Project Report: AI-Powered Chess Game

# 1. Introduction

The AI-Powered Chess Game is a Python-based interactive application developed using the pygame and python-chess libraries. This game allows a human player to play chess against a simple AI with enhanced gameplay mechanics such as move highlighting and dynamic piece transformations.

# 2. Objectives

The objective of this project is to design and implement a digital chessboard that includes AI gameplay, user interaction, promotion functionality, and a unique transformation mechanic that cycles through piece types every 3rd player turn.

# 3. Key Features

- Classic 8x8 chessboard with pygame rendering  
- Playable human vs AI mode  
- Pawn promotion with selection interface (Queen, Rook, Bishop, Knight)  
- Highlighting of legal moves  
- Transformation logic on every third turn:  
 Rook → Queen → Bishop → Knight → Rook (cycle)  
- Automatic reset on checkmate/stalemate

# 4. Technologies Used

- Python 3.8+  
- pygame for graphics and UI rendering  
- python-chess for move validation and board logic  
- Visual Studio Code as the primary IDE

# 5. Project Structure

AI-Powered-Chess-Game/  
├── main.py # Entry point to launch the game  
├── game.py # Contains the Game class with all game logic  
├── utils.py # Utility functions for drawing the board and loading images  
├── assets/ # Folder for chess piece images  
└── README.md # Project documentation

# 6. How to Run

To run the project, make sure you have Python 3.8 or higher installed.  
  
Install dependencies:  
 pip install pygame python-chess  
  
Launch the game:  
 python main.py

# 7. Demonstration

A video demonstration of the project will be available on YouTube:  
YouTube Link: https://youtu.be/M7znA2Zy6es

# 8. Conclusion

The AI-Powered Chess Game provides an engaging and dynamic way to play chess with a simple AI opponent. Its combination of classic chess mechanics and novel piece transformations introduces a new layer of strategy and challenge for players.

# 9. Author

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