AI plays checkers

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Introduction

- Create an AI bot that can play Checkers against other bots or real players.

- Create and interface for playing against the AI or see how two AI bots can play against each other.

Methodology

- **Create a checkers game and board using the python module *pygame*.**

- **Use the algorithm Minimax programmed in python 3.9.16 to decide the movements of the AI.**

- **Optimize the algorithm Minimax using Alpha-Beta prunning**

Methodology: Pygame

- Graphics Rendering
- Input Handling
- Event Management
- Animation and Effects
- Sound and Music
- User Interface (UI)
- Game Logic and State Management
- AI Integration
- Customization and Styling
- Cross-Platform Compatibility

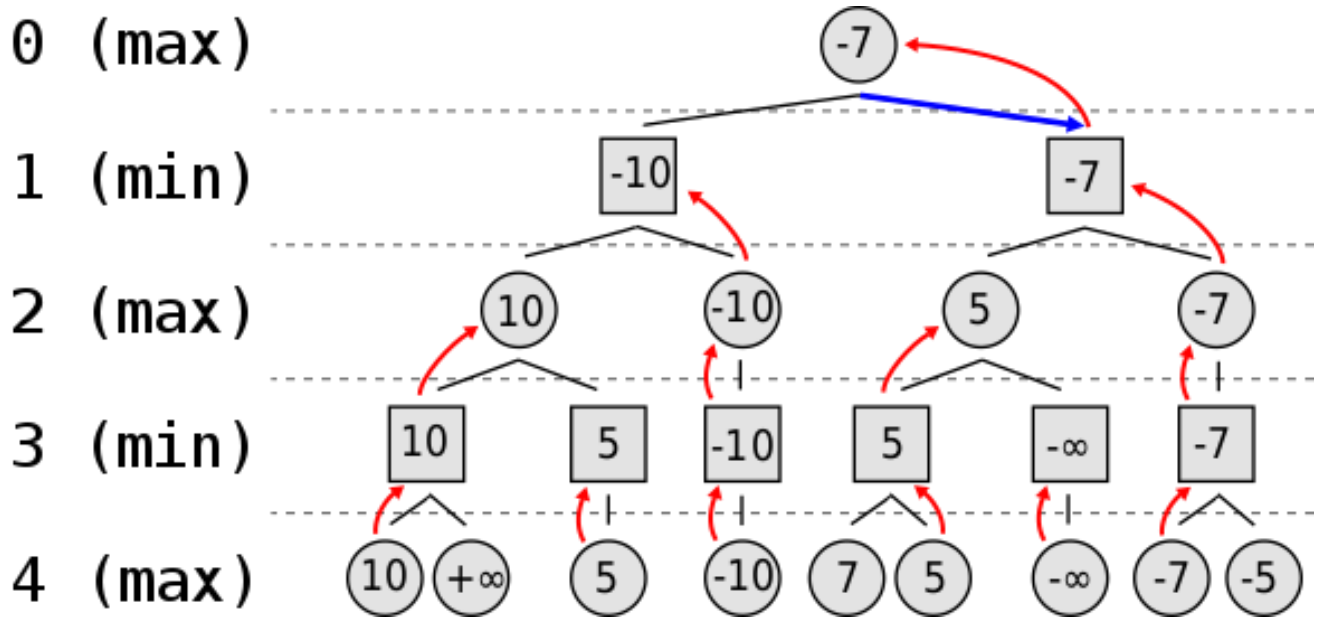
Methodology: Minimax algorithm

- Objective
- Two-Player, Zero-Sum Games
- Recursive Approach
- Maximizing and Minimizing
- Depth-Limited Search
- Challenges and Considerations
- Evaluation Function
- Backpropagation

Methodology: Minimax algorithm

Evaluation function:

