K.R. MANGALAM UNIVERSITY

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THE COMPLETE WORLD OF EDUCATION

Memory Game

Second Year Project Synopsis
Submitted by

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Project Overview

I’m working on a Memory Game Web App. The idea is to build a fun game, where players have to match pairs of cards, testing their memory and concentration. The game will feature randomized cards, multiple difficulty levels, scoring system to make it more engaging and interesting.
I also plan to add some cool features like, multiplayer mode, time challenges to keep things exciting. The goal is to make game both entertaining and a helpful tool to improve memory skills, all wrapped up in smooth and interactive experience.

About the Problem

- Problems Identified

➢ Limited Game Options: Current game apps often focus on a single type of game, limiting the user's experience and engagement over time.

➢ Lack of Cognitive Challenges: Most game fail to offer a balance of entertainment and cognitive improvement

About the Problem

- Issues or Problems

➢ Engagement Challenges: Some game fail to maintain player interest, due to lack of innovation, or multiplayer features.

➢ Lack of Innovation: Many games in the market stick to the traditional mechanics, without introducing new features, making them feel outdated.

About the Problem

- Need of Solutions

➢ Cognitive Engagement: Games should balance fun and mental challenge, pushing players to improve memory and focus while playing.

➢ Interactive and Social Elements: A multiplayer mode and other social features will increase engagement and allow for more competitive and fun experience.

About the Problem

- Existing Solution

➢ Memory Card Game : These games (Memory Match, Simon Says) provide simple way to test and improve memory but lack advanced difficulty levels.

➢ Basic Digital Memory Games : These platforms (Mobile & Web-Based Flashcard Apps like Anki & Quizlet) assist with memory retention but focus mainly on learning-based memory recall rather than interactive and entertaining gameplay.

Problem Statement

Memory-based games can become monotonous and offer little variety, which can reduce user engagement over time. Current options tend to concentrate on single-game formats, lack fresh features, or do not incorporate social and multiplayer aspects. Consequently, users looking for an enjoyable yet mentally stimulating experience often find themselves without a diverse platform that provides various interactive memory challenges.

Why is it Important?

Cognitive Development: Training memory is essential for enhancing focus, problem-solving skills, and overall brain health.

An interactive and engaging platform can transform this process into an enjoyable experience rather than a

Problem Statement

Engagement & Retention: Players frequently lose interest in static games that offer little variety, lack difficulty progression, or miss social interaction. A thoughtfully designed game can boost user engagement and ensure it remains enjoyable over the long term.

Lack of Multiplayer & Social Features: Many current solutions prioritize single-player experiences, which limits chances for competition, collaboration, and interactive learning. Incorporating social elements can make memory games more captivating and fulfilling.

Problem Statement

Expected Impact of Solving This Problem

- A more engaging and interactive gaming experience that captivates users while boosting their cognitive skills.
- Higher retention rates and user interest thanks to a diverse range of games and escalating difficulty levels.
- Improved social interaction through multiplayer options, fostering both competitive and cooperative gameplay.
- A unified platform featuring various memory games, minimizing the need to toggle between different applications.

Objectives

Create an interactive and engaging memory-based gaming platform aimed at boosting cognitive skills through various game modes, escalating challenges, and social features.

Specific Objectives :

- Craft a platform that includes a variety of memory-boosting games to keep users engaged.
- Introduce a progression of difficulty to offer players a challenging yet satisfying experience.
- Build multiplayer capabilities to foster competition and social interaction. Design a user-friendly interface with seamless gameplay mechanics for an enjoyable experience.

Methodology, Tools, and Techniques

The project begins with a well-defined development process that starts with researching existing memory-based games to pinpoint their shortcomings. The game aims to feature a variety of engaging memory challenges that increase in difficulty and support multiplayer gameplay.

Tools, Software, and Techniques Used:

Frontend Development: React.js is utilized to create a dynamic and responsive user interface.

Backend Development: Node.js with Express.js is employed to manage game logic and user interactions.

Database: Firebase or MongoDB is chosen for storing user progress, scores, and multiplayer data.

Game State Management: Redux or the React Context API is used to oversee player progress and real-time interactions.

Methodology, Tools, and Techniques

Multiplayer Integration: WebSockets (Socket.io) are implemented for real-time communication among players.

