**Project Report**

**Project Title:** Chess Variant AI Project - Advanced Chess with Fantasy Elements

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**Abstract:**

This project is an advanced chess game with fantasy elements. It introduces unique mechanics like teleporting squares and pawn replication. The game uses an 8×8 board with Python's pygame library for graphics and chess library for board logic. The AI employs the Minimax algorithm for decision-making.

**Introduction:**

The project is a variant of classic chess that integrates new mechanics to create a strategic twist. Players can use teleport squares to change positions and replicate pawns for strategic advantage. The AI plays as Black using Minimax with alpha-beta pruning.

**Objectives:**

* Develop a chess variant with unique rules.
* Implement an AI using Minimax for strategic gameplay.
* Use pygame for game graphics and user interaction.

**Scope:**

* Two modes: Player vs Player (PvP) and Player vs AI.
* Fantasy elements: Teleport squares and pawn replication.
* Sound toggle for in-game music.

**Tools and Technologies:**

* Language: Python
* Libraries: Pygame, Chess
* IDE: VS Code
* Hardware: Quad-core processor, 8GB RAM (recommended)

**System Design:**

* **User Interface:** Main menu with options for PvP or AI mode.
* **Game Board:** 8×8 chess board with standard piece layout.
* **Special Squares:**
  + Teleport Squares (Blue): Move from one to another instantly.
  + Replicate Squares (Purple): Duplicate a pawn forward.

**Artificial Intelligence:**

* **Algorithm:** Minimax with alpha-beta pruning.
* **Evaluation Function:** Piece values (Pawn: 1, Knight: 3, Bishop: 3, Rook: 5, Queen: 9).
* **Depth:** 2 for basic difficulty.

**Implementation:**

* Graphics: Handled using pygame.
* Board Logic: Managed by the chess library.
* AI Logic: Custom Minimax implementation with evaluation based on piece values.

**Results:**

* The game is fully functional in both modes (PvP and AI).
* The AI makes intelligent moves using the Minimax algorithm.
* Unique mechanics add strategic depth to classic chess.

**Conclusion:**

The Chess Variant AI Project offers a fun and strategic twist on classic chess. It demonstrates the use of AI in game design and provides a solid foundation for further enhancements.