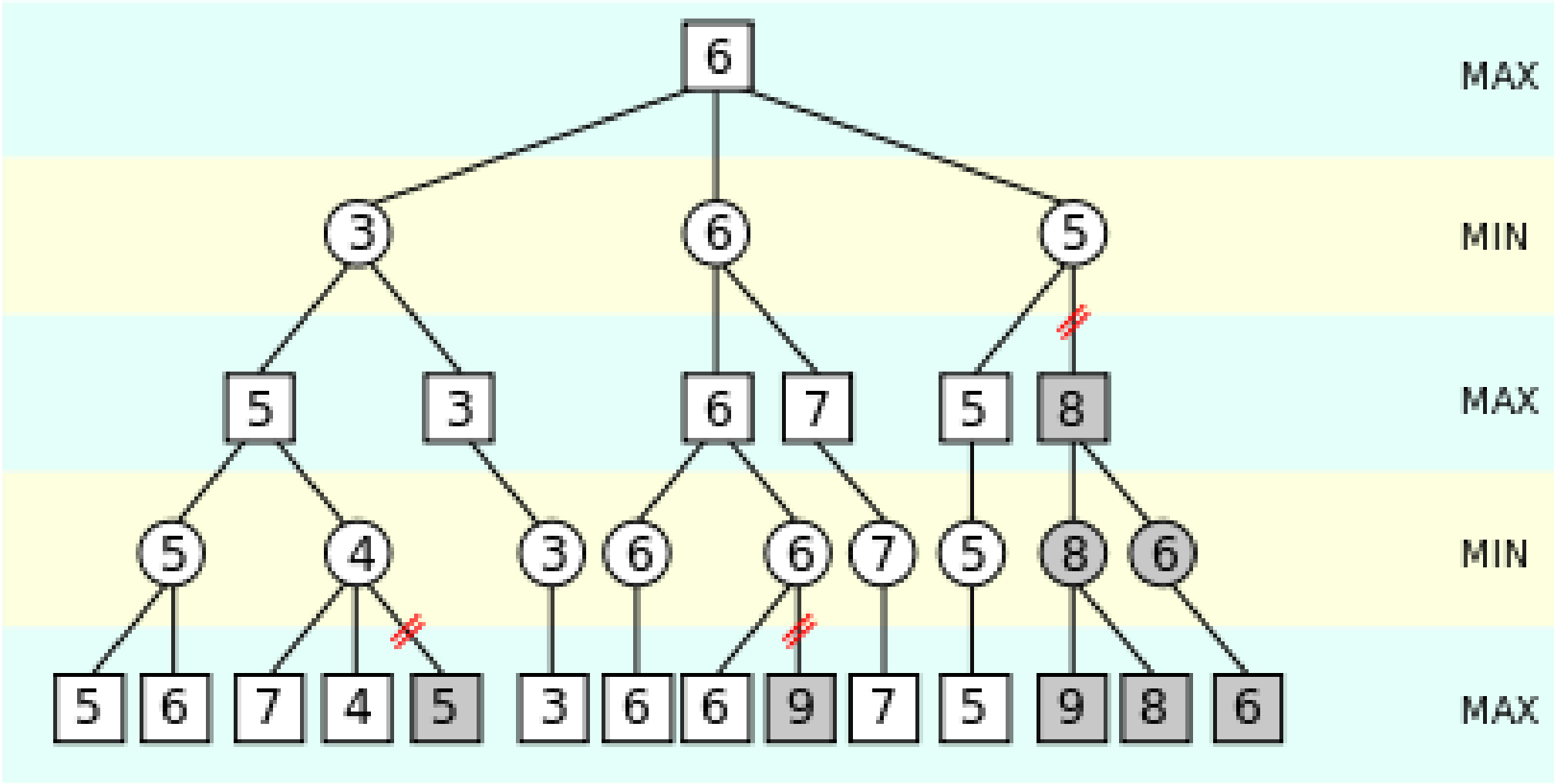
Max_player pieces - Min_player pieces + (Max_player kings * 0.5 - Min_player kings * 0.5)



Methodology: Alpha-Beta pruning

- Optimization Objective
- Node Evaluation Order
- Alpha and Beta Values
- Pruning Conditions
- Maximizing Player (Alpha)
- Minimizing Player (Beta)
- Efficiency Gain
- Depth-First Search:
- Impact on Complexity