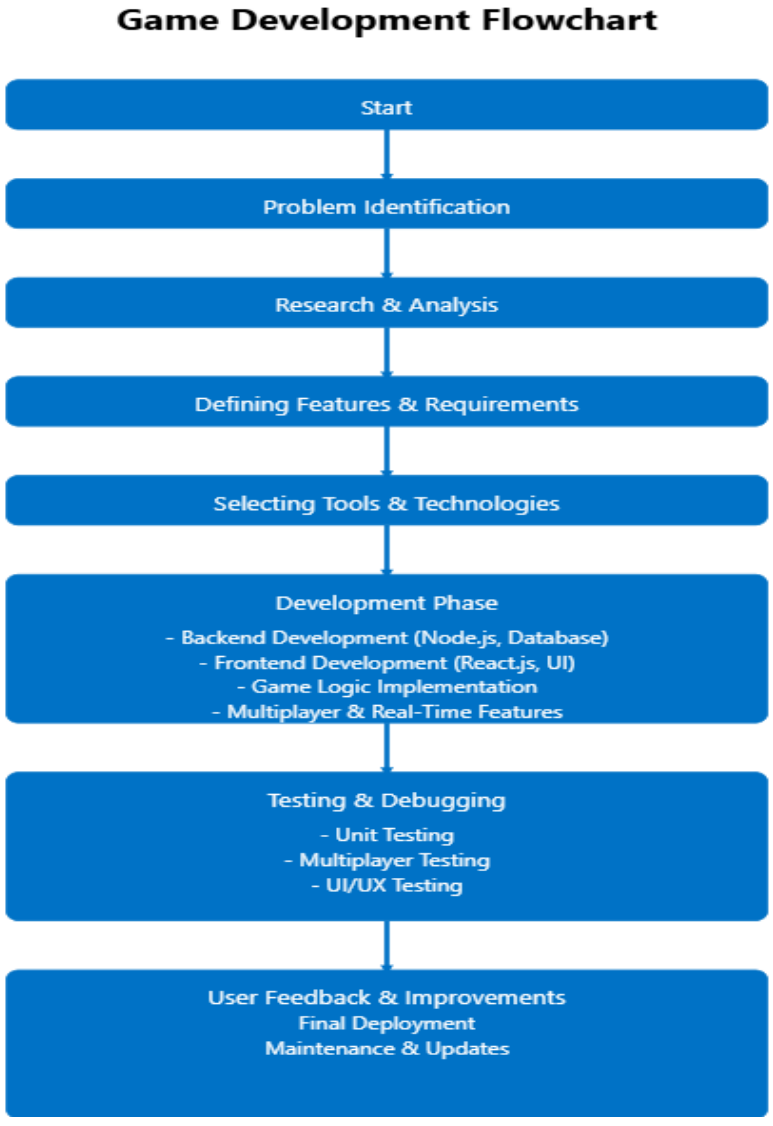
Justification for Chosen Methods:

React.js provides a fast and scalable frontend, ensuring a smooth gaming experience.

Node.js and WebSockets facilitate real-time interactions in multiplayer settings.

Firebase or **MongoDB** offers efficient data storage solutions for user progress and game sessions.

Methodology Flowchart



Project Timeline

Phase 1: Project Planning & Requirements
Duration: 1 week
Tasks: - Finalize the game concept and rules (e.g., number of cards, scoring system) - Identify essential features (e.g., difficulty levels, timer, leaderboard).

Phase 2: Research & Game Design
Duration 1 week
Tasks: - Analyze existing games for inspiration - Create wireframes and design the game interface - Finalize the user experience flow (e.g., how players will interact with the game).

Project Timeline

Phase 4: Development (Core Features)
Duration: 3 weeks
Tasks: - Implement game logic (card flipping, matching, shuffling) - Develop difficulty levels (easy, medium, hard) - Add a timer and scoring system - Create a restart and shuffle feature

Phase 5: Advanced Features (Enhancements)
Duration: 2 weeks Activities: advanced features such as animations, sound effects, multiplayers feature and a leaderboard.
Tasks: - Implement card flip animations - Add sound effects (e.g., card flip, match, game over) - Create a leaderboard for top scores - Add a reset/restart buttons.

Project Timeline

Phase 6: Deployment & Launch

Duration: 1 week

Tasks: - Deploy on a hosting platform (e.g., GitHub Pages, Netlify) - Conduct final testing in the production environment - Launch the game and share the link with others.

