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Project 3  
May 11, 2007

### ***Abstract***

This paper describes a Prolog implementation of a logical agent which uses logical inferences to derive new information about the agent's environment. The agent's environment is a randomized instance of the Wumpus World game board. The agent is capable of inferring information about the state of the game board. The inferred information is similar to information that a human player would reason from a Wumpus World game state.

### ***Introduction***

To produce intelligent agents, we require computational frameworks that establish some notion of "intelligence" which can be applied to problem areas. A less abstract idea of intelligence is the ability to store and retrieve knowledge. An intelligent agent that stores and retrieves knowledge can obtain new knowledge from interactions with the agent's environment. The agent can also derive new knowledge by performing systematic reasoning upon its accumulation of knowledge. Formalized logical reasoning systems are used to represent knowledge and specify how to derive new knowledge. Conventional imperative programming lacks the ability to explicitly mandate the truth (correctness) of the algorithms therein. Programs written using logical programming, however, fill this gap by ensuring the correctness of their logical declarations.

We demonstrate the reasoning ability of logical programming by applying a logical agent to the Wumpus World game. The Wumpus World game consists of a grid of squares, each representing a room in the Wumpus World. In exactly one room, there is an unmoving Wumpus. In exactly one other room, there is gold, which is also unmoving. Pits are found in multiple rooms of the Wumpus World. The player traverses rooms in the Wumpus World with the goal of obtaining the gold. If the player enters a room containing either a pit or a Wumpus, the player dies and the game is over. If the player enters a room containing the gold, the player wins the game. The player does not know the contents of any room before entering it. Some rooms have hints to indicate that the Wumpus, pit, or goal is in an adjacent room. Two rooms are considered adjacent if they are next to each other either horizontally or vertically (but not diagonally). A room containing a stench indicates that the Wumpus is in an adjacent room. A room containing a breeze indicates that a pit is in an adjacent room. A room containing glitter indicates that gold is in an adjacent room. A player receiving these hints can deduce moves that are safe and lead to gold by reasoning about what has been observed in the game environment.

### ***Algorithm***

***Results***

***Conclusions***