Research Summary

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I am a graduate student in the Computer Science department at Stanford University. My research interests include abstraction in planning, scheduling and reasoning under uncertainty.

In one project, we are examining methods of effectively eliciting utility functions. In many domains, decision models are designed to be evaluated for more than user. In these cases, for each new user, we must evaluate the model using the appropriate utility function. Traditionally this is done by eliciting a full utility function over the entire outcome space for each new user. This can be a long and tedious process. We have found that it can be more effective to identify a set of abstract utility functions, and to then classify a new user by the abstract class of their utility function. Often this classification of the new user's utility function can be done by asking the new user many fewer and simpler questions than for full utility elicitation. What is novel about our approach is rather than assuming a particular structure of the utility function, such as additive, we learn the appropriate decomposition. We have applied this technique in a prenatal testing domain.

I am also interested in abstraction in causal models. I have been working on methods of incorporating domain constraints into both constraint-based and Bayesian learning algorithms. The types of constraints typically considered are rather low-level, such as the existence or absence of a direct causal link between variables in the model. I am interested in identifying and making use of more abstract constraints, such as the existence of causal paths between variables and qualitative constraints on the influence of one variable on another.

I have also done work on approximation in online scheduling domains (Getoor *et al.* 1997). In that work, we identified heuristics for scheduling problems and showed how they can be instantiated using abstract features of the problem instances. We were thus able to find abstract constraints that were useful for different subsets of the input domain.

Finally, I am also interested in abstraction in planning, in particular techniques that are effective for Markov decision processes. In previous work, I studied abstraction in a constraint-based planning system (Lansky & Getoor 1995). This planner automatically constructed abstraction networks. These networks, called *localizations*, improved the performance of the planning system by partitioning the planning problem into overlapping subproblems. I am interested in methods for applying a similar blend of state-based and action-based abstraction to Markov decision processes.

References

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