COMP 4303: AI in Computer Game

PROJECT PROPOSAL: Tom's Maze Chase

14th March 2024

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Description of the Game Concept

Tom's Maze Chase is a modern reinterpretation of the iconic cat-and-mouse chase dynamics seen in classic Tom and Jerry cartoons. The game invites players to step into the shoes (or paws) of Tom, navigating through intricately designed mazes to catch Jerry and his clever companions. This game combines nostalgia with advanced gameplay mechanics and AI-driven challenges to offer an engaging and endlessly entertaining experience for players of all ages.

- **Dynamic Environments:** Players interact with environments in multifaceted ways. Appliances can create distractions, and furniture can hide secret passages or traps, deepening the strategy required to capture Jerry.
- **Character-Specific Challenges and Abilities:** Incorporating characters beyond Jerry, including Spike and Tuffy, introduces unique challenges, requiring players to adapt their strategies.
- **Adaptive AI and Emotional Depth:** The AI doesn't merely react; it anticipates and adapts, driven by a simulated emotional model. Jerry's confidence grows as he evades Tom, altering his behaviour, while Tom's frustration meter impacts his performance, adding a layer of emotional strategy to the gameplay.

1. Core Features and Functionality

- **Player Movement and Interaction:** Players guide Tom with keyboard controls through mazes, utilizing sophisticated movement algorithms for a seamless experience. The game's physics ensures realistic interactions with the environment and obstacles.
- **Enemy AI:** Jerry and his companions are powered by advanced AI, using pathfinding techniques like A* to navigate mazes with smart evasion tactics. Their behaviour adapts to player strategies, providing a dynamic challenge.
- **Power-Ups:** Reflecting the iconic gadgets and tricks from the cartoon, power-ups offer temporary advantages. For Tom, a speed boost for quick dashes; for Jerry, invisibility to evade capture, each adding strategic depth to the gameplay.
- **Procedural Content Generation:** Mazes and levels are procedurally generated, creating a unique layout for each playthrough. This ensures endless replayability with varied challenges and power-up placements.
- **Special Effects and Interactions:** The game includes interactive elements and physics-based effects, enhancing the visual appeal and engagement. These include environmental puzzles and traps that players can use to their advantage or must navigate around.
- **Emotion-Driven AI:** Characters display behaviours influenced by "emotions," affecting their decision-making and abilities, adding a layer of complexity and realism to the gameplay.

2. Categories

- **Complex Movement Algorithms**: Ensures smooth character navigation with path following and collision avoidance, facilitating dynamic chases through the mazes.
- **Pathfinding**: Utilizes A* for intelligent AI navigation, challenging players with unpredictable evasion tactics from Jerry and friends.
- **Decision Making**: Implements State Machines and Behavior Trees for AI decision-making, allowing characters like Jerry to strategize escapes or confrontations based on game dynamics.
- **Procedural Content Generation**: Employs Perlin Noise and Cellular Automata for unique, varied maze layouts in each playthrough, enhancing replayability.
- **Additional Concepts**: Introduces emotion-driven AI behaviours and special gameplay elements like unique power-ups and environmental puzzles, adding depth and variety to the player's experience.

3. Responsibility Division

- **Game Design and Conceptualization:**
  - **Both**: Collaborate on the overall vision, game mechanics, and narrative elements, ensuring the game remains true to the essence of Tom and Jerry while introducing innovative gameplay elements.
- **AI and Pathfinding Implementation:**
  - **Sahil**: Focuses on developing the AI for Jerry and friends, utilizing A* and Behavior Trees for intelligent pathfinding and decision-making, ensuring challenging and dynamic interactions.
- **Procedural Content Generation:**
  - **Harsh**: Leads the creation of unique and unpredictable mazes using Perlin Noise and Cellular Automata, enhancing the game's replayability and variety.
- **Complex Movement Algorithms and Interaction:**
  - **Sahil**: Implements sophisticated movement algorithms for both Tom and the AI characters, ensuring fluid navigation and realistic interactions within the game environment.
- **Frontend Development and User Interface:**
  - **Harsh**: Designs and develops the game's user interface, focusing on accessibility, user experience, and integrating the visual theme of Tom and Jerry into the game's presentation.
- **Testing and Debugging:**
  - **Both**: Share the responsibility for rigorously testing the game, identifying and fixing bugs, and ensuring the final product is polished and user-friendly.
- **Documentation and Presentation**:

- **Both**: Collaborate on creating comprehensive documentation detailing the game's design and development process and prepare an engaging presentation that showcases the game's features and the team's creative journey.