Workshop on Decision Making in Adversarial Domains

University of Maryland
College Park, Maryland

Motivation

- Adversarial decision making is studied in several different fields
  - Some of them overlap
  - Some are nearly disjoint
- Some of the approaches and techniques seem related
  - Hard to tell what the relationships are
    - » Different terminology
    - » Different ideas of
      - What terms to use
      - What assumptions to make
      - What the problem is
      - What constitutes a solution
    - » Some of this is stated explicitly, some is just assumed tacitly

- Goal of this workshop:
  - Bring people together from the relevant fields
  - Compare approaches and assumptions
  - Understand the relationships

Participants

● Even more diverse than we had expected:

- ◆ Artificial Intelligence

- ◆ Chemical Engineering

- ◆ Control Theory

- ◆ Economics

- ◆ Industrial Engineering

- ◆ Military Science

- ◆ Operations Research

- ◆ Psychology

- ◆ Systems Science

- ◆ *... perhaps others ...*

Format

- Didn't want the typical conference format
  - In a group this diverse, people wouldn't understand each other

- Small number of keynote talks and panel discussions
  - Appeal to a multi-disciplinary audience

- Breakout groups
  - You get to help choose the topics
  - **Fill out and return the questionnaire** *before lunch today*

Meals

- We'll provide lunch all three days, and dinner on Monday

- Lunch at the hotel buffet - ***Bring your name tag***

- Dinner on Monday - Franklin's Restaurant and Brewery
  - ◆ Buffet, unlimited drinks - ***Bring your name tag***
- Bus will start boarding at 6:15, will leave at 6:30
- To get there by car: directions & map in your registration materials

Workshop Proceedings

- No proceedings *per se*
- Instead, we'll create a permanent web site for the workshop
  - We'll post the presentations on the web site

- We'll pass a USB drive around to the panelists and keynote speakers
  - Please put a copy of your talk onto it
  - Please include your last name as part of the file name

- Recently created with help from AFOSR
  - This workshop is LCCD's very first activity

- Purpose
  - Decision making in different cultures
  - Build simulations, help policy experts form better decisions
  - Work with multiple international partners
    - Develop computational models to solve socio-economic health, other problems
- V. S. Subrahmanian will give an overview on Tuesday morning

Who We Are

» Dana Nau (chair)

» Michael Fu (co-chair)

» V.S. Subrahmanian (co-chair)

- Six different academic units (departments and institutes)
  - ◆ Dept. of Computer Science
  - ◆ Decision & Information Technology (i.e., Operations Research)
  - ◆ Electrical & Computer Engineering
  - ◆ Mechanical Engineering
  - ◆ Institute for Systems Research (ISR)
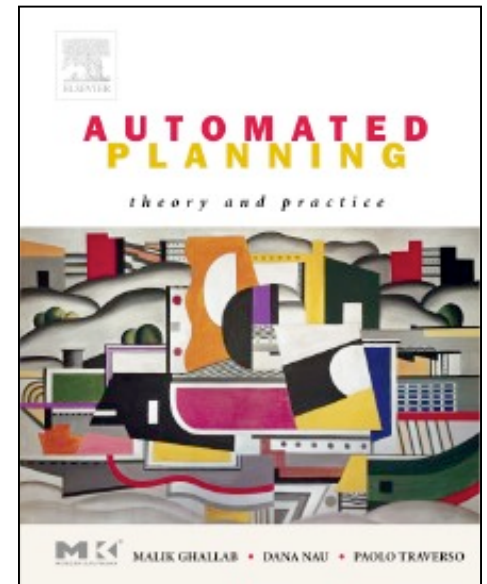 - ◆ Institute for Advanced Computer Studies (UMIACS)

  - ◆ LCCD

Who We Are (cont'd)

- Dana Nau
  - Dept. of Computer Science
  - Institute for Systems Research (ISR)
  - Affiliate - Institute for Advanced Computer Studies (UMIACS)
  - Affiliate - Dept.of Mechanical Engineering
  - Director of LCCD
- My field of research: Artificial Intelligence
  - Search & game trees:
    - » game-tree pathology
    - » plan-based game-tree search - *Bridge Baron*
  - Automated planning:
    - » task decomposition - *SHOP2*
    - » *Automated Planning: Theory and Practice*
  - Manufacturing process planning:
    - » Search-based planning & manufacturability analysis - *IMACS, EDAPS*

BRIDGE BARON
WORLD'S BEST COMPUTER BRIDGE GAME

SH▢P

AUTOMATED PLANNING
theory and practice

MALIK GHALLAB · DANA NAU · PAOLO TRAVERSO

Who We Are (cont'd)

- Michael Fu - Professor of Management Science
  - Decision and Information Technology Dept., R.H. Smith School of Business
  - Institute for Systems Research (ISR)
  - Affiliate - Dept. of Electrical & Computer Engineering
- Research: Operations Research
  - Simulation modeling/analysis, discrete-event systems, optimization
  - Applied probability - queueing theory, stochastic derivative estimation
  - Applications - manufacturing, telecommunications, finance

LCCD

- V.S. Subrahmanian
  - ◆ Director - Institute for Advanced Computer Studies (UMIACS)
  - ◆ Department of Computer Science
  - ◆ Affiliate - Institute for Systems Research
- Research: Artificial Intelligence, Databases
  - ◆ Reasoning - logical, probabilistic, nonmonotonic, temporal
  - ◆ Databases - logical, probabilistic, multimedia
  - ◆ Software agents

Acknowledgments

- AFOSR
  - ◆ John Tangney, Neal Glassman, and Brendan Godfrey

- The UMIACS staff
  - ◆ Especially Cecilia Kullman - local arrangements

Keynote Talk: Michael Littman

- Associate Professor, Dept. of Computer Science, Rutgers University
- Previous research positions at AT&T Labs and Bellcore, faculty position at Duke University

- Head of the Rutgers Laboratory for Real-Life Reinforcement Learning, RL^3
- Focus: learning and decision making in real environments
  - robotics, computer networking, human-computer interaction

- His 1994 paper on multiagent reinforcement learning helped introduced game-theoretic reasoning to the machine-learning community

- Today he'll present some tutorial information on computational models of adversarial decision making

Keynote Talk: Jonathan Schaeffer

- Professor, Dept. of Computer Science, University of Alberta

- Leads what I think is the best computer games group at any university in the world

- Author of Chinook
  - Official world checkers champion
  - First computer program to win a human world championship

- One of his group's current projects involves the game of poker
  - Program that plays at the level of expert humans
  - That's what he'll speak about today