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AI - TASK 1

1. **TOY PROBLEM: Tic-Tac-Toe**

* **States:**
  - In tic-tac-toe, a state represents the current configuration of the game board. The board is typically a 3x3 grid where each cell can be empty, marked with an "X" (for one player), or marked with an "O" (for the other player).
  - A state is fully defined by the placement of Xs and Os on the board.

* **Initial State:**
  - The initial state is the starting configuration of the game board, often an empty 3x3 grid where no moves have been made yet.
  - Both players (X and O) take turns to make moves from this initial state.

* **Actions:**
  - Actions in TIC-tac-toe represent the legal moves that a player can make from a given state.
  - An action consists of specifying the row and column where a player wants to place their symbol (X or O) on the board.
  - Actions are constrained by the rules of the game: you can only place your symbol in an empty cell.

* **Transition model:**
  - The transition model describes how the game progresses from one state to another based on the actions taken.
  - Given a current state and a valid action, the transition model updates the board to reflect the new state after the move.
  - For example, if the current state has an empty cell at (1,2), and the action is to place "X" there, the transition model will update the board to have "X" at that location.

* **goal test:**
  - The goal test checks if a given state is a terminal state where the game has been won by one of the players or has ended in a draw.
  - The goal is typically defined as having three symbols (either X or O) in a row, column, or diagonal, or the board

being fully occupied with no winner.
• If a goal state is reached, the game is over.

* Path text:
• The path text in Tic-Tac-Toe represents the sequence of states and actions that lead from the initial state to a goal state, signifying the moves made by both players.
• The path text is constructed by applying actions to states and checking the goal test at each step to see if the game has ended.
• If a goal state is reached, the path text can also indicate which player has won or if the game ended in a draw.

2. REAL-WORLD PROBLEM: Amazon product recommendation system:

* States:
• The states in the Amazon product recommendation system represent the current status of a user's shopping experience, including their browsing and purchase history, demographic information and the products available on the Amazon platform.

* Initial state:
• The initial state corresponds to a new or returning user with a minimal shopping history on Amazon, typically with no or very limited recommendation history.

* Actions:
• Users take actions such as viewing products, adding items to their shopping cart, making purchases, leaving reviews, or conducting searches, which provide data points for the recommendation system to understand their preferences.

* Transition Model:
• The transition model defines how a user's state evolves based on their interactions with the platform. When users take actions, the recommendation system collects and processes this data using machine learning algorithms, adapting its recommendations for future interactions.

* Goal test:
• The primary goal of the Amazon product recommendation system is to continuously offer personalized and relevant product recommendations to users. The aim is to enhance user engagement, satisfaction and conversion rates by suggesting products aligned with user interests and preferences.

*Path Text:

- The Path text is a dynamic sequence of user actions and corresponding recommendations that evolve as the user interacts with the platform. It represents the user's journey and interactions on Amazon, with the recommendation system continually adjusting its suggestions to provide a tailored shopping experience.