POKER GAME USING EXPECTIMINIMAX ALGORITHM

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Abstract *— This project focuses on the development of a Texas Hold'em poker game simulator integrating the Expectiminimax algorithm for strategic decision-making. By modeling the inherent uncertainty of poker, the simulator enables AI agents to make informed choices based on expected outcomes and probabilities. The implementation includes a comprehensive game environment, hand evaluation logic, and the Expectiminimax search algorithm. Performance evaluation through simulation trials will assess the algorithm's effectiveness in navigating uncertain events and optimizing decision strategies.*

Keywords — AI, Expectiminimax Algorithm, Texas Hold'em Poker, Game Simulation, Stochastic Games, Decision Making, Uncertainty, AI Agent, Game Theory, Monte Carlo Simulation.

I. INTRODUCTION

This report details the progress of the project "Poker (Texas Hold'em) game simulator using Expectiminimax." The objective of this project is to design and implement a simulation of the poker game, with the help of Expectiminimax algorithm to facilitate strategic decision-making in case of uncertainty. This report outlines the current status, achievements, challenges, and future plans.

II. PROJECT OBJECTIVES

The primary objectives of this project are :

- Develop a comprehensive simulation of the Texas Hold'em poker game environment.
- Design and integrate necessary components, including hand evaluation and betting logic.
- Implement the Expectiminimax algorithm to enable strategic decision-making for AI players.
- Evaluate the performance of the Expectiminimax algorithm through simulations.
- Simulate the game with a graphical or textual interface for user interaction.

III. CURRENT STATUS

The current progress includes :

- **Environment Setup :** The fundamental classes and functions for the poker game environment have been established. This includes the Card, Deck, and Player classes, along with functions for deck creation, shuffling, and card dealing.
- **Basic Game Logic :** The simulation can currently deal hands and

community cards. Initial attempts have been made to implement hand evaluation, but this requires further refinement.

- **Challenges :**
  - Implementing a robust hand evaluation system.
  - Integrating the Expectiminimax algorithm.
  - Developing the betting logic and player action management.

IV. METHODOLOGY

The project employs a modular approach, with each component being developed and tested independently. The Expectiminimax algorithm will be implemented using a recursive search strategy, considering the probabilities of uncertain events. Performance will be evaluated through simulation trials, comparing the win rates of AI players using Expectiminimax against those using simpler strategies.

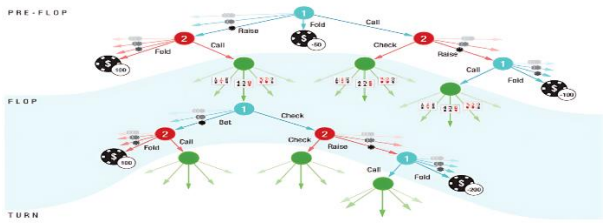

Fig 01 : Implementation of Expectatiminimax.

V. RESULTS & DISCUSSION

At this stage, the foundational components of the game environment are in place. Further development is required to implement the core game logic and the Expectiminimax decision-making algorithm. The challenges encountered highlight the complexity of simulating a game with uncertain information.

VI. NEXT PLANS

The following tasks will be prioritized :

- **Hand Evaluation :** Complete the implementation of a reliable hand evaluation system.
- **Expectiminimax Implementation :** Integrate the Expectiminimax algorithm for decision-making.
- **Betting Logic :** Develop the betting round logic and player action management.
- **Simulation and Evaluation :** Conduct simulation trials to evaluate the algorithm's performance.
- **User Interface :** Implement a textual or graphical interface for user interaction.

VI. CONCLUSION

The project is currently in the initial development phase. The foundational components are established, and future efforts will focus on implementing the core game logic and the Expectiminimax algorithm. The successful completion of this project will provide a valuable tool for studying strategic decision-making in uncertain environments.

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