Project Title:

Snakes and Ladders With Prediction Challenge

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Course: AI

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1. Executive Summary

A classic Snakes and Ladders game enhanced with AI predictions. Both players (AI and human) predict the dice roll. Correct predictions grant bonuses. The AI uses frequency-based prediction, making the game strategic.

2. Introduction

Traditional snakes and ladders game made strategic with predictive AI.
Objectives:

- Implement AI to predict dice rolls.
- Allow players & AI to predict and get bonuses.
- Enable decisions based on predictions.
- Visualize the game with Pygame.

3. Game Description

Original Rules: Move based on dice; ladders advance; snakes set back.
Modifications:

- Predictions before each move.
- Frequency-based AI prediction.
- Bonuses on correct prediction: double move, skip opponent, gain points.
- Use points to neutralize snakes.

4. AI Approach and Methodology

Technique:

Heuristics:

- Predict based on history.
- Choose bonuses based on game state.

Evaluation:

- Based on prediction accuracy and strategic bonus use.

5. Game Mechanics and Rules

- Predict before rolling dice.
- Correct prediction options:
    - Double move
    - Skip opponent's turn
    - Gain 10 points
- Spend N points to avoid the snake penalty.
- Turns alternate: AI vs. Player.
- Win condition: Reach"100" position on board.

6. Implementation and Development

Process:

- Game & GUI in Pygame.
- Linked AI predictions and bonuses.

Tools:

- Language: Python
- Libraries: Pygame, collections

Challenges:

- Pygame prediction UI.
- Real-time AI integration.
- Snake/ladder + dynamic rewards handling.

7. Team Contributions

- **Syed Uzair Hussain:** Prediction interface, AI logic, debugging, visuals.
- **Saad Ahmed:** Bonus systems, user interaction,Testing.

8. Results and Discussions

- Strategic decisions improved gameplay.

- Reduced game randomness with AI logic.

9. References

- Python Documentation
- Pygame Docs
- StackOverflow
- Online articles on game logic and AI