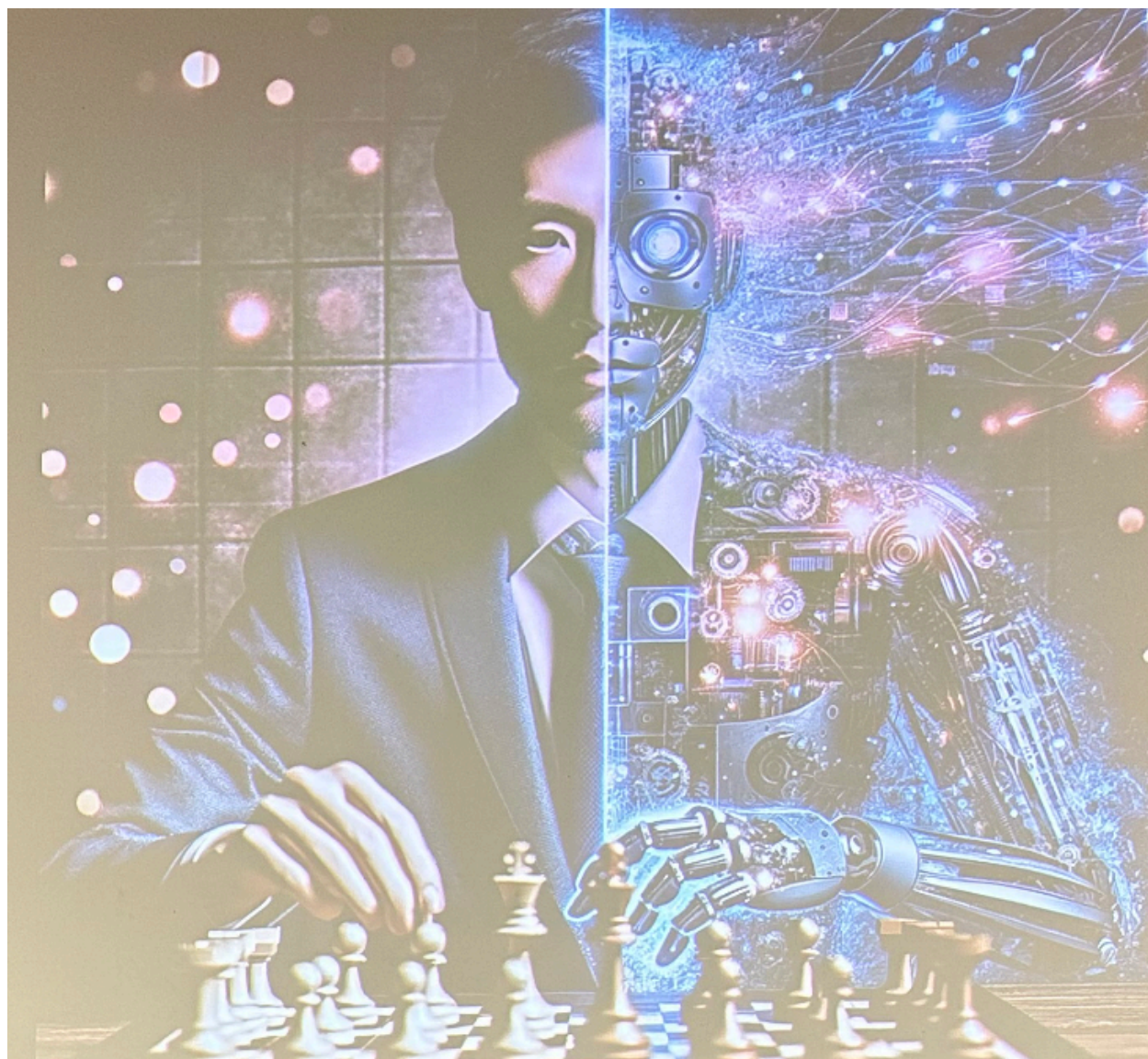


Martin Bot Chess Engine

V1.0



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April 08, 2024

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

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Glossary

B

Bishop - A piece that can move a number of spaces on its diagonals and cannot move over spaces obstructed by other pieces. It is typically represented by the letter B or the symbols , 

Black - The Black side of the board. The player playing Black plays with Black pieces and moves second.

