# Self-Learning Board Game Designer

Artificial Intelligence and Machine Learning (24AD2001)

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## Problem Statement

Board games are a timeless source of entertainment and cognitive development, but designing engaging and balanced games requires creativity, game theory knowledge, and extensive playtesting. Traditional design approaches are time-consuming and rely heavily on human experience, which limits innovation. This project aims to develop an AI-driven self-learning system capable of designing, testing, and refining board games automatically. By leveraging reinforcement learning and evolutionary algorithms, the system can generate novel game mechanics, evaluate playability, and adapt based on player feedback—reducing manual effort and accelerating innovation.

## Objectives

- Develop a system that autonomously generates board game concepts with defined rules, objectives, and mechanics.

- Implement reinforcement learning for AI to improve game balance and engagement over time.

- Simulate AI players to test generated games and identify potential issues in fairness or complexity.

- Integrate human player feedback for refining the game design.

- Create a flexible platform that supports various board game genres.

- Demonstrate AI’s creative potential in entertainment and game design.

## Proposed Methodology

- Data Collection – Gather and store game data from existing board games.

- Game Generation – Use generative algorithms to create new rules and mechanics.

- Simulation & Self-Play – AI agents test games for feasibility and engagement.

- Player Feedback Integration – Collect and process human player feedback using NLP.

- Evaluation & Refinement – Compare AI-generated games with existing classics for quality assessment.

## Expected Outcomes

- An AI tool capable of designing fully playable and balanced games.

- A reinforcement learning framework for improving gameplay quality.

- A library of original AI-generated board games.

- Applications in gaming, education, and personalized entertainment.

## Abstract

This project presents a Self-Learning Board Game Designer, an AI system capable of autonomously creating and refining board games using reinforcement learning and generative algorithms. The system generates game rules, objectives, and layouts based on a game database, tests them using AI self-play, and integrates human feedback to fine-tune designs. It reduces design time, fosters innovation, and has applications in gaming, education, and personalized entertainment.