Project Timeline

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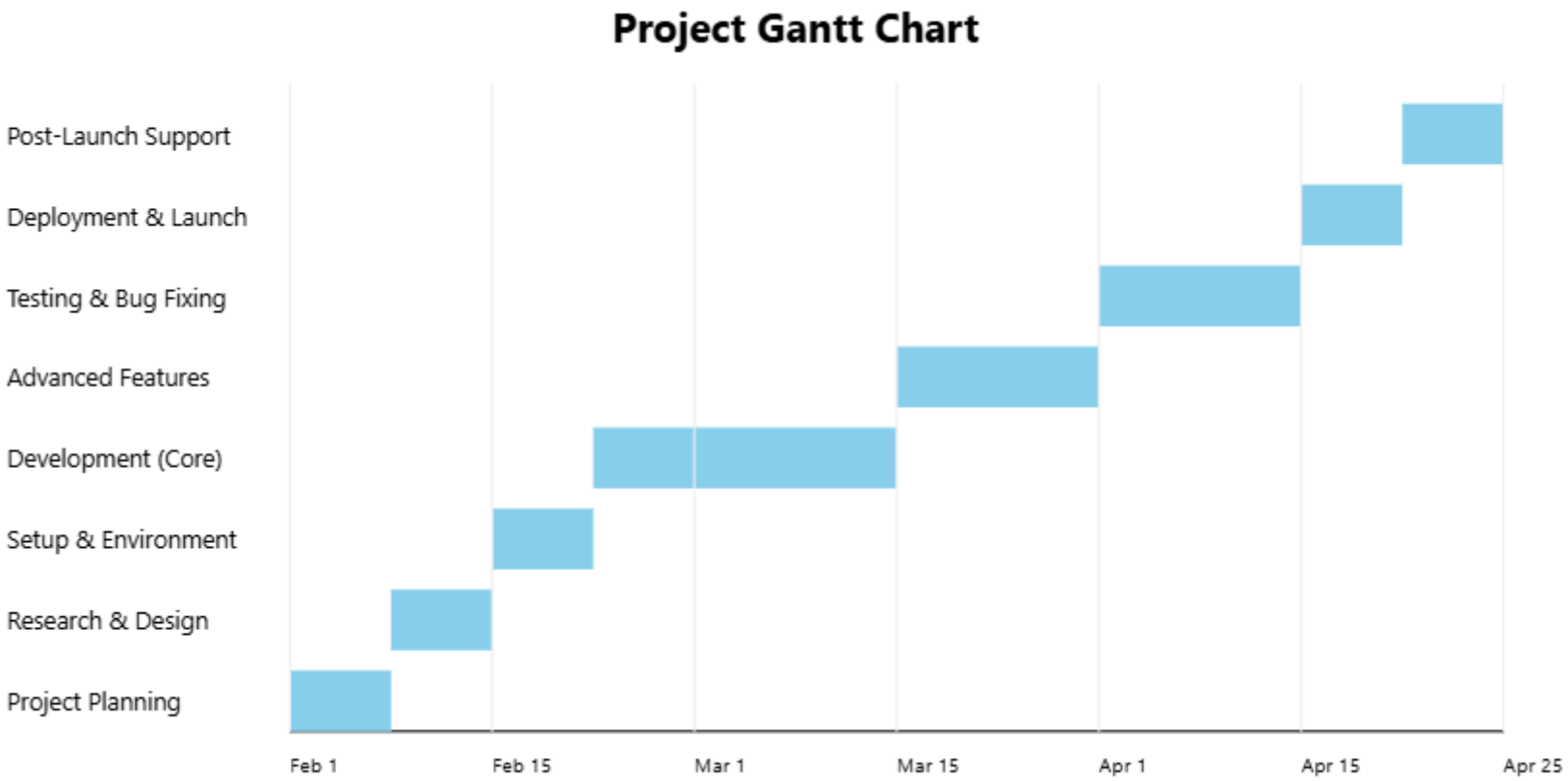


Expected Results & Impact

Expected Results:

The goal of this project is to create a fully functional, engaging, and user-friendly memory game designed to enhance players' memory and cognitive abilities. The game will include various difficulty levels, a timer, a scoring system, and a responsive design to ensure compatibility across different devices. The final product will feature a working prototype that allows users to engage with the game, providing an enjoyable and challenging experience while fulfilling its educational objectives.