C

Capture - A move that is typically performed by moving a piece onto a space occupied by an opposing piece. This removes the opposing piece from play unless the opposing piece is a King. An Exception to this rule is the En Passant.

Castling - A special move that may be performed if the chosen Rook and the King has not been moved, there are no pieces between the Rook and the King, and the King is not in check. This moves the King two spaces towards the Rook and the Rook is moved next to the King in the opposite direction of where it originally was.

Check - A state in which a King is being attacked by an opposing piece. The check must be resolved either by capturing the attacking piece, blocking its path to the king, or moving the King to a safe location. All of this has to be done without immediately creating another check. If no moves are possible, this is called a Checkmate

Checkmate - A state in which the King is being attacked and the defending player has no available moves to put it out of immediate danger. This results in a win for the attacking player and a loss for the defending player.

Chess - Chess is a strategy game that involves using a set of 16 pieces to attack an opponent and attempting to capture their king. The official rules of chess can be found [here](#).



D



Draw - A player can request a draw if the same position has been repeated three times and no capture or pawn move has been made in the last fifty moves.

E



En Passant - If an opposing pawn chooses to advance two spaces forward, a pawn is able to capture it if it was able to capture the opposing pawn as if it advanced one space forwards instead. The pawn will then be moved to the spot where the opposing pawn would be if it advanced one space forwards.

K

King - The King is a piece that can move one space in any direction in an unobstructed space. It can also perform a Castle with the Rook. Having a piece attacking the King puts it in check, and the game ends when the King can be captured and cannot escape, or checkmate. It is typically represented by the letter K or the symbols , 



Knight - A piece that moves two spaces forward left, right, up, or down and then moves one space left or right relative to the direction it moved. It can move over pieces that would typically obstruct the moves of any other piece. It is typically represented by the letter N or the symbols , 

P



Pawn - A piece that can move one space forwards into an unobstructed space. If it has not moved in the game, it can move two spaces forwards instead. If an opposing piece is one space in front and one space to the left or right of the pawn, the Pawn can move to that diagonal to capture the piece. The Pawn can also promote to any piece if it makes it to the opposite edge of the board. The Pawn can also perform an En Passant under certain circumstances. It is typically represented by the letter P or the symbols , .

Promotion - A state in which a pawn can be replaced by any piece if it reaches the opposite edge of the board.

Q

Queen - A piece that can move any number of spaces in any unobstructed direction. It is typically represented by the letter Q or the symbols , 

R

Rook - A piece that can move up, down, left, or right any number of spaces in any unobstructed direction. It can also perform a Castle with the King. It is typically represented by the letter R or the symbols , 

S

Stalemate - A state in which a player has no legal moves left to make and. The game will then result in a draw. If the player is in check, it would be checkmate instead.

W

White - The White side of the board. The player playing White plays with White pieces and moves first.

1 Computer Chess.

1.1 Usage scenario.

The intended usage scenario of this Chess Engine is for someone who wants to play a casual game of Chess with a Computer or against a friend. The Martin Bot Chess Engine will offer a fun experience for anyone who desires to pass the time or challenge themselves.

Below is an imagined form of the UI which will most likely be replicated with text based characters. The GUI will provide a layout of the board for the user to interpret the game as well as the pieces captured by each side. Something that will likely be added to the imagine form is a layout on the edges of the board that specifies which spots align with A-H and 1-8. The Engine will also send output messages to inform the user of advancements in the game like moves made by the opposing side or prompt the user for moves.

