Project Documentation

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Fall - 1403

Overview

This document provides an overview of the 2048 game, its features, and the underlying game mechanics. 2048 is a single-player puzzle game where the objective is to combine numbered tiles to reach the 2048 tile (or higher). The game is played on a 4x4 grid, and the player controls the movement of tiles.

Components

Game Grid: A 4x4 grid where the numbered tiles are placed.

• **Tiles**: Square tiles containing powers of 2 (2, 4, 8, 16, 32, etc.).

• **Score:** A running total of the points earned by combining tiles.

• **Game Over:** The game ends when no more moves are possible.

• **New Tile Generation:** After each move, a new tile (either 2 or 4) is randomly placed on the grid.

Features

• **Tile Movement:** The player can move all tiles in four directions (up, down, left, right). Tiles slide as far as possible in the chosen direction until they hit another tile or the edge of the grid.

• **Tile Combination**: If two tiles with the same number collide during a move, they merge into a single tile with double the value. This adds to the player's score.

• **Random Tile Placement**: A new tile is added to the grid after each move. The probability of a 2 appearing is higher than a 4.

• **Game Over Condition**: The game ends when there are no more possible moves (no empty spaces and no adjacent tiles with the same value).

• **Score Tracking:** The player's score is displayed and updated after each successful tile combination.

Technologies Used

- **Python: The main programming language used for game logic.**
- **Pygame: A Python library for handling game development, including graphics, sprite movement.**

User Interface Overview

The game has a simple yet functional user interface:

- **Game Grid**: The game is played on a 4x4 grid, with numbered tiles appearing on the board. The background grid is a light-colored pattern, and the tiles have distinct colors based on their values, making it easy for players to distinguish between them.
- **Score and Best Score**: Displayed at the top of the screen. The current score shows how many points the player has earned in the ongoing game, while the best score reflects the highest score achieved in previous games.
- **Control Buttons**: Located beneath the score, there are "New Game" and "Undo" buttons, allowing players to reset the game or undo their previous move. These buttons are clearly labeled and easy to access.
- **Keyboard Controls**: Players use the arrow keys to slide the tiles in four directions (up, down, left, right). The controls are intuitive, allowing for smooth tile movement across the grid.

Functionality and Flow

- The core gameplay loop involves:

Player Input: The player chooses a direction (up, down, left, or right) to move the tiles.

Tile Movement: All tiles slide in the chosen direction.

Tile Combination: Tiles with the same value merge if they collide.

New Tile Generation: A new tile is randomly added to the grid.

Score Update: The player's score is updated.

Game Over Check: The game checks if any moves are still possible. If not, the game ends.

Conclusion

2048 is a simple yet engaging puzzle game with a straightforward objective and intuitive gameplay. Its addictive nature stems from the challenge of strategically combining tiles to achieve higher values.