**Game Design Document(GDD)**

**Memory Matching Game**

**1. Game Overview**

* Title: Memory Matching Game
* Genre: Puzzle / Memory
* Platform: PC (Desktop
* Target Audience: Casual gamers, ages 8 and above, puzzle enthusiasts
* Objective:
* The player is tasked with uncovering matching pairs of cards within a grid. The goal is to find all pairs in the least number of moves and the shortest possible time.

**2. Game Concept**

Memory Matching Game is a classic card-matching puzzle where the player flips two cards at a time to find matching pairs. The game helps improve memory and concentration. Once paired, cards remain revealed. If the cards do not match, they are flipped back after a short delay.

**3. Gameplay Mechanics**

**3.1 Core Gameplay Loop**

* Display a grid of facedown cards.
* Player clicks on a card to flip it and reveal its color.
* Player selects a second card.
* If the two cards match, they stay revealed and are considered "matched."
* If not, they are flipped back after a pause.
* Continue until all pairs are matched.
* Record the number of moves and approximate elapsed time.

**3.2 Player Interaction**

* Mouse clicks are used to select and flip cards.
* Keyboard inputs:
* Press R to restart the game.
* Press ESC to quit.

**3.3 Win Conditions**

* The game ends when all pairs are found.
* A congratulatory message is displayed.
* Player can restart or quit.

**4. Game Design Elements**

**4.1 Visual Design**

* Background: Dark blue (#1e1e3e) for contrast.
* Back: grayish blue (#505080).
* Front: vibrant colors (Red, Green, Blue, Yellow, Magenta, Cyan, Orange, Light Blue, Purple, Teal.
* White for visibility.
* Displays "Moves" count and "Time" in seconds.
* Win message in green to indicate success.

**4.2 User Interface**

* Score Panel:
* Top left: moves count.
* Top right: elapsed time.
* Game Board:n4 rows x 5 columns grid (20 cards).
* Win Message: Centered overlay with instructions to restart or quit.

**5. Game Mechanics Details**

**5.1 Card Properties**

* Color: Each card is associated with a color. Each color appears exactly twice.
* States:nFace down: default, unflipped.
* Flipped: temporarily revealed.
* Matched: permanently revealed, no longer interactable.
* Animation: Flip animation simulates card flipping with scaling effect.

**5.2 Rules & Logic**

* Player may flip only two cards at a time.
* After flipping two cards, compare their colors:
* Match: keep both revealed.
* No match: flip both back after a delay (1 second).
* Track number of moves (each pair attempt counts as one move).
* Track elapsed time since the start of the game.
* Win when all pairs are matched.

**6. Technical Design**

**6.1 Programming Languages & Libraries**

* Python 3
* Pygame library for graphics, input, and animations.

**6.2 Core Components**

* Card Class:Stores position, color, state variables.
* Handles rendering and flip animations.
* Game Board:2D list of Card objects.
* Handles creation and reset of the game.
* Game Loop:Manages rendering, input, updating game state.
* Checks for win conditions.
* Event Handlers:Mouse clicks for flipping.
* Key presses for restart and exit.

**6.3 Asset Management**

* Colors are hard-coded, no external image assets.
* Use Pygame drawing for rectangles and text.

**6.4 Performance**

* Efficient redraws.
* Object-oriented design for modularity.

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**7. User Experience & Interaction**

**7.1 Controls**

* Click to flip cards.
* R to restart.
* ESC to quit.

**7.2 Feedback**

* Flip animations signal card flips.
* Immediate reveal upon flipping.
* Clear visual distinction when matched or unmatched.
* Win message with final score (moves and time).

**8. Sound & Effects (Future Enhancements)**

* Implement sound effects for card flips, matches, and game completion.
* Add background music.
* Visual effects for matched pairs.

**9. Development & Future Updates**

**9.1 Future Features**

* Difficulty levels allowing choices in grid size (e.g., 4x5, 6x6).
* A scoring system based on moves and time.
* High score tracking.
* Mobile version optimization.
* Incorporate images instead of colors for more visual appeal.
* Sound effects and animations for better feedback.

**10. Summary & Conclusion**

This Memory Matching Game is designed for accessible, intuitive play, encouraging memory skills. Its visual simplicity allows it to run smoothly across systems, with potential for extensive feature enhancement in future updates.