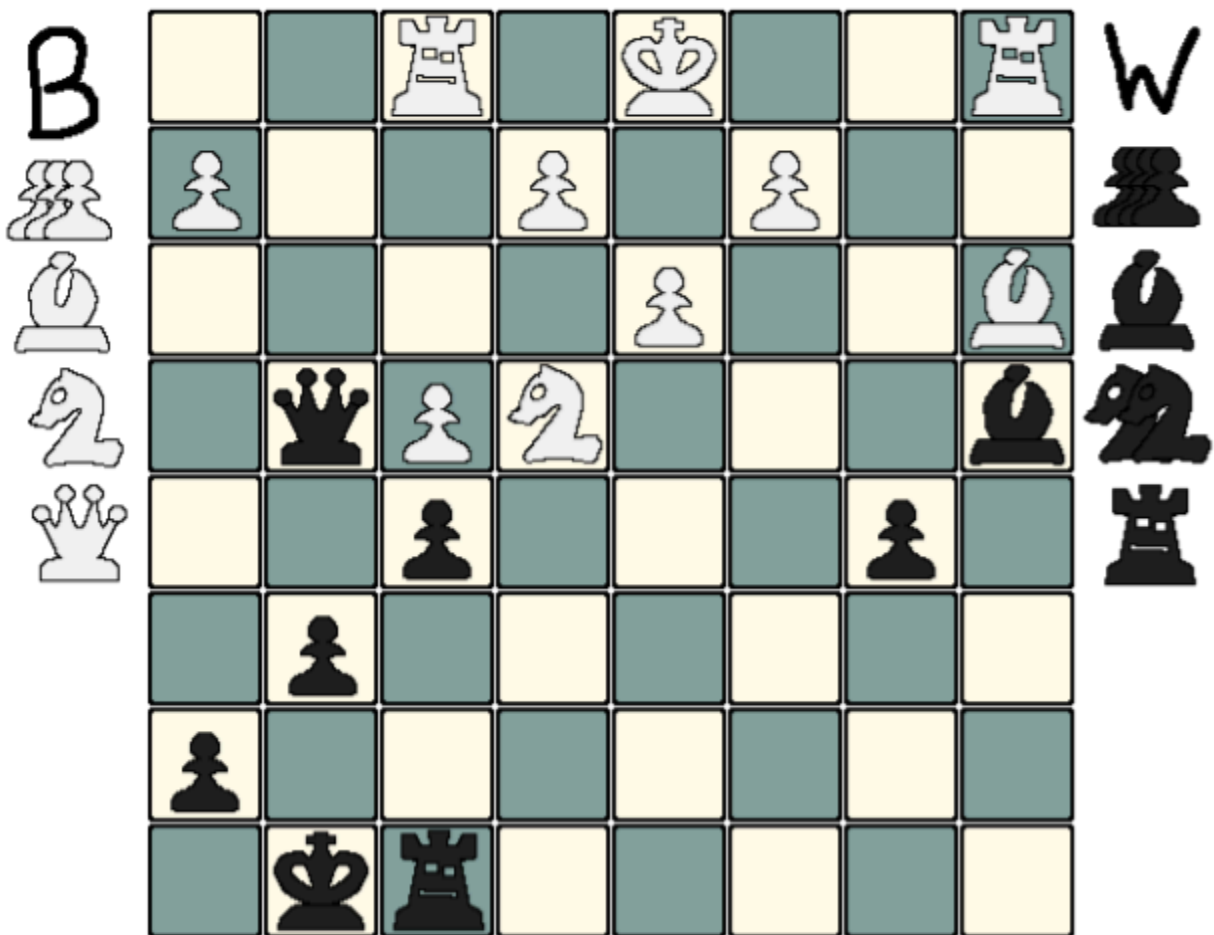


Figure 1: A sketch of the chessboard

1.2 Goals.

The goals of this engine should be to provide a fun and challenging experience for the user. The user should be able to clearly describe what they want to the engine and the engine should be able to provide for their desires without major interruptions in their experience. The engine also sets itself on a standard to prevent illegal moves, bugs, or even crashes that could hurt the user's enjoyment and experience with the engine. The engine will also need specific input from the user in order to perform its job.

The goal of the user should be to beat the CPU(s) included in the Engine as well as any friends or rivals they invite to play. The user can, if applicable, get better at chess by using the engine to practice against the CPU and study moves and their outcomes.

