Visualization of Decision-Theoretic Plans

HNRS-200
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Research Team

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The Problem

- Humans look for advice in situations where decisions are complex and include a vast array of possible choices and outcomes.
- Current probabilistic decision applications fail to communicate scenarios effectively with users who are not familiar with statistical theory.
Previous Research

- This project is a continuation efforts by a group of from the University of Kentucky.

- Their efforts led to the development of a software suite called **PlanIt**.

- The current user interface was tested using students at the University of Kentucky who said that it did not provide an intuitive experience.
Old User Interface
Procedures

1. **Qualitative analysis** - used to identify the weaknesses of the current system

2. **Brainstorming and Research** - the team brainstormed design ideas and researched the human cognition of decision making to identify goals for the new interface

3. **Prototyping** - using the goals list and the list of flaws in the previous interface, we made models for a new interface

4. **Discussion** - the prototypes are being discussed and critiqued for implementation later in the project
Research Materials

Thinking, Problem Solving, Cognition - Richard E. Mayer, 1992
We are using this book to understand the basics of human logic and problem solving, and how those relate to computer simulations which solve the same problems.

The Nature of Cognition - Robert J. Sternberg, 1999
This book will be critical in the development of an accurate and useful cognitive model for later parts of the project.
Results - Problems with the Current System

- No indication of dead end states.
- Confusing terminology/vocabulary
- Information about current/future states is hard to visualize
- State changes are hard to evaluate
- Does not allow comparison of multiple actions and results
- Action usefulness and result probability not precise
Results - Problems with the Current System

- Action selection is hard to use/understand, and is shown after result selection when really it should happen first.
- Can't see the long term result of choosing a specific action.
- No easy way to go back many steps.
- The system doesn't say why a state changed the way it did.
- There is no indication of time progression.
Results - Goals for the New System

- Glossary
- Interface customization
- Progress/time indication
- Checkpoints for easy navigation through the plan
- Indication of most likely end result of choosing a specific path, and the number of steps to reach that result.
Results - Goals for the New System

- Have all information accessible, but hide less useful information until the user asks for it
- Goals to determine which end results are acceptable
- Preferences to determine which goal results are better
- Possible evaluation of multiple actions sequentially and/or simultaneously (to be determined next quarter)
Brian's User Interface Concept
Evan's User Interface Concept
The Future

● This project will continue into next quarter.

● The focus of Spring Quarter work will be initial implementation of prototype designs produced this quarter.

● These implementations will be tested and experimented with. The results of these tests will help the research team refine the interface and improve the overall quality of the software.

● We hope to be able to publish our results in an AI journal.
Questions and Answers