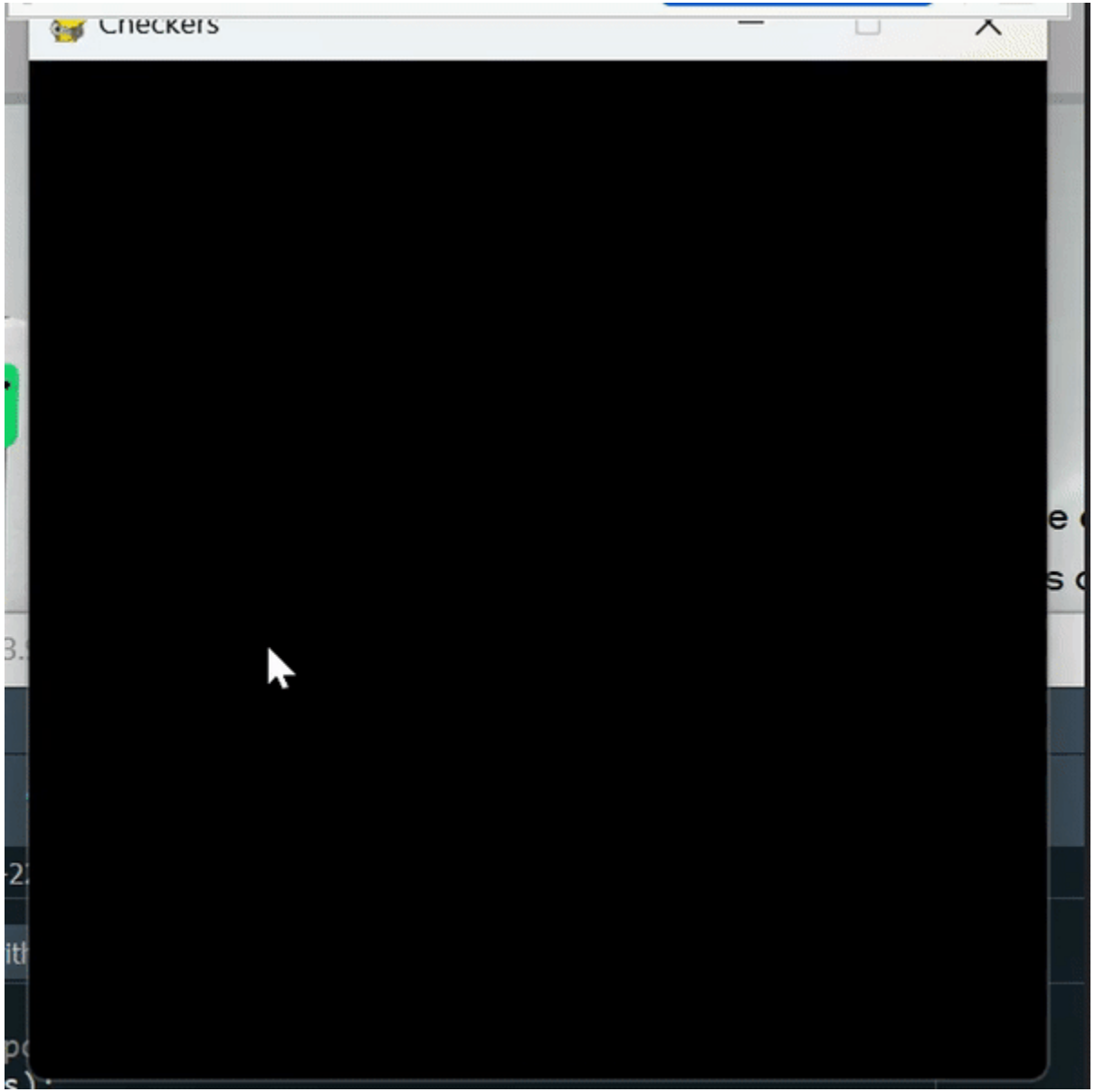
Methodology: Alpha-Beta pruning



Methodology: Repository structure

- Code Organization and Readability
- Modularity and Reusability
- Collaboration and Teamwork
- Ease of Maintenance
- Scalability
- Version Control and History
- Documentation
- Testing and Quality Assurance
- Reduced Technical Debt

The game



Possible Extensions

- Deep Reinforcement Learning (DRL)
- Monte Carlo Tree Search (MCTS)
- Ensemble Learning
- Dynamic Learning Rates
- Curriculum Learning
- Hierarchical Reinforcement Learning
- Reward Shaping
- Exploration Strategies
- Adversarial Training
- Human-AI Collaboration
- Visual Recognition
- Multi-Agent Learning
- Real-Time Learning

Thank you for your attention