1.3 Features.

The features included in the Martin Bot Chess Engine are:

- A functioning Chess Engine
- Playable Chess with a CPU with different difficulty levels
- Playable Chess with another player
- An intuitive GUI
- The ability to undo moves
- A timer for multiplayer games
- Ability to choose which side to play
- A hint feature that lists legal moves for a piece.

The user will be able to enter moves by specifying the location of the piece they'd like to move (I.E. C2, E4, A7) and then specifying where they want to move that piece to. If an illegal move is made, the program will return a brief invalid message and then prompt for another location. The user will also be able to undo moves and request a draw if applicable. Furthermore, the Engine will prompt the Player when a check occurs or a checkmate has happened and a side has won the game.

The user will be able to choose which side of the board it wants to play as or have it determined by a coin flip, which will be simulated through a generated random number. This will also determine who goes first, as White will always go first.

The user will also be able to choose what type of gamemode they'd like to play before game start, whether playing against another player or against a CPU. The other player would use the same control scheme as the player and they would alternate control of the board. The user can also request a timer to speed up games and encourage quicker thinking.

2 Installation.

2.1 System requirements.

The recommended system requirements are:

- OS: Linux (64 bit)
- Processor: Anything that can run at at least 2 GHz
- Memory: 2 GB of RAM
- Graphic Card: Integrated graphics or dedicated GPU with basic capabilities

2.2 Setup and configuration.

The developer must have access to a machine running Linux OS or access to a server with Linux OS installed on it.

- The chess program is inside the '**Chess_V1.0.tar.gz**' file that contains all the source files needed to run the program.
- They can extract the archive by running "**gtar xvzf Chess_V1.0.tar.gz**".
- Go into the source file directory by using "**cd Chess_V1.0**".
- Copy the bin folder inside this directory anywhere on your system.
- The program should be an executable called "**testchess.exe**" and you can run it. If you are running the GUI, make sure there are .dll files present.

2.3 Uninstalling.

The program can be uninstalled by heading to the directory where the files extracted from 'tar.gz' file reside. Delete everything in this directory. Then, delete the 'tar.gz' file.

3 Chess Program Functions and Features.

3.1 Function 1: Start Game

Allows the user to begin the chess game. If requested, the timer will start

3.2 Function 2: Start Settings

Allows the user to begin the chess program. The user will be prompted whether they would like to play or exit the game. The user will be prompted to choose a side: either white or black. The user will also be prompted to choose whether to play vs the computer or a player or watch two computers to play against each. If the player chooses to play against another player, they will be prompted to ask whether they want a timer, and if so how long the timer will be (30 seconds minimum). If the player chooses to play against a computer or watch a computer play, they can specify the difficulty level of the computer(s). The difficulties that will be supported will be easy, medium, and hard. The user will finally be prompted to set up the board. Before the game starts

- Chess with CPU/Player/or CPU vs CPU
- Different difficulty levels if user decides to play against CPU
- A timer
- Which side they want to play(Black or White)

