

Memory Match Game - Player Analytics Report

Project Title

Memory Match Game - Player Analytics using Machine Learning

Introduction

The Memory Match Game project leverages machine learning to analyze player behavior and generate design insights. Using gameplay data such as time, attempts, and final score, the system identifies trends and patterns, clusters players by performance, and visualizes results through an interactive dashboard.

Project Objectives

- Understand how players interact with different grid sizes and themes.
- Detect performance variations to identify potential gameplay difficulties.
- Use ML clustering to segment players into groups.
- Support game designers with data-driven recommendations.

About the Game

Memory Match is a browser-based card matching game found on Y8. Players are required to match pairs of hidden cards in grids of various sizes (4x4, 5x5, etc.). Each grid can have different visual themes like Letters, Animals, Sports, and more. The simplicity of the game makes it an excellent case study for behavioral analytics.

Dataset Description

The dataset was created manually by observing multiple players. Each entry includes:

- Player Name: Identifier for the session
- Grid: Game grid size (e.g., 4x4, 6x6)
- Theme: Visual theme used (e.g., Letters, Animals)
- Time: Time spent to finish the game (in seconds)
- Attempts: Number of card selections made
- Score: Final success rate (%)

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Tools & Technologies

The following tools were used in the project:

- Python 3: Core programming language
- pandas: Data cleaning and manipulation
- matplotlib and seaborn: Data visualization
- scikit-learn: Machine learning (KMeans clustering)
- Streamlit: For building an interactive dashboard

Methodology

1. Collected gameplay session data and saved it in CSV format.
2. Cleaned the data and encoded categorical variables.
3. Used KMeans clustering to group players by grid, theme, time, attempts, and score.
4. Visualized clusters using scatter plots (time vs score).
5. Built a dashboard using Streamlit to display results and auto-generate recommendations.

Dashboard Features

- Displays a dynamic table of all player sessions.
- Shows an interactive scatter plot color-coded by cluster.
- Lists automated design recommendations for underperforming players.
- Built with Streamlit and updates automatically with new data.

Generated Recommendations

Sample insights from the analysis include:

- Omar is struggling with Grid 10x10 and Theme Realistic. Consider simplifying this level.
- Yazan is struggling with Grid 8x8. A guided tutorial may improve performance.

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Future Enhancements

- Automate real-time data collection during gameplay.
- Deploy the dashboard online for public access.
- Add prediction models to forecast player success.
- Integrate with a game API for seamless analytics.

Student Information

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