POMDP Practitioners workshop: solving real-world POMDP problems

DISCUSSION

Workshop at ICAPS 2010, May 12, 2010 Toronto, Canada

Discussion points

- 1. What are the key <u>computational</u> challenges?
- 2. What are the key <u>application</u> challenges?
- 3. Many practical problems are well-stated as POMDPs, but do not lend themselves to POMDP-type solutions. Why?
- 4. With what types of applications can we have the most impact?
- 5. List of available software packages.
- 6. Suggestions of future events for the community

Computational challenges

- Approximate tracking / planning
- "Lifted" (first-order) representations
 See Scott Sanner's work
- Non-Gaussian continuous domains
- More tools for visualizing policies

Applications challenges

- Tools for specifying / designing the model
- Preference/reward elicitation
- Selecting the appropriate time granularity
- Explain the action (to convince someone)
- Whether and how to discretize

Jason's comment

• Many practical problems are well-stated as POMDPs, but do not lend themselves to POMDP-type solutions. Why?

Impractical because of global solutions

Even non-POMDP solutions to POMDP should be called POMDP-type solutions (Pascal)

Mausam: POMDP solution should be applicable for a range of domains

Figure out what approximation the non-POMDP solutions use for POMDP domain

Representation is nice per s'e, no matter how we solve it

Doing the belief update already is nice

Types of applications to target

- Healthcare
- Robotics
- Dialogue systems
- SmartGrid/Sustainability
- Tutoring
- Human-machine interactions
- Entertainment or games

Do we have benchmark problems from real applications

- -Amin Atrash: dialogue
- -Pascal Poupart: handwashing

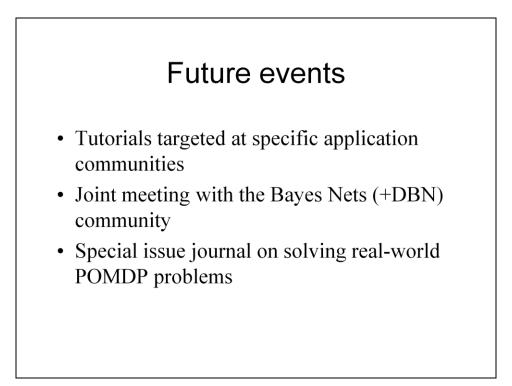
-Do the domains require the actions to be executed by humans or the system?

Name of package	Creators	Language	Comments
ZMDP	T. Smith	C++	
Symbolic HSVI	KAIST		Factored representation
APPL / Sarsop	Nat.Uni.Singapore	C++	
Perseus	M. Spaan / N. Vlassis	Matlab	
MADP Toolbox	F. Oliehoek / M. Spaan	C++	Multi-agent (DEC- POMDPs) / Perseus
Symbolic Perseus	P. Poupart	Matlab / Java	Factored representation
libPOMDP	D. Maniloff	Java/Matlab	
pomdp-solve	T. Cassandra	С	Exact methods, grid- based approximations
libpg / fpg	O. Buffet	C++	Policy gradient fpg is factored
Carmen / OpenMarkov	M. Arias / F. J. Diez (UNED)	Java	Factored representation

Fileformats:

- -Tony's format
- -SPUDD format
- -POMDPX (singapore)
- -XDSL Smile

-Present in table: language, authors, representation, capabilities



Do we need a home conference Link with UAI POMDP Track at ICAPS? AAAI Spring symposium? Link with OR community (informs)