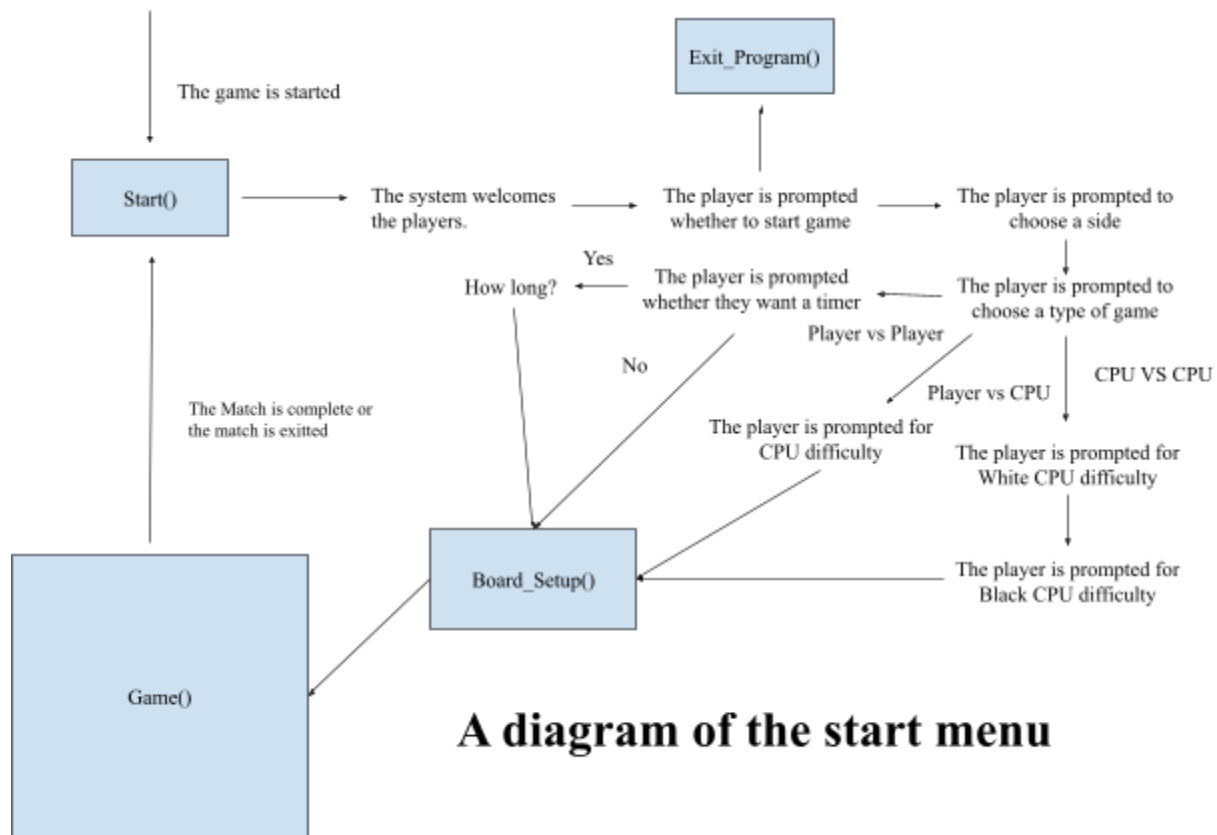
3.3 Function 3: Exit Program

Allows the user to exit the chess program, however the game information is not saved.

3.4 Function 4: Board Setup

Allows the user to choose a custom board configuration or add or remove pieces as they like.

- Chess Game Arrangement
 - Standard: normal game state
 - Random: randomizes the back ranks
 - Puzzle: creates a puzzle for the user
 - Remove N Pieces: Remove n-pieces (except King) randomly on both sides.
 - Opening: Begins the game at a predetermined state arrived through standard openings.



3.5 Function 5: Resign

Allows the user to resign the game. The option to resign can be requested anytime during gameplay. The user can request this option by inputting “RESIGN” into the prompt or clicking the resign button.

3.6 Function 6: Offer/Accept Draw

Allows the user to offer a draw to the opponent. The opponent then has the option to accept the draw. The user can request this option by inputting “DRAW” into the prompt or clicking the draw button.

3.7 Function 7: Undo

Allows the user to undo the previous move. The user can request this option by inputting “UNDO” into the prompt or clicking the undo button.

3.8 Function 8: Move and Capture

Allows the user to move the selected piece from one location to another, and capture the piece at the final position if there is one. If the position is not legal, the user will be notified. The program will accept coordinates as well as chess algebraic notation as inputs. The user will be informed whether a move will result or an opposing move has resulted in a check, checkmate, or stalemate.