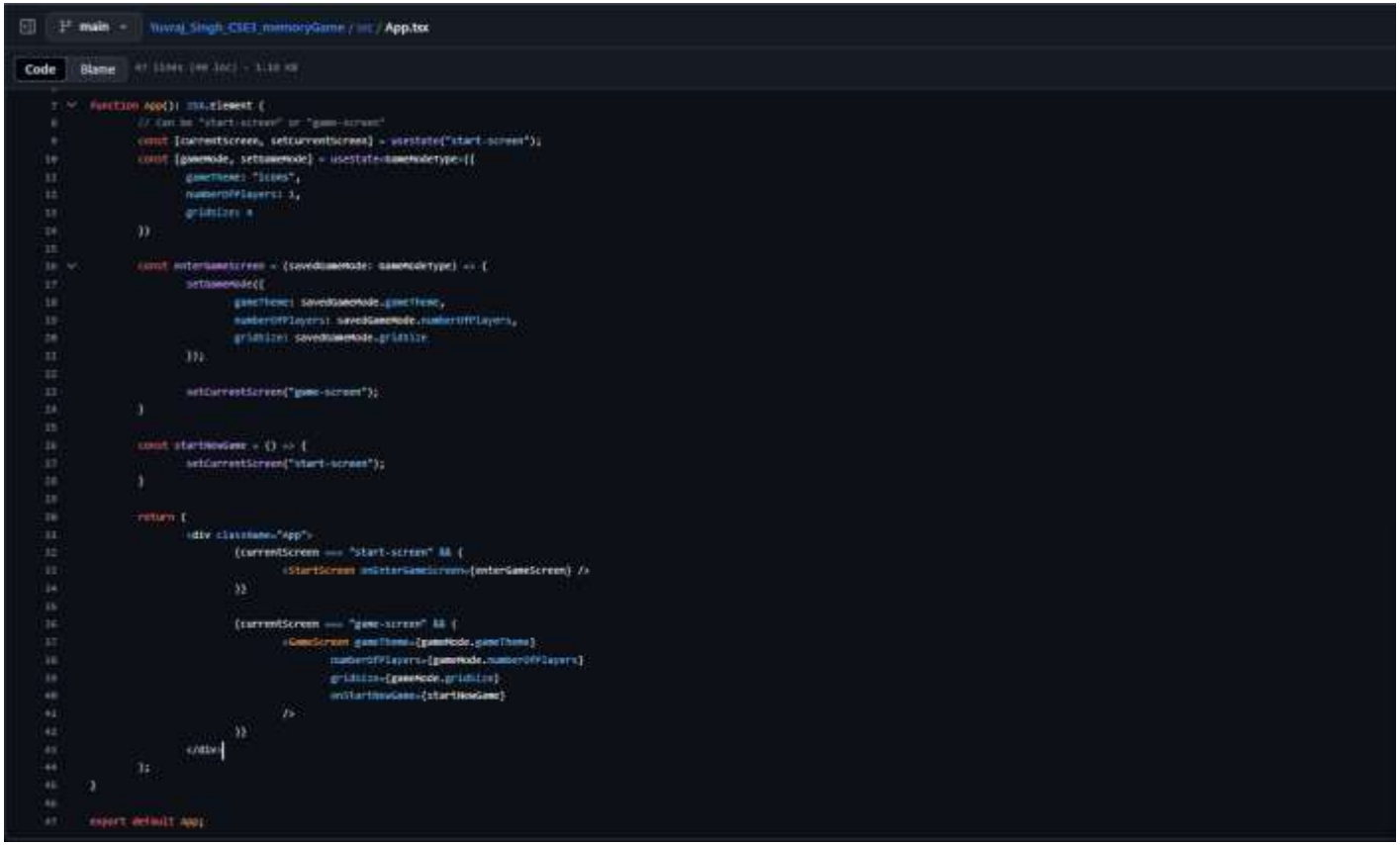
Expected Results & Impact

Impact:

This project aims to make a significant contribution to the educational gaming sector by offering a tool that improves memory and concentration through interactive play. It will also demonstrate the application of React in developing interactive web games, serving as a valuable resource for researchers focused on cognitive enhancement. Users will find an entertaining way to sharpen their memory skills, and potential future developments, such as multiplayer options or advanced analytics, could further enhance its functionality and reach.

