, A. Mukherjee, and P. Tang. In Proceedings of the Twentieth International Conference on Automated Planning and Scheduling (ICAPS 2010).

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Thank you!

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Questions and suggestions are welcome.
Use your index cards or send me e-mail:
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