3.8.1 Function 8.1: Castle

Allows the user to move the king two spaces to either the left or right, and simultaneously move the rook so that it leaps over the king to the square right next to it. The function can be performed by moving the King to the resulting position or inputting “CASTLE”. This is only allowed under the following conditions:

- The king and the rook have not moved
- There are no pieces between the king and the rook
- The king is not in check
- The spaces the king moves through are not under attack

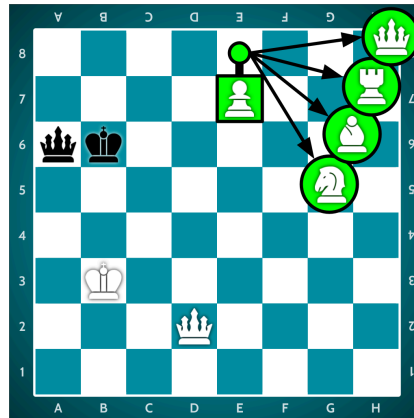
*This is a subfunction of the move function and is only available when castling is legal.



3.8.2 Function 8.2: Promote

Allows the user to promote the pawn to any piece, except for the King and Pawn, when the pawn reaches the end of the chess board. The user will be prompted to specify what piece they'd like to promote to and be given a list of pieces that they are allowed to promote to.

*This is a subfunction of the move function and is only available when promoting is legal.



3.8.3 Function 8.3: En Passant

*This is a subfunction of the move function and is only available when en passant is legal.

When a pawn is moved two spaces during its first move and ends up on the same rank as the opponent's pawn, the opponent's pawn can choose to take this pawn through en passant. The opponent's pawn will end in the position as if the pawn only moved one rank.

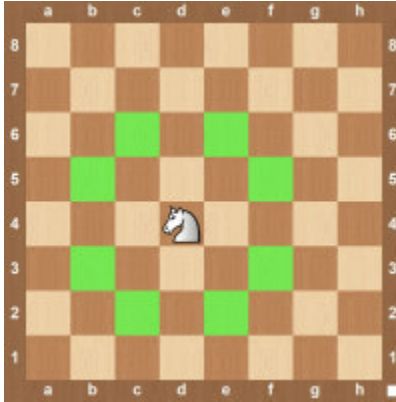


3.9 Function 9: Pause/Exit Game

Allows the user to exit the current game. The user can choose whether or not to save the game state. If the game is not saved, the user is brought back to the start settings menu. The user can request this option by inputting "PAUSE" / "EXIT" into the prompt or clicking the pause button.

3.10 Function 10: See Available Moves

Allows the user to see all available moves of the selected piece. The user can request this option by inputting “HINT” into the prompt or clicking the hint button.



3.11 Function 11: Inspect History

Allows the user to see all moves made in a chess game, up to current game state. The user can request this option by inputting “HISTORY” into the prompt or clicking the history button.

3.12 Function 12: Evaluation

Allows the user to see all the current computer evaluation of the chess board. The user can request this option by inputting “EVALUATION” into the prompt or clicking the evaluate button.

3.13 Function 13: View Rules

Gives the user the link to the [official rules](#) set by FIDE. The user can request this option by inputting “RULES” into the prompt or clicking the rules button.

3.14 Function 14: Game

Will prompt the user to make a move. The game will display the time remaining if applicable as well as the current board state. The game will also display the keywords that can be entered such as “RESIGN”, “DRAW”, “UNDO”, “CASTLE”, “PAUSE”, “EXIT”, “HISTORY”, “HINT”, “EVALUATION”, or “RULES”.

Backmatter.

Copyright.

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Error Messages.

Invalid Move Error: An illegal move was selected. Please try a different move or request a hint to list all possible legal moves for a certain piece on the board.

Invalid Input Error: The input entered was unable to be processed or was not applicable to the prompt. Please reread the prompt or enter the input in a different way.

Invalid Time Error: The time for the timer that was entered was too low or invalid. Please enter a larger amount of time.

System Setup Error: The Engine was not able to set up properly. Please refer to the Installation part of the manual to attempt to troubleshoot or Uninstall then Reinstall the program.

Save Error: The game state was not able to save properly. Please ensure there is enough memory.

Invalid Setup Error: The user attempted to add more pieces than the board could contain. Please try a different board setup.

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