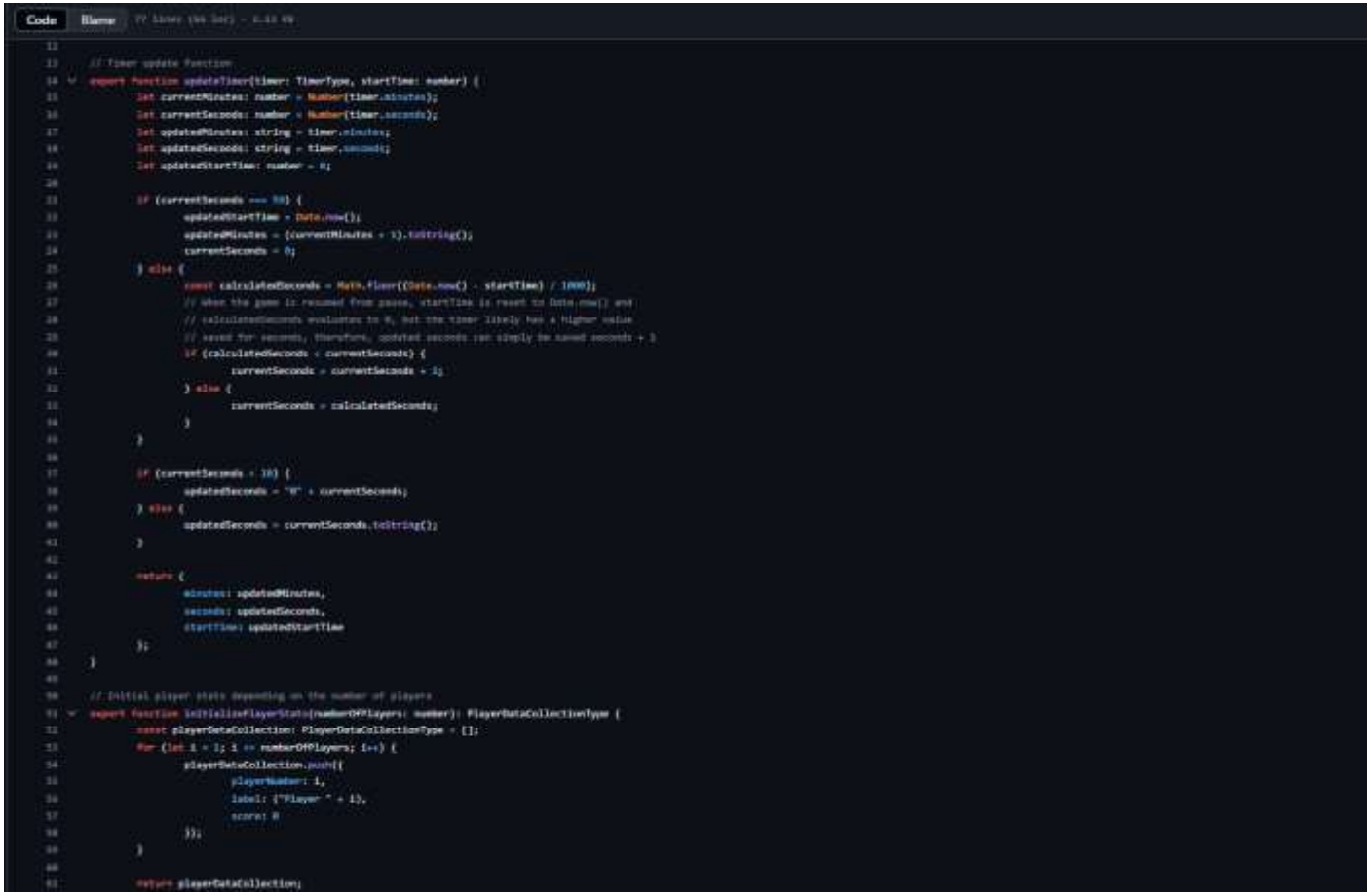
Code Snippet

- Main App Layout



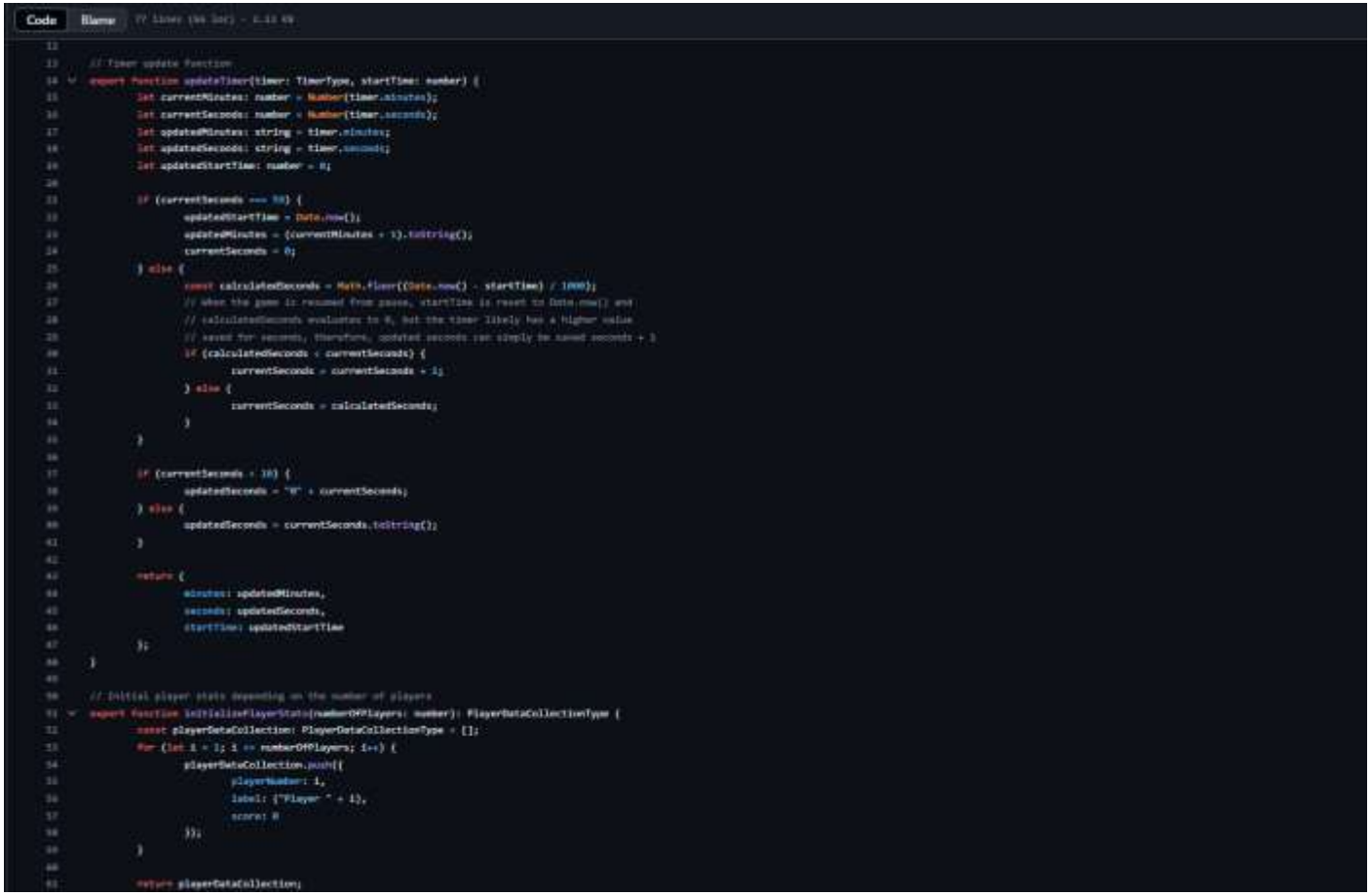
Code Snippet

- Helper Functions



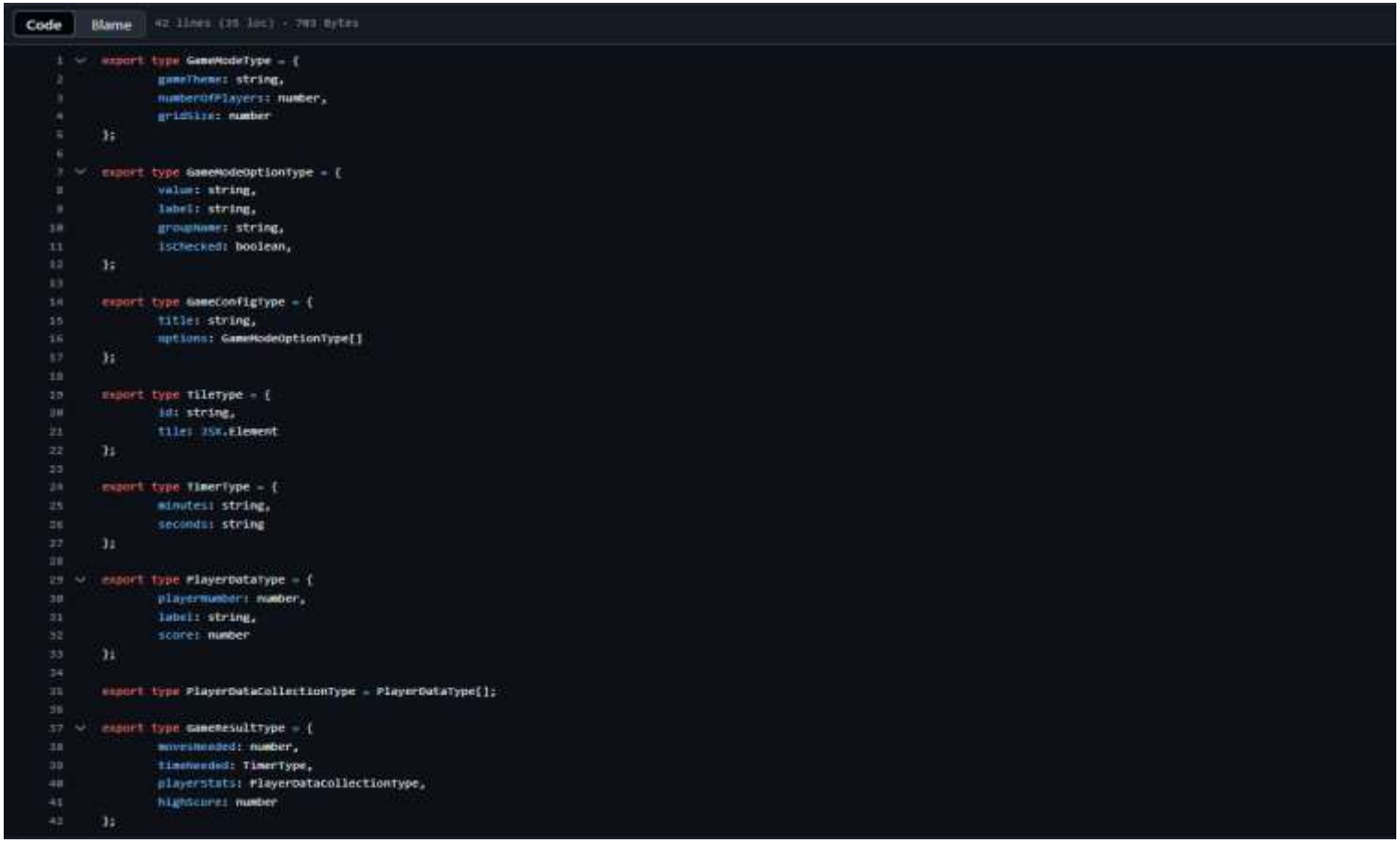
Code Snippet

- Helper Functions



Code Snippet

- Types for Code-Maintenance and Readability



Future Work

The current version of the Memory Game built with React and TypeScript successfully demonstrates core functionality such as card flipping, matching logic, and score tracking. However, there are several areas where the project can be expanded and improved to enhance user engagement, scalability, maintainability, and overall user experience.

1. Enhanced User Interface and Animations

While the current UI is functional, there is significant scope for introducing more polished and dynamic visual elements

2. Progressive Web App (PWA) Features

To broaden accessibility and offline functionality, the memory game can be enhanced into a fully-fledged Progressive Web App. This would involve:

- Enabling offline play through service workers.
- Allowing installation on mobile and desktop devices.
- Implementing push notifications for updates, challenges, or new themes.

3. Difficulty Levels and Game Modes

Introducing varied difficulty levels would cater to a wider range of users, from beginners to seasoned players. Future developments could include:

- **Easy, Medium, and Hard Modes:** Vary the grid size (e.g., 4x4, 6x6, 8x8) and number of card pairs.
- **Timed Challenges:** Implement a countdown timer that pressures players to complete matches within a limited time.

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3. Carter, B. & Evans, J. (2022). “User Experience in Memory Game Design: Balancing Challenging and fun, Game Development Review.
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THANK YOU